Curriculum Book

and

Assessment and Evaluation Scheme

based on

Outcome Based Education (OBE)

and

Choice-Based Credit System (CBCS)

in

Bachelor of Technology

in

Civil Engineering

4 Year Degree Program

Revised as on 01 August 2023
Applicable w.e.f. Academic Session 2023-24

AKS University

Satna 485001, Madhya Pradesh, India

Faculty of Engineering and Technology
Department of Civil Engineering

FORWARDING

Dear Esteemed Readers,

It is my distinct honor to extend a warm welcome to you on behalf of the Civil Engineering Department at AKS University. As the Pro-Chancellor of this esteemed institution, I take immense pride in presenting this preface, reflecting our collective commitment to excellence, innovation, and transformative education.

The Civil Engineering Department at AKS University stands as a pillar of academic distinction, embodying a tradition of excellence that spans generations. Rooted in a steadfast dedication to advancing knowledge and fostering intellectual curiosity, our department serves as a dynamic hub for cutting-edge research, groundbreaking innovation, and unparalleled academic rigor.

Under the visionary leadership of our faculty members, who are distinguished scholars and practitioners in their respective fields, the Civil Engineering Department has consistently set new benchmarks of academic excellence and research prowess. The unwavering commitment to scholarly inquiry, coupled with the passion for teaching and mentorship, ensures that our students receive a world-class education that prepares them to excel in the ever-evolving landscape of Civil engineering.

At AKS University, we recognize the transformative power of education not only to shape individual destinies but also to catalyze societal progress and drive economic development. In this spirit, our Civil Engineering Department is deeply committed to equipping our students with the knowledge, skills, and ethical values necessary to become visionary leaders, innovative problem-solvers, and responsible global citizens.

Moreover, our department prides itself on fostering a culture of inclusivity, diversity, and collaboration, where students from diverse back grounds come together to exchange ideas, challenge assumptions, and collaborate on interdisciplinary projects that transcend traditional boundaries. Through experiential learning opportunities, industry partnerships, and community engagement initiatives, we empower our students to make meaningful contributions to society and create positive change in the world.

As we embark on this journey of discovery, innovation, and academic excellence, I am confident that the Civil Engineering Department at AKS University will continue to be a beacon of inspiration and a catalyst for positive change. Together, let us strive to push the boundaries of knowledge, unlock new frontiers of discovery, and harness the power of technology to build a brighter future for generations to come.

With warm regards,
Er. Anant Kumar Soni
Pro-Chancellor
AKS University

From the Desk of the Vice-Chancellor

The curriculum for Civil Engineering at AKS University. It is with great pleasure that we present this comprehensive guide to the study of Civil Engineering, a field that is not only at the forefront of technological advancements but also plays a pivotal role in shaping the future of our world.

Civil Engineering is a dynamic and ever-evolving discipline that encompasses the study, design and application of Civil systems. From small houses and shopping malls and offices and buildings to the enormous dams and large bridges and beyond, the scope of Civil Engineering is vast and multifaceted. It is a field that bridges theory with practical application, offering opportunities to innovate, problem-solve, and contribute to society in profound ways.

At AKS University, our Civil Engineering curriculum is designed to provide students with a solid foundation in the fundamental principles of the discipline while also fostering creativity, critical thinking, and technical expertise. Through a combination of rigorous coursework, hands-on laboratory experiences, and real-world projects, students will develop the skills and knowledge necessary to excel in the field of Civil Engineering.

This curriculum has been carefully crafted to reflect the latest advancements in the field, ensuring that our students are well prepared to tackle the challenges of tomorrow. Whether you aspire to work in renewable energy, telecommunications, robotics, or any other area within the realm of Civil Engineering, our program will equip you with the tools and resources you need to succeed.

As you embark on this educational journey, I encourage you to approach your studies with curiosity, enthusiasm, and a passion for learning. Take advantage of the opportunities available to you, seek out mentorship from faculty members and industry professionals, and never stop pushing the boundaries of what you thought possible.

On behalf of the faculty and staff of AKS University, I extend my best wishes to you as you pursue your academic and professional goals in the field of Civil Engineering. May this curriculum serve as a guiding light on your path to success.

Professor B.A. Chopade
Vice-Chancellor
AKS University

Preface

It is with great pleasure and pride that we present to you this preface for the Civil Engineering Department at AKS University. As we embark on this journey of discovery and innovation, we are reminded of our commitment to excellence, advancement, and service to society.

At AKS University, our Civil Engineering Department stands as a beacon of knowledge and innovation in the field. With a rich legacy of academic excellence, research prowess, and industry partnerships, we have consistently strived to nurture the brightest minds and push the boundaries of Civil engineering.

Our department boasts a distinguished faculty comprising seasoned academics, researchers, and industry experts who are dedicated to imparting cutting-edge knowledge and skills to our students. Through a blend of rigorous coursework, hands-on laboratory experiences, and industry internships, we ensure that our graduates are not only well-versed in theory but also equipped with the practical know-how to tackle real-world challenges.

In line with our university's ethos of holistic development, we foster a culture of innovation and entrepreneurship within our department. We encourage our students to think creatively, explore new ideas, and develop solutions that have the potential to transform the world. Through various initiatives such as hackathons, innovation challenges, and collaborative projects, we provide a platform for our students to showcase their ingenuity and make meaningful contributions to society.

Furthermore, our department is committed to staying at the forefront of research and technological advancement. From renewable energy systems and smart grids to artificial intelligence and machine learning applications in Civil engineering, our faculty members are actively engaged in cutting-edge research that addresses the pressing needs of our time.

As we look towards the future, we remain steadfast in our commitment to nurturing the next generation of Civil engineers who will lead with integrity, innovation, and a sense of purpose. We invite you to join us on this exciting journey as we strive to make a positive impact on the world through the power of Civil engineering.

Sincerely,
Er. Vishutosh Bajpai
Head
Civil Engineering Department
AKS University

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Dean
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AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

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INTRODUCTION:

Welcome to the Department of Civil Engineering at AKS University, Satna, where we lay the foundation for the future of infrastructure, innovation, and sustainable development. Our department is a hub of academic excellence, cutting-edge research, and practical application, dedicated to training the next generation of engineers who will design and build the structures that support society.

At the Department of Civil Engineering, we offer a comprehensive curriculum that blends theoretical knowledge with hands-on experience. Our faculty comprises leading experts in the field, who bring both academic rigor and industry experience to the classroom. Whether you are interested in structural engineering, transportation, environmental systems, or geotechnical engineering, our programs are designed to equip you with the skills and knowledge necessary to tackle the complex challenges of the modern world.

We are committed to fostering an environment of innovation and discovery. Our state-of-the-art laboratories and research facilities provide students and faculty with the tools to explore new ideas, from sustainable construction practices to advanced materials and smart city technologies. Collaboration with industry partners ensures that our research has real-world impact, and our strong focus on sustainability prepares our graduates to lead in an era of global environmental responsibility.

Join us at AKS University's Department of Civil Engineering, where your education will be the blueprint for a successful and impactful career. Here, we not only build infrastructure but also build leaders who will shape the future.

VISION:

Our vision is to be a globally recognized leader in civil engineering education, research, and innovation, fostering a sustainable and resilient built environment. We aim to cultivate a diverse community of future leaders, equipped with cutting-edge knowledge, practical skills, and a commitment to ethical and sustainable practices. By embracing interdisciplinary collaboration and leveraging emerging technologies, we strive to address the complex challenges of the 21st century, driving positive societal impact and enhancing the quality of life for all.

We envision a department where students, faculty, and industry partners work together in a dynamic, inclusive, and innovative environment, advancing the frontiers of civil engineering to create safer, smarter, and more sustainable infrastructure. Through our dedication to excellence in education, research, and community engagement, we seek to inspire the next generation of civil engineers to lead with integrity, creativity, and a deep sense of responsibility towards the environment and society.

MISSION:

M-01: Educating Future Engineers: To provide high-quality education and training to students, equipping them with the knowledge, skills, and ethical foundations necessary to excel as innovative and responsible civil engineers in a global society.

M-02: Advancing Research and Innovation: To engage in cutting-edge research that addresses the challenges of civil infrastructure, environmental sustainability, and community resilience, fostering innovation and contributing to the advancement of the civil engineering field

M-03: Community and Industry Collaboration: To establish strong partnerships with industry, government, and local communities, ensuring that the department's work is relevant, impactful, and aligned with the evolving needs of society, while providing students with real-world experience and professional opportunities.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO01: Have successful career in the diversified sectors of the engineering Industry and/ or higher studies by acquiring knowledge in mathematical, scientific and engineering fundamentals.

PEO02: Analyze and design Civil engineering systems with social awareness and responsibility.

POE03: Exhibit professionalism, ethical approach, communication skills, team work in their profession and adapt to modern trends by engaging in lifelong learning.

PEO04: Ability to understand the impact of professional engineering solutions in societal, economic and environmental contexts and demonstrate knowledge and need for sustainable development.

PROGRAM OUTCOMES (POs)

A Civil Engineering Graduate will able to perform:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and reactive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage Project and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

On completion of B.Tech. Civil Engineering program, the students will achieve the following program specific outcomes: -

PSO1: Survey, map, plan and mark layouts for buildings and other Structures.

PSO2: Specify, analyze, design, test and assess different Structures with quality and safety aspect.

PSO3: Plan, analyze, and design water resource systems with effectiveness and sustainable environmental considerations.

PSO4: Graduates shall have the ability to apply knowledge of science, mathematics and engineering using modern tools for higher studies, research and employability and to solve the societal and environmental problems.

Consistency/Mapping of PEOs with Mission of the Department

PEO	M-01	M-02	M-03
PEO1	3	2	3
PEO2	2	2	2
PEO3	2	3	2
PE04	2	2	3

1*: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) "-": No correlation*

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GENERAL COURSE STRUCTURE & THEME

1. Definition of Credit

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

2. Range of Credits:

In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, the total number of credits proposed for the four-year B. Tech. Civil Engineering is kept as 168 considering NEP-20 and NAAC guidelines.

3. Structure of UG Program in Civil Engineering:

The Structure of UG program in Civil Engineering shall have essentially the following categories of courses with the breakup of credits as given:

COMPONENTS OF THE CURRICULUM

(Program curriculum grouping based on course components)

Sl No	Course Component	% of total number of credits of the Program	Total number of Credits
1.	Basic Science (BSC)	14.29	24
2.	Engineering Science (ESC)	17.26	29
3.	Humanities and Social Science (HMSC)	7.14	12
4.	Professional Core (PCC)	35.12	59
5.	Professional Electives (PEC)	5.36	09
6.	Open Electives (OEC)	5.36	09
7.	Project(s) (PRC)/ On job Plant Training (OJT)	11.31	19
8.	Seminar (PSC)	1.79	03
9.	Indian Knowledge System	1.19	02
10.	Sustainable Development Goal	1.19	02
Total		**100**	**168**

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GENERAL COURSE STRUCTURE AND CREDIT DISTRIBUTION

Scheme of B.Tech. Civil Engineering

SEMESTER-I		SEMESTER-II	
Course Title	**Credit**	**Course Title**	**Credit**
1. Physics-1	3:1:2=5	1. Indian Knowledge System	2:0:0=2
2. Mathematics-1	3:1:0=4	2. Chemistry-1	3:0:2=4
3. Biology for Engineers	3:0:0=3	3. Mathematics-II	3:1:0=4
4. Basic Electrical Engineering	2:1:2=4	4. Programming for Problem Solving	3:0:4=5
5. Engineering Graphics & Design	1:0:4=3	5. Manufacturing Practice Workshop	1:0:4=3
6. Design Thinking & Ideal Lab	0:0:2=1	6. Communication Skills (English)	3:0:0=3
7. Basic Civil Engineering	3:0:0=3	7. Sports and Yoga or NSS/NCC	2:0:0=0
8. Sustainable Development Goals	2:0:0=2		
Total Credit	**25**	**Total Credit**	**21**

SEMESTER-III		SEMESTER-IV	
Course Title	**Credit**	**Course Title**	**Credit**
1. Surveying	3:0:2=4	1. Construction Technology	3:0:2=4
2. Mathematics-III	3:1:0=4	2. Theory of Structures	3:1:0=4
3. Environment Science (Audit)	2:0:0=0	3. Transportation-I	3:0:2=4
4. Basic Electronics Engineering	3:1:2=5	4. Geo-Technical Engineering	3:1:2=5
5. Engineering Mechanics	3:1:2=5	5. Fluid Mechanics-II	3:0:0=3
6. Fluid Mechanics-I	3:1:2=5	6. Project Management / Finance & Accounting	3:0:0:3
7. Universal Human Values	2:1:0=3		
Total Credit	**26**	**Total Credit**	**23**

SEMESTER-V		SEMESTER-VI	
Course Title	**Credit**	**Course Title**	**Credit**
1. Design of Concrete Structures	3:0:0=3	1. Transportation-II	3:0:2=4
2. Construction Material	3:0:2=4	2. Environmental Engineering-II	3:0:0=3
3. Strength of Materials	3:0:2=4	3. Advance Surveying	3:0:2=4
4. Building Material-Lab	0:0:2=1	4. Design of Advanced Concrete Structures	3:0:0=3
5. Industrial Psychology/ Operations Research	3:0:0:3	5. Open Elective-2	3:0:0=3
6. Open Elective-1	3:0:0=3	6. EngineeringProject-1	0:0:2=2
7. Environmental Engineering-I	3:0:2=4		
Total Credit	**22**	**Total Credit**	**19**

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Semester –VII		Semester – VIII	
Course Title	**Credit**	**Course Title**	**Credit**
1. Departmental Elective -1	1:0:2=3	1. Engineering Project 3(Prototype & Testing) / On job plant training	0:0:24=12
2. Departmental Elective -2	3:0:0=3		
3. Departmental Elective -3	3:0:0=3		
4. Engineering Project-2 (Design &Analysis)	0:0:10=5		
5. Open Elective-3	3:0:0=3		
6. Seminar	0:0:6=3		
Total Credit	**20**	**Total Credit**	**12**

i. **Humanities & Social Sciences & Mgt. Electives (HSM):** Any 2 courses from the list of those offered.

ii. **Open Electives (OEL**): Any 3 courses (from any department), based on individual interest and Project.

iii. **Industry internship**: Internship in industry, start-up or R&D lab in 2nd/3rd year summer is compulsory (audit). Longer internship for 6-monthy (12 credits) can be taken in 8th semester, in lieu of Engineering Project. The internship must be properly evaluated.

Total Credit: 168

Course code and definition:

L = Lecture
T = Tutorial
P = Practical
C = Credit
BSC = Basic Science Courses
ESC = Engineering Science Courses
HSMC = Humanities and Social Science including Management courses
PCC = Professional core courses
PEC = Professional Elective courses
OEC = Open Elective courses
LC = Laboratory course
MC = Mandatory courses
IKS = Indian Knowledge System
SDGs = Sustainable Development Goals

Course level coding scheme:

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course. Digit at hundred's place signifies the year in which course is offered. e.g.
101, 102 … etc. for first year.
201, 202 …. Etc. for second year.
301, 302 … for third year.
401. 402--- for Fourth year.

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CATEGORY-WISE COURSES

HUMANITIES & SOCIAL SCIENCE COURSES [HS] & MANAGEMENT COURSES (2 compulsory + 2 others)

Sl.	Code No.	Subject	Semester	Credits
1.	HSMC 01	Communication Skills/English	2	2:0:2=3
2.	HSMC 301	Universal Human Values	2	2:1:0=3
3.	HSMC 03	Industrial Psychology	5 / 6	3:0:0=3
4.	HSMC 04	Operations Research	5 / 6	3:0:0=3
5.	HSMC 05	Project Management	3 / 4	3:0:0=3
6.	HSMC 06	Finance Accounting	3 / 4	3:0:0=3
7.	HSMC 09	Sports and Yoga	2	2:0:0=0
			Total Credits:	**12**

BASIC SCIENCE COURSES [BSC] (TOTAL 7)

Sl.	Code No.	Subject	Semester	Credits
1.	BSC 101	Physics-I	1	3:1:2=5
2.	BSC 102	Mathematics-I	1	3:1:0=4
3.	BSC 103	Chemistry-I	2	3:0:2=4
4.	BSC 104	Mathematics-II	2	3:1:0=4
5.	BSC 201	Mathematics-III	3	3:1:0=4
6.	BSC 105	Biology for Engineers	1	3:0:0=3
7.	BSC 106 AU	Environment Science (Audit)	3	2:0:0=0
			Total Credits:	**24**

ENGINEERINGSCIENCTCOURSE[ESC](Total8)

Sl.	Code No.	Subject	Semester	Credits
1.	ESC 101	Basic Electrical Engineering	1	2:1:2=4
2.	ESC 102	Engineering Graphics Design	1	1:0:4=3
3.	ESC 103-L	Design Thinking +Idea Lab (Audit)	1	0:0:2=1
4.	ESC 104	Programming for Problem Solving	2	3:0:4=5
5.	ESC 105	Manufacturing Practice Workshop	2	1:0:4=3
6.	ESC 201/ESC 201-L	Basic Electronics Engineering	3	3:1:2=5
7.	ESC 202	Engineering Mechanics	3	3:1:2=5
8.	ESC 106	Basic Civil Engineering	1	3:0:0=3
			Total Credits:	**29**

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PROFESSIONAL CORE COURSES [PCC] (Total 16)

Sl.	Code No.	Subject	Semester	Credits
1.	PCC CE 02	Surveying-I	3	3:0:2=4
2.	PCC CE 03	Fluid Mechanics	3	3:1:2=5
3.	PCC CE 04	Construction Technology	4	3:0:2=4
4.	PCC CE 05	Theory of Structures	4	3:1:0=4
5.	PCC CE 06	Transportation-1	4	3:0:2=4
6.	PCC CE 07	Geo-Technical Engineering	5	3:1:2=5
7.	PCC CE 08	Transportation -II	5	3:0:2=4
8.	PCC CE 09	Construction Materials	5	3:0:2=4
9.	PCC CE 10	Strength of Materials	5	3:0:2=4
10.	PCC CE 11-L	Building Material-Lab	5	0:0:2=1
11.	PCC CE 12	Design of Concrete Structures	6	3:0:0=3
12.	PCC CE 13	Fluid Mechanics-II	3	3:0:0=3
13.	PCC CE 14	Environmental Engineering-I	5	3:0:2=4
14.	PCC CE 15	Environmental Engineering-II	6	3:0:0=3
15.	PCC-CE 16	Advance Surveying	6	3:0:2=4
16.	PCC-CE 17	Design of Advanced Concrete Structures	6	3:0:0=3
			Total Credits:	**59**

PROFESSIONAL ELECTIVE [PEC]

Total 3 to be taken, at least one from each group – Technology and Industry Sector, based on Project topic and individual interest. Illustrative courses are listed here

Sl.	Code No.	Subject	Semester	Credits
		TECHNOLOGYGROUP		
1.	PEC CE 01	Quantity, Survey and Costing	5	3:0:0=3
2.	PEC CE 02	Water Resource Engineering	6	3:0:0=3
3.	PEC CE 03	CAD Lab	7	1:0:2=3
		INDUSTRYSECTORGROUP		
1.	PEC-CT04	Building Planning & Management	7	3:0:0=3
2.	PEC-CT05	Construction Planning and Management	7	3:0:0=3
			Total Credit	**09**

OPEN ELECTIVE

(Total 3 from the Open Elective Subjects)

Sl.	Code No.	Subject	Semester	Credits
		TECHNOLOGYGROUP		
1.	OEC CE 01	Geology& Remote Sensing	5	2:0:2=3
2.	OEC CE 02	Artificial Intelligence	6	3:0:0=3
3.	OEC CE 03	Design of Steel Structures	7	3:0:0=3
4.	OEC CE 04	Foundation Engineering	7	3:0:0=3
			Total Credit	**09**

ENGINEERING PROJECT (3 Stages)

Sl.	Code No.	Subject	Semester	Credits
1.	PROJ CE 01	Engineering Project-1 (Literature Review)	6	0:0:2=02
2.	PROJ CE 02	Engineering Project-2 (Design & Analysis)	7	0:0:10=5
3.	SEM CE 03	Seminar	7	0:0:2=03
4.	PROJ/ OJT CE 04	Engineering Project-3 (Prototype & Testing)/ On job plant Training	8	0:0:24=12
			Total Credit	**22**

OTHER

Sl.	Code No.	Subject	Semester	Credits
1.	HSMC 08	Sustainable Development Goals	1	2:0:0 =2
2.	HSMC 07	Indian Knowledge System	2	2:0:0= 2
			Total Credit	**04**

Induction Program

Induction program for students to be offered right at the start of the first year. It is mandatory. AKS University has designed an induction program for 1st year students, details are below:

i. Physical activity
ii. Creative Arts
iii. Universal Human Values
iv. Literary
v. Proficiency Modules
vi. Lecture by Eminent People
vii. Visits to local Areas
viii. Familiarization to Dept./Branch & Innovations

Mandatory Visits/ Workshop/Expert Lecture:

i. It is mandatory to arrange one industrial visit every semester for the students.
ii. It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.
iii. It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from industry.

Evaluation Scheme:

1. For Theory Courses:

i. The weight age of Internal assessment is 50% and
ii. End Semester Exam is 50%

The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

2. For Practical Courses:

i. The weight age of Internal assessment is 50% and
ii. End Semester Exam is 50%

The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

3. **For Summer Internship / Project / Seminar etc.**
   Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

SEMESTER WISE COURSE STRUCTURE

Semester wise Brief of total Credits and Teaching Hours

Semester	L	T	P	Total Hours	Total Credit
Semester –I	17	03	10	30	25
Semester –II	19	02	10	31	21
Semester –III	19	05	08	32	26
Semester – IV	18	02	06	26	23
Semester –V	18	00	08	26	22
Semester –VI	15	00	06	21	19
Semester – VII	12	00	16	28	20
Semester -VIII	0	0	24	24	12
Total	**118**	**12**	**88**	**218**	**169**

DETAILS OF SEMESTER WISE COURSE STRUCTURE

SEMESTER – I

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**BSC**	**BSC 101**	Physics-1	3	1	0	4	4
2.	**BSC**	**BSC 102**	Mathematics-1	3	1	0	4	4
3.	**BSC**	**BSC 105**	Biology for Engineers	3	0	0	3	3
4.	**ESC**	**ESC 101**	Basic Electrical Engineering	2	1	0	3	3
5.	**ESC**	**ESC 102**	Engineering Graphics &Design	1	0	0	1	1
6.	**ESC**	**ESC 103-L**	Design Thinking &Idea Lab	0	0	2	2	1
7.	**ESC**	**ESC 101-L**	Physics-I Lab	0	0	2	2	1
8.	**ESC**	**ESC 101-L**	Basic Electrical Engineering Lab	0	0	2	2	1
9.	**ESC**	**ESC 106**	Basic Civil Engineering	3	0	0	3	3
10.	**ESC**	**ESC 102-L**	Engineering Graphics &Design Lab	0	0	4	4	2
11.	**HSMC**	**HSMC 08**	Sustainable Development Goals	2	0	0	2	2
Total				**17**	**3**	**10**	**30**	**25**

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SEMESTER – II

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**BSC**	**BSC 103**	Chemistry-1	3	0	0	3	3
2.	**BSC**	**BSC 104**	Mathematics-II	3	1	0	4	4
3.	**ESC**	**ESC 104**	Programming for Problem Solving	3	0	0	3	3
4.	**ESC**	**ESC 105**	Manufacturing Practice Workshop	1	0	0	0	1
5.	**HSMC**	**HSMC 01**	Communication Skills (English)	3	0	0	3	3
6.	**HSMC**	**HSMC 07**	Indian Knowledge System	2	0	0	2	2
7.	**HSMC**	**HSMC 09**	Sports and Yoga or NSS/NCC	2	0	0	2	0
8.	**BSC**	**BSC 103-L**	Chemistry-I Lab	0	0	2	2	1
9.	**ESC**	**ESC 104-L**	Programming for Problem Solving Lab	0	0	4	4	2
10.	**ESC**	**ESC 105-L**	Manufacturing Practice Workshop Lab	0	0	4	4	2
Total				**19**	**2**	**10**	**31**	**21**

SEMESTER – III

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PCC**	**PCC CE 02**	Surveying	3	0	0	3	3
2.	**BSC**	**BSC 201**	Mathematics-III	3	1	0	4	4
3.	**BSC**	**BSC 106 AU**	Environment Science (Audit)	2	0	0	2	0
4.	**ESC**	**ESC 201**	Basic Electronics Engineering	3	1	0	4	4
5.	**HSMC**	**HSMC 301**	Universal Human Values	2	1	0	3	3
6.	**ESC**	**ESC 202**	Engineering Mechanics	3	1	0	4	4
7.	**PCC**	**PCC CE 03**	Fluid Mechanics-I	3	1	0	4	4
8.	**PCC**	**PCC CE 03-L**	Fluid Mechanics-I Lab	0	0	2	2	1
9.	**PCC**	**PCC CE 02-L**	Surveying Lab	0	0	2	2	1
10.	**ESC**	**ESC 202-L**	Engineering Mechanics Lab	0	0	2	2	1
11.	**BSC**	**BSC 201-L**	Basic Electronics Engineering lab	0	0	2	2	1
Total				**19**	**5**	**8**	**32**	**26**

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SEMESTER – IV

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PCC**	**PCC CE 04**	Construction Technology	3	0	0	3	3
2.	**PCC**	**PCC CE 05**	Theory of Structures	3	1	0	4	4
3.	**PCC**	**PCC CE 06**	Transportation-I	3	0	0	3	3
4.	**PCC**	**PCC CE 07**	Geo-Technical Engineering	3	1	0	4	4
5.	**PCC**	**PCC CE 13**	Fluid Mechanics-II	3	0	0	3	3
6.	**PCC**	**PCC CE 04-L**	Construction Technology Lab	0	0	2	2	1
7.	**PCC**	**PCC CE 06-L**	Transportation-I Lab	0	0	2	2	1
8.	**PCC**	**PCC CE 07-L**	Geo-Technical Engineering Lab	0	0	2	2	1
9.	**HSMC**	**HSMC 05**	Project Management/Finance and Accounting	3	0	0	3	3
Total				**18**	**2**	**6**	**26**	**23**

SEMESTER – V

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PCC**	**PCC CE 12**	Design of Concrete Structures	3	0	0	3	3
2.	**PCC**	**PCC CE 09**	Construction Material	3	0	0	3	3
3.	**PCC**	**PCC CE 10**	Strength of Materials	3	0	0	3	3
4.	**PCC**	**PCC CE 11-L**	Building Material Lab	0	0	2	2	1
5.	**HSMC**	**HSMC 03/ HSMC 04**	Industrial Psychology/Operations Research	3	0	0	3	3
6.	**OEC**	**OEC CE ****	Open Elective-I	3	0	0	3	3
7.	**PCC**	**PCC CE 14**	Environmental Engineering-I	3	0	0	3	3
8.	**PCC**	**PCC CE 09-L**	Construction Material Lab	0	0	2	2	1
9.	**PCC**	**PCC CE 10-L**	Strength of Materials Lab	0	0	2	2	1
10.	**PCC**	**PCC CE 14-L**	Environmental Engineering-I Lab	0	0	2	2	1
Total				**18**	**0**	**8**	**26**	**22**

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SEMESTER – VI

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PCC**	**PCC CE 08**	Transportation-II	3	0	0	3	3
2.	**PCC**	**PCC CE 15**	Environmental Engineering-II	3	0	0	3	3
3.	**PCC**	**PCC CE 16**	Advanced Surveying	3	0	0	3	3
4.	**PCC**	**PCC CE 17**	Design of Advanced Concrete Structures	3	0	0	3	3
5.	**OEC**	**OEC CE ****	Open Elective-II	3	0	0	3	3
6.	**PROJ**	**PROJ CE 01**	Engineering Project-I	0	0	2	2	2
7.	**PCC**	**PCC CE 16-L**	Advanced Surveying Lab	0	0	2	2	1
8.	**PCC**	**PCC CE 08-L**	Transportation-II Lab	0	0	2	2	1
Total				**15**	**0**	**6**	**21**	**19**

Semester VII

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PEC**	**PEC CE ****	Departmental Elective-I	3	0	0	3	3
2.	**PEC**	**PEC CE ****	Departmental Elective-II	3	0	0	3	3
3.	**PEC**	**PEC CE ****	Departmental Elective-III	3	0	0	3	3
4.	**PROJ**	**PROJ CE 02**	Engineering Project-II (Design & Analysis)	0	0	10	10	5
5.	**OEC**	**OEC CE ****	Open Elective-III	3	0	0	3	3
6.	**PROJ**	**SEM CE 03**	Seminar	0	0	6	6	3
Total				**12**	**0**	**16**	**28**	**20**

Semester VIII

SN	Category	Code	Course Title	L	T	P	Total Hour	Credit
1.	**PROJ/ OJT**	**PROJ/OJT CE 04**	EngineeringProject-3(Prototype &Testing) / On job plant training	0	0	24	24	12
Total				**0**	**0**	**24**	**24**	**12**

Total credit: 168

Semester-I

Course Code: **BSC 101**
Course Title: **Physics-I**
Pre-requisite: Students should review the fundamentals of Electrostatics Magneto statics. Wave optics, and Modern physics
Rationale: The program aims to develop advanced problem-solving and analytical skills and prepares students for careers in academia, research, industry, or other sectors that require advanced physics expertise.

Course Outcomes:

BSC 101.1: Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems and to relate to applications to electron optic device and CRO.

BSC 101.2: Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications.

BSC 101.3: Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.

BSC 101.4: Recall the basic concepts of crystal structure and apply them in solving numerical problems based on them in relating to applications for determination of crystal structure.

BSC 101.5: Relate the basic idea of total internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications in engineering.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 101	Physics-I	4	2	1	1	8	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
BSC	BSC 101	Physics-I	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
BSC	BSC 101-L	Physics-I	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course

progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 101.1: Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**06**
SW	**01**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the concept of Electric charge electric field intensities. SO1.2 Understand the electrostatic potential, Calculation of electric field and electrostatic potential for a charge distribution SO1.3 Understand the Dielectrics, Dielectric substance in an electric field SO1.4 Understand Biot Savart law & its application SO1.5 Understand the magnetic materials.	1. Measuring the magnetic field for a straight conductor and on circular conductor loops 2. Measuring the magnetic field for a straight conductor and on circular conductor loops at small currents 3. Measuring the magnetic field for a straight conductor and on Straight Wire	**Unit-1.0** 1.1 Electric charge electric field intensities 1.2 electrostatic potential, Calculation of electric field and electrostatic potential for a charge distribution 1.3 Introduction to. Quantization & conservation of charge 1.4 Coulomb's law, vector form of Coulomb's law 1.5 superposition principle, charge densities, electric field 1.6 Dielectrics, Dielectric substance in an electric field, 1.7 V-I phase dependence for ideal & real dielectrics 1.8 Biot Savart law & its application 1.9 current carrying conductor moving charge in a magnetic field 1.10 comparison of electric field and magnetic field 1.11 magnetic induction and intensity, magnetization 1.12 classification of magnetic materials.	SL.1 Define Electric charge electric field intensities SL.2 Define Quantization & conservation of charge

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Analyze and sketch the graph of a V-I phase dependence for ideal & real dielectrics
ii. Calculation of electric field and electrostatic potential for a charge distribution
iii. Apply Biot Savart law in different problems.

b. Mini Project:

I Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test.

BSC 101.2: Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**06**
SW	**01**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Define and understand the basic concepts of coherent sources, etc **SO2.2** Define and understand the basic concepts of Interference of light. **SO2.3** Understand the Michelson's Interferometer, experiments and their applications **SO2.4** Define and understand the basic concepts of diffraction of light. **SO2.5** Understand dispersive power of grating	1. To determine the Refractive Index of Prism by using spectrometer. 2.To determine the wavelength of sodium light by using Newton's Ring apparatus 3. to determine the wavelength of prominent lines of mercury by plane transmission diffraction grating	**Unit-2.0** 2.1 coherent sources, principle of superposition 2.2 Interference: -, definition and types of interference 2.3 Interference from parallel thin films 2.4 wedge shaped films 2.5 Newton's rings 2.6 Michelson's Interferometer, experiments and their applications 2.7 Michelson's Interferometer, experiments and their applications 2.8 Diffraction: - Fresnel diffraction 2.9 Fraunhofer diffraction from a single slit diffraction	1. Define coherent sources, principle of superposition. 2 Define Fresnel diffraction, Fraunhofer diffraction from a single slit diffraction.

and,resolving power of grating.		2.10 double slit diffraction 2.11 N-Slit Diffraction grating 2.12 dispersive power of grating and,resolving power of grating.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Write the application of Interference of light in daily life.
ii. Write the application of diffraction of light in daily life.
iii. Write a short note on Newton's rings with example.
iv. Describe the method of calculation of Michelson's Interferometer with example

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test

BSC 101.3: Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**06**
SW	**01**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Define Quantum mechanics. **SO3.2** Understand the Wave particle duality **SO3.3** Explain operators in quantum mechanics. **SO3.4** Understand Uncertainty principle with elementary proof and applications **SO3.5** To Understand Time	1. To determine Planck's Constant and work function using photo electric effect. 2. Davisson–Germer experiment - this showed the existence of	**Unit-3.0** 3.1 Introduction to Quantum mechanics 3.2 Wave particle duality 3.3 de-Broglie's concept of matter waves 3.4 Free-particle wave function and wave-packets 3.5 Phase & Group velocities and their relationship 3.6 Compton Effect	1 Define Wave particle duality. 2 Define operators in quantum mechanics.

dependent and time independent Schrodinger equation for wave function.	electron matter waves and that they would be diffracted by a crystal 3. Compton effect - evidence for particle nature of light	3.7 Uncertainty principle with elementary proof and applications 3.8 Uncertainty principle with elementary proof and applications 3.9 operators 3.10 Time-dependent and time independent Schrodinger equation for wave function. 3.11 Time-dependent Schrodinger equation for wave function. 3.12time independent Schrodinger equation for wave function	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Write the Application of Uncertainty principle with elementary proof in real life.

ii. Explain the difference between Time-dependent and time independent Schrodinger equation for wave function.

iii. Write the properties of wave-packets.

iv. Define Phase & Group velocities.

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test

BSC 101.4: Understand Recall the basic concepts of crystal structure and apply them in solving numerical problems based on them in relating to applications for determination of crystal structure.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**06**
SW	**01**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO4.1 Understand the Free electron theory of metals **SO4.2** Understand the Fermi level of Intrinsic and extrinsic **SO4.3** Understand the Kronig Penney model and origin of energy bands. **SO4.4** Understand the intrinsic & extrinsic semiconductor **SO4.5** Understand the tunnel diode, and its applications	1.To draw the characteristics curve of p-n junction. 2.To draw the characteristics curve of zener diode 3.Study the temperature dependence of resistivity of a semiconductor (Four probe method) and to determine band gap of experimental material (Ge).	Unit-4.0 4.1 Free electron theory of metals 4.2 Fermi level of Intrinsic and extrinsic 4.3 Kronig-Penney model (no derivation) and origin of energy bands. 4.4 classification of conductors, semiconductors and insulators on the basis of energy band theory 4.5 classification of conductors, semiconductors and insulators on the basis of energy band theory 4.6 semiconductors and it's classification 4.7 semiconductors and it's classification 4.8 intrinsic & extrinsic semiconductor 4.9 P-N junction 4.10 Zener diode 4.11 tunnel diode, and it's applications 4.12 Hall effect	1. Define Free electron theory of metals 2.Define semiconductors and it's classification.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Explain Kronig-Penney model and origin of energy bands.
2. Explain Free electron theory of metals.
3. Explain Hall effect with example.

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test

BSC 101.5: Relate the basic idea of total internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications in engineering.

Approximate Hours

Item	Approx. Hours

CI	**12**
LI	**06**
SW	**01**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understand and state the Fundamental properties of laser beam **SO5.2** Understand and state the Einstein's theory of matter radiation interaction and A and B coefficients **SO5.3** Understand the different types of lasers **SO5.4** Understand Solid-State laser (Ruby & NdYAG) **SO5.5** Understand applications of lasers in science, engineering and medicine.	1.To study the intensity distribution due to diffraction from single slit and to determine the slit width. 2.Study the characteristics of led and laser sources. 3.Energy gap of a material of p-n junction	**Unit-5.0** 5.1 Absorption 5.2 Stimulated and Spontaneous emission 5.3 coherence, pumping, population Inversion 5.4 Principle & properties of laser beam 5.5 Einstein's theory of matter radiation interaction and A and B coefficients 5.6 different types of lasers: gas laser (He-Ne), 5.7 different types of lasers: gas laser (He-Ne), 5.8 Solid-State laser (Ruby & Nd-YAG) 5.9 solid-state laser (Ruby & Nd-YAG) 5.10 applications of lasers in science, engineering and medicine. 5.11 applications of lasers in science 5.12 applications of lasers in engineering and medicine.	1. Define Absorption, Stimulated and Spontaneous emission, coherence, pumping, population Inversion. 2. Define Principle & properties of laser beam

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i. Write the Principle & properties of laser beam.

ii. Write the applications of lasers in science, engineering and medicine.

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 101.1 Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems and to relate to applications to electron optic device and CRO.	12	6	1	2	21
BSC 101.2: Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications	12	6	1	2	21
BSC 101.3: Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.	12	6	1	2	21
BSC 101.4: Recall the basic concepts of crystal structure and apply them in solving numerical problems based on them in relating to applications for determination of crystal structure.	12	6	1	2	21
BSC 101.5: Relate the basic idea of total internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications in engineering	12	6	1	2	21
Total Hours	60	30	5	10	105

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 101.1	Electrostatics & Magnetostatics	02	04	05	11
BSC 101.2	Wave optics	03	07	04	14
BSC 101.3	Quantum mechanics	02	06	02	10
BSC 101.4	Introduction to solids & semiconductors	03	03	02	08
BSC 101.5	Lasers	03	02	02	07
	Total	13	22	15	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to scientific museums
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	AICTE's Prescribed Textbook: Physics (Introduction to Electromagnetic Theory) with Lab Manual	Bhattacharya & Nag, Engineering Physics	Khanna Book Publishing Company.	2nd Edition 2021
2.	Introduction to Electrodynamics	David Griffiths	Tata McGraw Hill	11th Reprint, 2010.
3.	Physics	Halliday and Resnick	Tata McGraw Hill	10th Edition 2018
4.	Electricity, magnetism and light	W. Saslow	Academic Press	1st Edition 2002
5.	Engineering Physics	Malik, Singh	Tata McGraw Hill	10th Edition 2020

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 101
Course Title: Physics-I

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 101.1 Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems and to relate to	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

applications to electron optic device and CRO.																
BSC 101.2: Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
BSC 101.3: Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 101.4: Recall the basic concepts of crystal structure and apply them in solving numerical problems based on them in relating to applications for determination of crystal structure.	2	1	2	3	2	3	2	3	2	3	2	2	1	2	3	2
BSC 101.5: Relate the basic idea of total	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications in engineering																

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**BSC 101.1** Find how to extend the basic concepts of motion of charged particles in electric magnetic fields to solve numerical problems and to relate to applications to	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

	electron optic device and CRO.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**BSC 101.2:** Apply concepts in interference and diffraction to solve relevant numerical problems and to relate to relevant engineering applications	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**BSC 101.3:** Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**BSC 101.4**: Recall the basic concepts of crystal structure and apply them in solving numerical problems based	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	on them in relating to applications for determination of crystal structure.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**BSC 101.5:** Relate the basic idea of total internal reflection to the propagation of light in an optical fiber and make use of the fiber concepts to solve numerical problems and relate to applications in engineering	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

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Semester-I

Course Code: **BSC 102**
Course Title: **Engineering Mathematics –I**
Pre-requisite: Students should review the fundamentals of calculus and basic knowing of differential and integration. Rationale:
Rationale: The program aims to develop advanced problem-solving and analytical skills and prepares students for careers in academia, research, industry, or other sectors that require advanced mathematical expertise.

Course Outcomes:

BSC 102.1: Define and understand the concept of limits, evaluate limits algebraically and graphically, Apply the basic rules of differentiation, including the power rule, product rule, quotient rule, and chain rule. Use linear approximation and differentials to estimate values of functions

BSC 102.2: Define and understand the basic concepts of matrices, differentiate between different types of matrices Perform basic matrix operations, use matrices to represent and solve systems of linear equations. Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics.

BSC 102.3: Define and compute partial derivatives of functions of several variables, Define and compute the gradient vector of a scalar function, Apply the chain rule to compute derivatives of composite functions involving multiple variables, Identify critical points of multivariable functions.

BSC 102.4: Understand the definition of a first-order ordinary differential equation, solve separable differential equations using the separation of variables technique, Sketch direction fields to visualize the behaviour of solutions, Apply first-order ODEs to model and analyse various phenomena.

BSC 102.5: Understand and state the Fundamental Theorem of Calculus, both parts and apply the Fundamental Theorem to evaluate definite integrals. Apply integration techniques, including substitution, integration by parts, and partial fractions.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course (BSC)	BSC 102	Engineering Mathematics -I	4	0	1	1	6	4

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
Basic Science Course	BSC 102	Engineering Mathematics -I	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 102.1: Define and understand the concept of limits, evaluate limits algebraically and graphically, Apply the basic rules of differentiation, including the power rule, product rule, quotient rule, and chain rule. Use linear approximation and differentials to estimate values of functions.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1Understand the concept of local and global extrema. **SO1.2**Understand the geometric interpretation of the derivative as the slope of a tangent line **SO1.3** Apply implicit differentiation to find derivatives of implicitly defined functions **So1.4** Understand the hypothesis of L' Hospital's rule **So1.5** Understand the concept of curvature.		**Unit-1. Define and understand the concept of limits.** 1.1. Rolle's Theorem, 1.2. Mean value theorems 1.3. applications, extreme values of functions 1.4. linear approximation, Indeterminate forms 1.5.L' Hospital's rule 1.6 Tutorial-1 1.7. curvature, 1.8. Radius of curvature 1.9evolutes and involutes 1.10Expansion of functions by Maclaurin's series 1.11Expansion of functions by Taylor's series for one variable 1.12 Tutorial- 2	**SL.1** Define the derivative of a function at a point using the limit definition.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Analyse and sketch the graph of a function using information from its derivative.

ii. Identify critical points, inflection points, and concavity.

iii. Apply Hospital's Rule to find limits involving indeterminate forms

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):
Quiz, Class Test.

BSC 102.2: Define and understand the basic concepts of matrices, differentiate between different types of matrices Perform basic matrix operations, use matrices to represent and solve systems of linear equations. Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1Define and understand the basic concepts of matrices, determinant, etc **SO2.2** Perform basic matrix operations, including addition, subtraction, and scalar multiplication **SO2.3** Understand the connection between matrix equations and systems of linear equations **SO2.4** Define and compute the determinant of a matrix **SO2.5** Understand numerical techniques		**Unit-2.0 Define and understand the basic concepts of matrices** 2.1. Rank of a Matrix 2.2. Determinant, 2.3. Inverse of a matrix, 2.4-Nullity 2.5. system of linear equations, 2.6. Symmetric, skew symmetric 2.7. orthogonal matrices 2.8. Eigen values and Eigen vectors, orthogonal transformation, 2.9. diagonalization of matrices, Cayley-Hamilton Theorem, 2.10. linear systems of equations, 2.11 linear independence and linear dependence 2.12 Tutorial-1	**SL.1** Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Write the application of Matrices in Real Life.
ii. Write the properties of Eigen values.
iii. Write a short note on types of matrixes with example.
iv. Describe the method of calculation of rank with example

b. Mini Project:
Oral presentation, Poster presentation, Power Point Presentation**.**
c. Other Activities (Specify):
Quiz, Class Test

BSC 102.3: Define and compute partial derivatives of functions of several variables, Define and compute the gradient vector of a scalar function, Apply the chain rule to compute derivatives of composite functions involving multiple variables, Identify critical points of multivariable functions.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Define and compute partial derivatives of functions of several variables **SO3.2** Understand the directional derivative and its relation to the gradient vector **SO3.**3 Apply the chain rule to compute derivatives of composite functions involving multiple variables **SO3.4** Understand mixed partial derivatives and Clairaut's theorem		**Unit-3. Define and compute partial derivatives of functions of several variables** 3.1. Limit and continuity 3.2. total derivative, 3.3. Euler's theorem on Homogeneous function. 3.4. Application of Euler's theorem in approximation and errors, 3.5. Application of Euler's theorem in errors 3.6. Tangent plane and normal line. 3.7. maxima, minima	1. Apply Lagrange multipliers to solve constrained optimization problems

SO3.5 Identify critical points of multivariable functions		3.8 saddle points, 3.9. Method of Lagrange multipliers 3.10. partial derivatives 3.11 Questions of partial differential. 3.12 Tutorial-1	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Write the Application of Euler's theorem in real life.
ii. Explain the difference between differential and partial differential
iii. Write the properties of maxima, minima.
iv. Define saddle points, point of inflection.

b. Mini Project:

I. Oral presentation

c. Other Activities (Specify):

Quiz, Class Test

BSC 102.4: Understand the definition of a first-order ordinary differential equation, solve separable differential equations using the separation of variables technique, Sketch direction fields to visualize the behaviour of solutions, apply first-order ODEs to model and analyse various phenomena.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Understand the definition of a first-order ordinary differential equation **SO4.2** Solve separable Differential equations using		**Unit-4. Understand the definition of a first-order ordinary differential equation** 4.1. Order and degree of equation 4.2Exact equations.	Apply first-order ODEs to model and analyse various phenomena, such as population growth, chemical reactions, and

the separation of variables technique **SO4.3** Identify and use integrating factors to solve linear first-order ODEs **SO4.4** Identify autonomous differential equations and their significance **SO4.5** Recognize and solve exact Differential equations		4.3Questions of Exact equations, 4.4. Linear equations 4.5 Tutorial-1 4.6. Bernoulli's equations. 4.7. Equations not of first degree: 4.8. Equations solvable for p, 4.9. Equations solvable for y, 4.10. Equations solvable for x 4.11 Equations Clairaut's type 4.12 Tutorial-2	electrical circuits

SW-4 Suggested Sessional Work (SW):

a. Assignments:
I. Explain degree and order of differential equation with example.

d. Other Activities (Specify):
I. Quiz, Class Test.

BSC 102.5: Understand and state the Fundamental Theorem of Calculus, both parts and apply the Fundamental Theorem to evaluate definite integrals. Apply integration techniques, including substitution, integration by parts, and partial fractions.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1. Understand and state the Fundamental Theorem of Calculus **SO5.2.** Find antiderivatives of Elementary functions **SO5.3.** Understand the		**Unit-5. Understand and state the Fundamental Theorem of Calculus** 5.1. Evaluation of definite and improper integrals, 5.2. Beta and Gamma functions 5.3. Properties of Beta and	SL.1 Apply calculus techniques to analyse curves defined in polar form

concept of a definite integral as a limit of Riemann sums **SO5.4.** Interpret definite integrals as areas under curves **SO, 5.5** Understand and evaluate improper integrals.		Gamma functions, 5.4 Relation between Beta and Gamma functions 5.5. Double integrals (cartesian), 5.6 questions of double integrals 5.7. Change of order of integration in double integrals, 5.8 Change of order of integration questions 5.9. Triple integrals (cartesian), 5.10. simple applications involving cubes and sphere 5.11 Rectangular parallelepipeds 5.12 Tutorial-1	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Write the application of double and tripal integration.

ii. Write the Properties of Beta and Gamma functions.

b. Mini Project:

I. Power Point Presentation.

c. Other Activities (Specify):

Quiz, Class Test.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 102.1: Define and understand the concept of limits, evaluate limits algebraically and graphically, Apply the basic rules of differentiation, including the power rule, product rule, quotient rule, and chain rule. Use linear approximation and differentials to estimate values of functions	12	1	1	14
BSC 102.2: Define and understand the basic concepts of matrices, differentiate between different types of matrices Perform basic matrix operations, use matrices to represent and solve systems of	12	1	1	14

linear equations. Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics.				
BSC 102.3: Define and compute partial derivatives of functions of several variables, Define and compute the gradient vector of a scalar function, Apply the chain rule to compute derivatives of composite functions involving multiple variables, Identify critical points of multivariable Functions	12	1	1	14
BSC 102.4: first order ordinary differential equation, solve separable differential equations using the separation of variables technique, Sketch direction fields to visualize the behaviour of solutions, apply first-order ODEs to model and analyse various phenomena.	12	1	1	14
BSC 102.5: Understand and state the Fundamental Theorem of Calculus, both parts and apply the Fundamental Theorem to evaluate definite integrals. Apply integration techniques, including substitution, integration by parts, and partial fractions.	12	1	1	14
Total Hours	60	05	05	70

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 102.1	Single-variable Calculus	02	04	05	11
BSC 102.2	Single-variable Calculus	03	07	04	14
BSC 102.3	Multivariable Calculus	02	06	02	10
BSC 102.4	First order ordinary differential equations	03	03	02	08
BSC 102.5	Integral Calculus.	03	02	02	07
	Total	13	22	15	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Engineering Mathematics-I,	D.K, Jain	Shree Ram Prakashan.	7th Edition 2015-16
2.	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	36th Edition, 2010
3.	Engineering Mathematics-I	D.C.Agrawal	Shree Sai Prakashan	10th Edition 2018
4.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw Hill	11th Reprint, 2010.

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Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 102
Course Title: Engineering Mathematics-I

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 102.1: Define and understand the concept of limits, evaluate limits algebraically and graphically, Apply the basic rules of	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

differentiation, including the power rule, product rule, quotient rule, and chain rule. Use linear approximation and differentials to estimate values of functions																
BSC 102.2: Define and understand the basic concepts of matrices, differentiate between different types of matrices Perform basic matrix operations, use matrices to represent and solve systems of linear equations. Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics.	1	2	3	2	3	2	3	2	3	2	1	2	3	2	2	3
BSC 102.3: Define and compute partial derivatives of functions of several	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

variables, Define and compute the gradient vector of a scalar function, Apply the chain rule to compute derivatives of composite functions involving multiple variables, Identify critical points of multivariable Functions																
BSC 102.4: first order ordinary differential equation, solve separable differential equations using the separation of variables technique, Sketch direction fields to visualize the behaviour of solutions, apply first-order ODEs to model and analyse various phenomena.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
BSC 102.5: Understand and state the Fundamental Theorem of Calculus, both parts and apply the Fundamental	1	2	3	2	3	2	3	2	3	2	3	2	3	3	2	3

Theorem to evaluate definite integrals. Apply integration techniques, including substitution, integration by parts, and partial fractions.																

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4	**BSC 102.1**: Define and understand the concept of limits, evaluate limits algebraically and graphically, Apply the basic rules of differentiation, including the power rule, product rule, quotient rule, and chain rule. Use linear approximation and differentials	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-1. Define and understand the concept of limits, evaluate limits algebraically and graphically 1.1,1.2,1.3,1.4,1.5,1.6**	**Asmentionedin page number _to_**

	to estimate values of functions				
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4	**BSC 102.2**: Define and understand the basic concepts of matrices, differentiate between different types of matrices Perform basic matrix operations, use matrices to represent and solve systems of linear equations. Explore more advanced topics, such as linear transformations, matrix norms, and applications in optimization and computer graphics.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-2. Define and understand the basic concepts of matrices 2.1,2.2,2.3,2.4,2.5,2.6**	
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4	**BSC 102.3**: Define and compute partial derivatives of functions of	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-3. Define and compute partial derivatives of functions of several variables 3.1,3.2,3.3,3.4,3.5,3.6**	

	several variables, Define and compute the gradient vector of a scalar function, Apply the chain rule to compute derivatives of composite functions involving multiple variables, Identify critical points of multivariable functions	SO1.6			
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4	**BSC 102.4**: first order ordinary differential equation, solve separable differential equations using the separation of variables technique, Sketch direction fields to visualize the behaviour of	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-4. first order ordinary differential equation** **4.1,4.2,4.3,4.4,4.5,4.6**	

	solutions, apply first-order ODEs to model and analyse various phenomena.				
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4	**BSC 102.5:** Understand and state the Fundamental Theorem of Calculus, both parts and apply the Fundamental Theorem to evaluate definite integrals. Apply integration techniques, including substitution, integration by parts, and partial fractions.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-5. Understand and state the Fundamental Theorem of Calculus 5.1,5.2,5.3,5.4,5.5,5.6**	

Curriculum Development Team

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Revised as on 01 August 2023

Semester-I

Course Code: **BSC 105**
Course Title: **Biology for Engineers**
Pre-requisite: Student should have basic knowledge of biology.
Rationale: Engineering combines scientific knowledge with creative activities to move beyond current knowledge and produce original solutions to important problems. Biological systems are subject to the laws of chemistry and physics, which are also the basis of engineering, biological systems can provide excellent examples of the applications of statics, dynamics, chemical affinities, energy relations, and other concepts taught in undergraduate engineering science courses.

Course Outcomes:

BSC 105.1: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.

BSC 105.2: To convey the classification of organism underlying criterion, such as morphological, biochemical or ecological be highlighted.

BSC 105.3: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences" and understand the molecular basis of coding and decoding genetic information is universal.

BSC 105.4: To convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. To convey that without catalysis life would not have existed on earth

BSC 105.5: To convey the concept of microbes and their role in environment.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 105	Biology for Engineers	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
BSC	BSC 105	Biology for Engineers	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 105.1: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Why we need to study biology **SO1.2** To know the differences and similarities between human eye and camera. **SO1.3** Analyze the mechanism of birds flying with Aircraft **SO1.4** Gain knowledge about the role of biology with discoveries in living world. **SO1.5** To understand the concept and amazing facts about living organisms. **SO1.6** Describe various\ criteria of classification of organism. **SO1.7** In depth study about the cell and cell theory. **SO1.8** Brief about the role of biological observations in major discoveries. **SO1.9** Understanding Binomial system of nomenclature		**Unit1**.(2hours)-Introduction 1.1-Introduction to biology branches and scopes 1.2: comparison between eye and camera 1.3: Comparison between Bird flying and aircraft. 1.4 Important discoveries of biology. 1.5 Living organisms, characteristics of living organism 1.6 classification of living organisms 1.7 Cell theory 1.8 Discuss how biological observations of 18th Century that lead to major discoveries. 1.9 Understanding Binomial system of nomenclature	1. Importance of Biology in engineering 1.2 Discuss how biological observations of 18th Century that lead to major discoveries.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
I. Compare living and non-living organisms

b. Mini Project:
I. Make a model of camera and try to make a flying object.

c. Other Activities (Specify):
I. try to make a flying object.

BSC 105.2: To convey the classification of organism underlying criterion, such as morphological, biochemical or ecological be highlighted.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Describe hierarchy of life forms at phenomenological level. **SO2.2:** Understand ultra structure of prokaryotic and eukaryotic organism, **SO2.3** Study mode of nutrition in organism. **SO2.4** Analyze the made of nutrition in Autotroph **SO2.5** Explain the mechanism of obtaining nutrition by Heterotrophs. **SO2.6** Define lithotrophs and their occurrence. **SO2.7** Build up the concept of Molecular taxonomy and its uses in biology. **SO2.8** To understand the major types of kingdoms. **SO2.9**: Able to define the Diversity of living organisms		**Unit2.** Classification 2.1 Discuss classification based on (a) cellularity- Unicellular or multicellular 2.2: Discuss classification based on (b)Ultra structure- prokaryotes or eukaryotes. 2.3 classification based on (c) energy and Carbon utilization – 2.4Autotrophs 2.5 heterotrophs, 2.6 Lithotrophs. 2.7 Molecular taxonomy- 2.8 Three major kingdoms of life. 2.9 Diversity of living organisms	1: Study different examples of unicellular and multicellular organisms. 2: Gain knowledge about the basic structure of cell and functions of cell organelles.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Differentiate between prokaryotic cell and eukaryotic cell.

b. Mini Project:

I. Prepare the poster explaining classification of organism.

c. Other Activities (Specify):

I. Grow yeast or fungus and observe the growth.

BSC 105.3: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences and understand the molecular basis of coding and decoding genetic information is universal

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**04**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Illustrate how genetic material passes from parent to offspring Concepts of recessive Ness and dominance. **SO3.2** Describe the concept of allele. **SO3.3** Understand the cell cycle and its importance. **SO3.4** Discuss types of cell division **SO3.5** Able to realize concept of mapping of phenotype to genes. **SO3.6** Discuss about the single gene disorders in humans. **SO3.7** Analyze the molecular basis of information transfer and study the DNA structure and compacting of genome **SO3.8** Define concept of genetic code. **SO3.9** Gaining knowledge about the universality and degeneracy of genetic code.		**Unit3**.Genetics& Information Transfer 3.1: Mendel's laws, Concept of segregation and independent assortment. 3.2 Concept of allele. 3.3: cell cycle 3.4 Meiosis and Mitosis 3.5 Genome mapping 3.6 Gene disorders in humans 3.7 DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. 3.8 Concept of genetic code 3.9 Universality and degeneracy of genetic code.	1: Build-up the concept on the phenotype and genotype. Concepts of recessive Ness and dominance 2 Basic knowledge of cell and cell theory 3 Concepts of physical and genetic mapping. 4: Boost your knowledge on some genetic disorders in human. And mutation.

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. Differentiate between mitosis and meiosis.

b. Mini Project:
I. Explain different types of crosses of Mendelian genetics

c. Other Activities (Specify):
I. Make a model of DNA and RNA and chart of cell cycle.

BSC 105.4: To convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. To convey that without catalysis life would not have existed on earth.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**03**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 In this context discuss monomeric units and polymeric structures. **SO4.2** To know about the structure and functions of carbohydrates. **SO4.3** Define structure and function of starch. **SO4.4** Analyze the structure = and properties of cellulose. **SO4.5** Able to know about the building blocks of proteins. **SO4.6** Understand proteins structure and function. **SO4.7** Describe hierarchy in protein structure. Primary secondary, tertiary		**Unit 4**- Biochemistry and metabolism and Enzymes 4.1 Molecules of life 4.2: Discuss about sugars, 4.3 starch 4.4 cellulose. 4.5 Amino acids 4.6 Proteins 4.7Primary, secondary, tertiary and quaternary structure of proteins. 4.8 Enzyme classification. Mechanism of enzyme action. 4.9 Nucleotides and DNA/RNA	1: Study about the various disorders related to carbohydrate metabolism. 2 Learn names of essential and non-essential amino acids. 4.3 To know about the important enzymes of human body and discuss two examples.

and quaternary structure. **SO4.8** Analyze the how does an enzyme catalyze reactions. **SO4.9** Explain the chemical composition and types of Nucleotides.			

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Write a detail note on Classification of Carbohydrate.

b. Mini Project:

I. Make a chart explaining bio molecules.

d. Other Activities (Specify):

I. List out important enzymes of human body.

BSC 105.5 To convey the concept of microbes and their role in environment**.**

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1: Gain the knowledge of different microscopic techniques. **SO5.2** To know the methods of identification of microorganism. **SO5.3** Able to classify microorganism **SO5.4** Explain the Concept of single celled organisms. **SO5.5** To gain knowledge about different bacterial species and strain.		**Unit 5.** Microbiology 5.1 Microscopy 5.2 staining methods 5.3Classification of microorganisms(types) 5.4 Concept of single celled organisms 5.5 Concept of species and strains 5.6 Sterilization 5.7 Types of sterilization. 5.8 Media compositions. 5.9 Growth kinetics	1 Concept of single celled organisms 2 Ecological aspects of single celled organisms

SO5.6 Define the process of sterilization. **SO5.7** Understand principle and types of sterilization used in microbiology. **SO5.8** Study the different components used in media and preparation of medium **SO5.9** Analyze the microbial growth curve.			

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Draw and explain simple and compound microscope and their parts.

II. Describe Bacterial growth curve.

b. Mini Project:

I. Make a chart showing different sterilization techniques.

c. Other Activities (Specify):

I. Try to make a simple microscope model.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 105.1: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.	9	2	1	12
BSC 105.2: To convey the classification of organism underlying criterion, such as morphological, biochemical or ecological be highlighted.	9	2	1	12
BSC 105.3: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences and understand the molecular basis of coding and decoding genetic information is universal	9	4	1	14
BSC 105.4: To convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. To convey that without catalysis life would not have existed on earth.	9	3	1	13
BSC 105.5 To convey the concept of microbes and	9	2	1	12

their role in environment**.**				
Total Hours	45	13	05	63

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 105.1	Introduction	03	01	01	05
BSC 105.2	Classification	02	06	02	10
BSC 105.3	Genetics& Information Transfer	03	07	05	15
BSC 105.4	Biochemistry and metabolism and Enzymes	-	10	05	15
BSC 105.5	Microbiology	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to nearby sites to interact with workers
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Biology for engineers	Arthur T Johanson	CRC press Taylor and Francis group	Second edition in 2019
2.	Biology for engineers	Dr. Tanu Allen, Dr. Sohini singh	Vayu education of India	First edition in 2020
3.	Biology for engineers	Tanushree Chakraborti	PHI Learning	First edition in 2022

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 105
Course Title: Biology for Engineers

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 105.1: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 105.2: To convey the classification of organism underlying	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

criterion, such as morphological, biochemical or ecological be highlighted.																
BSC 105.3: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences and understand the molecular basis of coding and decoding genetic information is universal	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 105.4: To convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. To convey that without catalysis life would not have existed on earth.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 105.5 To convey the concept of microbes and their role in environment**.**	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)
PO 1,2,3,4,5,6 7,8,9 ,10,11,12 PSO 1,2, 3	**BSC 105.1**: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.	1.1, 1.2, 1.3, 1.4,1.5 1.6,1.7,1.8,1.9		**1.1, 1.2, 1.3,1.4,1.51,6,1.7,1.8,1.9**	**1 SL-1,2,**
PO 1,2,3,4,5,6 7,8,9 ,10,11,12 PSO 1,2, 3	**BSC 105.2**: To convey the classification of organism underlying criterion, such as morphological, biochemical or ecological be highlighted.	2.1,2.2,2.3,2.4,2.5 2.6,2.7,2.8,2.9		**2.1, 2.2,2.3,2.4,2.5, 2.6,2.7,2.8,2.9**	**2 SL-1,2**
PO 1,2,3,4,5,6,7,8,9 ,10,11,12 PSO 1,2, 3	**BSC 105.3**: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences and understand the	3.1, 3.2,3.3, 3.4, 3.5,3.6,3.7, 3.8, 3.9		**3.1, 3.2,3.3, 3.4,3.5 ,3.6,3.7,3.8,3.9**	**3 SL-1,2,3,4**

	molecular basis of coding and decoding genetic information is universal				
PO 1,2,3,4,5,6,7,8,9 ,10,11,12 PSO 1,2, 3	**BSC 105.4**: To convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. To convey that without catalysis life would not have existed on earth.	4.1,4.2, 4.3, 4.4 ,4.5,4.6,4.7 ,4.8 ,4.9		**4.1,4.2,4.3, 4.4, 4.5, 4.6,4.7,4.8,4.9**	**4 SL-1,2,3,**
PO 1,2,3,4,5,6,7,8,9 ,10,11,12 PSO 1,2, 3	**BSC 105.5** To convey the concept of microbes and their role in environment**.**	5.1, 5.2, 5.3,5.4,5.5,5.6,5 .7,5.8,5.9		**5.1, 5.2, 5.3,5.4,5.5,5.6,5.7,5.8,5.9**	**5 SL-1,2,**

Curriculum Development Team

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Semester-I

Course Code: **ESC 101**
Course Title: **Basic Electrical Engineering**
Pre-requisite: Students should have basic knowledge of Basic Circuit Elements with brief information of AC, DC, and electromagnetic concepts.
Rationale: A process of introducing formal knowledge of basic electrical elements and AC, DC, and magnetic circuit in electrical and electronic devices along with necessary knowledge about single-phase Transformer and DC machine.

Course Outcomes:

ESC 101.1: Apply network theorems to solve electrical DC circuits.

ESC 101.2: Understand the concept of sinusoidal quantities and solve single phase AC circuits.

ESC 101.3: Analyse the three phase AC circuits and solve series and parallel magnetic circuits.

ESC 101.4: Understand the basic operating principle, types, efficiency of Transformers.

ESC 101.5: Understand the basic operating principle, types of machines.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 101	Basic Electrical Engineering	3	2	1	1	7	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 101	Basic Electrical Engineering	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
ESC	ESC 101-L	Basic Electrical Engineering	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 101.1: Apply network theorems to solve electrical DC circuits.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**12**
SW	**02**
SL	**01**
Total	**22**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the Classification of electrical elements. **SO1.2**Understand the concept of voltage and current source. **SO1.3**Understand the concept of mathematical analysis based on KCL and KVL. **SO1.4** Analyse different network theorems. **SO1.5** Understand the concept of star-delta transformation.	**1.** Verification of KVL. **2.** Verification of KCL. **3.** Identification of different electrical and electronic components. **4**. Calculation of Power, Impedance and P.F. in R-L-C Circuits. **5.** Verification of Superposition Theorem. **6**. Verification of Thevenin's	**Unit-1.0** DC Network 1.1 Classification of elements – active, passive, unilateral, bilateral, linear, nonlinear, lumped and distributed 1.2 classification of voltage & current sources 1.3 mesh and nodal analysis 1.4 Superposition theorem 1.5 Star-Delta Transformations (Numerical only). 1.6 Thevenin's theorem (Only independent sources). 1.7 Numerical	1.Learn the theoretical concept of circuit element.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Numerical Problems on mesh and nodal analysis.

b. Mini Project:

I. Derive different network theorems.

ESC 101.2: Understand the concept of sinusoidal quantities and solve single phase AC circuits.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**02**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To Understand the concept of sinusoidal periodic waveforms. **SO2.2** To understand the concept of phase difference. **SO2.**3To understand the different triangles. **SO2.4** To understand the different connections.	1. Study about different types of connection in AC circuit.	**Unit-2** Single-Phase AC Circuits construction 2.1 Sinusoidal periodic waveforms: frequency, cycle, time period, peak value, root mean square value, average value, form factor and peak factor. 2.2 Phasor representation of alternating quantities. 2.3 Concept of phase difference, The j operator 2.4Rectangular and polar form 2.5 Power Triangle 2.6 Impedance Triangle, Power factor 2.7Solution of series, parallel, series-parallel network.	1.Remember different concept related to the Sinusoidal Periodic Waveform.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Numerical Problems on Sinusoidal Network.

II. Numerical Problems on Power Triangle and Impedance Triangle.

III. Numerical Problems on Series and Parallel Circuit.

b. Mini Project:

I. Draw the chart of Phasor Representation.

ESC 101.3: Analyse the three phase AC circuits and solve series and parallel magnetic circuits.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To Understand the basic concept of three phase AC circuit. **SO3.2** To understand the different types of connection of three phase winding. **SO3.3**To Understand the three-phase power equations. **SO3.4** To Understand the concepts of magnetic circuit. **SO3.5** To understand the concept of leakage flux and fringing**.**	1. Study about the different types of three-phase AC circuits. 2. Study different concepts related with Magnetic Circuit.	**Unit-3: Three-Phase AC Circuit** 3.1 Introduction 3.2 phase sequence, balanced load 3.3 Connection of Three phase Windings (delta and star connection): line and phase quantities. 3.4 phasor diagrams, Three phase power equations in balanced conditions (Elementary Numerical). 3.5 Magnetic Circuits: Introduction 3.6 magneto motive force (MMF) 3.7 magnetic field strength, magnetic flux, reluctance 3.8 Comparison of the electric and magnetic circuits. 3.9 Solution of simple magnetic circuits (only for constant permeability materials). Leakage flux and fringing.	1. Basic principle of three-phase AC Circuit.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Numerical Problems on three-phase load.

II. Numerical Problems on Magnetic circuit.

ESC 101.4: Understand the basic operating principle, types, efficiency of Transformers.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**08**
SW	**02**
SL	**02**
Total	**22**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 To Understand the constructional and operational features of Single-phase Transformer. **SO4.2** Understanding the classification of Transformer. **SO4.**3Understand the different concept related with transformer **SO4.4** Derive EMF equation of transformer. **SO4.5** Understand the Phasor Diagram at different loads. **SO4.6** Understand the different concepts related to efficiency for single-phase transformer.	1. Study the construction details of transformer. 2. Perform open circuit and Short Circuit test on single phase transformer. 3. Study and Verification of Transformer Ratio Polarity. 4. Perform Back to-back Test on Transformer	Unit-4: Single-Phase Transformer 4.1 Introduction 4.2 principles of operation 4.3 Construction 4.4 classification of transformers 4.5 Rating of transformer 4.6 EMF equation, ideal and practical transformer 4.7 phasor diagram under no load and loaded conditions 4.8 losses, efficiency calculations, Condition of Maximum Efficiency 4.9 All day efficiency 4.10 (Elementary Numerical)	I. Remember different parts of transformer. II. Calculate Losses and Efficiency of transformer.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Numerical Problems on transformer

b. Mini Project:

I. Draw phasor diagram of transformer at different loads.

ESC 101.5: Understand the basic operating principle, types of machines.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**04**
SW	**02**
SL	**01**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understand the constructional details of DC machines. **SO5.2** Derive EMF and Torque equations. **SO5.3** Evaluate different types of dc machine. **SO5.4** Understanding the Electrical Installation.	1.Study different components of DC Motor and Three Phase Starter. 2. Study of different components of Induction Motor and Star	**Unit 5: DC Machines** 5.1 Common Construction features of DC Machines 5.2 EMF equation 5.3 types of DC machines (Separately & self-excited) 5.4 Elementary numerical 5.5 Components of LT Switchgear 5.6 Switch fuse unit (SFU) 5.7 MCB, ELCB, MCCB 5.8 Types of wires 5.9 Earthing 5.10 Cables 5.11 Torque equation 5.12 Compound DC Machine	1. Remember the Constructional features of DC Machine.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Numerical Problem based on EMF and Torque equation of DC machine.

b. Mini Project:

I. Draw the chart of different types of cable and earthing.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 101.1: Apply network theorems to solve electrical DC circuits.	7	12	2	1	22
ESC 101.2: Understand the concept	7	2	2	1	12

of sinusoidal quantities and solve single phase AC circuits.					
ESC 101.3: Analyse the three phase AC circuits and solve series and parallel magnetic circuits.	9	4	2	1	16
ESC 101.4: Understand the basic operating principle, types, efficiency of Transformers.	10	8	2	2	22
ESC 101.5: Understand the basic operating principle, types of machines.	12	4	2	1	19
Total Hours	45	30	10	06	91

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 101.1	DC Network	03	01	01	05
ESC 101.2	Single-Phase AC Circuit	02	03	02	07
ESC 101.3	Three-Phase AC Circuit	02	04	04	10
ESC 101.4	Single-Phase Transformer	03	07	05	15
ESC 101.5	DC Machines	01	06	06	13
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to sitpura power grid station
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.		Title	Author	Publisher	Edition &Year
1.		Basic Electrical Engineering	Fitzrald and Higgonbothom	Tata McGraw-Hill	Fifth
2.		Theory and Problems of Basic Electrical Engineering	D.P. Kothari and I. J. Nagrath	Prentice Hall India Learning Private Limited	2016 - Second
3.		Basic Electrical Engineering	D. C. Kulshreshtha	McGraw Hill	2009
4.		Fundamentals of Electrical Engineering	Ashfaq Hussain	Dhanpat Rai and Co	Third
5.		Lecture note provided by Dept. of electrical engineering, AKS University, Satna.			

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 101
Course Title: Basic Electrical Engineering

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 101.1: Apply network theorems to solve electrical DC circuits.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 101.2: Understand the concept of sinusoidal quantities and solve	2	2	3	2	2	3	2	2	1	2	3	2	3	2	3	3

single phase AC circuits.																
ESC 101.3: Analyse the three phase AC circuits and solve series and parallel magnetic circuits.	1	2	3	2	3	2	3	1	2	3	2	3	2	3	2	3
ESC 101.4: Understand the basic operating principle, types, efficiency of Transformers.	1	2	3	2	3	2	3	2	3	1	2	3	2	3	2	3
ESC 101.5: Understand the basic operating principle, types of machines.	3	2	3	2	3	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 101.1:** Apply network theorems to solve electrical DC circuits.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: DC Network 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above.**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 101.2:** Understand the concept of	SO1.1 SO1.2 SO1.3	**1**	**Unit-2: Single-Phase AC Circuit 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	

	sinusoidal quantities and solve single phase AC circuits.	SO1.4			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 101.3:** Analyse the three phase AC circuits and solve series and parallel magnetic circuits.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :Three-Phase AC Circuit 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 101.4**: Understand the basic operating principle, types, efficiency of Transformers.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4:Single-Phase Transformer 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 101.5:** Understand the basic operating principle, types of machines.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: DC Machines 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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Semester-I

Course Code: **ESC 102**
Course Title: **Engineering Graphics & Design**
Pre-requisite: Student should have basic knowledge of Geometry, Geometrical Shapes, basic knowledge of Computer, Mouse and keyboard use, navigating menus and dialogs, managing files and directories, etc.
Rationale: The students studying Graphics are essential in mechanical engineering, allowing engineers to visualize and communicate complex ideas clearly and concisely. Using graphics, engineers can create detailed plans for construction projects, analyses structural components, and convey design concepts to clients and stakeholders.

Course Outcomes:

ESC 102.1: Get introduced with Engineering Graphics and visual aspects of design.

ESC 102.2: Know and use common drafting tools with the knowledge of drafting standards.

ESC 102.3: Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering viewpoints.

ESC 102.4: Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

ESC 102.5: To make the student understand the viewing perception of a solid object in Isometric and perspective Projection, Design modulation and simulation by Auto CAD.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 102	Engineering Graphics & Design	1	4	1	1	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
ESC	ESC 102	Engineering Graphics & Design	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
ESC	ESC 102-L	Engineering Graphics & Design	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 102.1: Get introduced with Engineering Graphics and visual aspects of design.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Proficiency in using plain scales for measurement and drawing and understanding of representative factors in scales. **SO1.2** Construction of ellipses, parabolas, and hyperbolas using various methods **SO1.3** Knowledge and construction of special curves like cycloids, epicycloids, hypocycloids, involutes, and Archimedean spirals. **SO1.4** Application of these curves in various engineering and mathematical contexts.	1.1 Construction of ellipse by different methods; Normal and Tangent . 1.2. Construction of parabola by different methods; Normal and Tangent. 1.3Construction of involute such as polygons and circle 1.4 Construction of Cycloid, Epi-cycloid, Hypo cycloid 1.5 Construction of Simple Scale, 1.6 Diagonal Scale & Scale of Chord	**Unit-1.0** ENGINEERING CURVE& SCALE 1.1Introduction of Engineering Drawing, Drawing material and their uses Application of mini drafter, compass, divider, French curves, pencils grades and their uses. 1.2 Construction of ellipse by different methods; Normal and Tangent Construction of parabola by different methods; Normal and Tangent. 1.3 Construction of Cycloid, Epi-cycloid, Hypo-cycloid. Construction of Simple Scale, Diagonal Scale & Scale of Chord	1. Construction of Involutes 2. Construction of Archimean Spiral

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Ellipse by concentric circle method, Cycloid, Involutes of Circle.

b. Mini Project:

I. Model of Hexagon, Pentagon, Square

ESC 102.2: Know and use common drafting tools with the knowledge of drafting standards.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**02**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Differentiate between various types of projections when and where each type of projection is commonly used in engineering and technical design. **SO2.2** Be able to create orthographic projection views of objects, including front view, top view, and side views. **SO2.3** Able to project points and lines onto different planes using orthographic projection. **SO2.4** Learn how to find the traces of straight lines in orthographic projection and use these traces to determine the positions of lines in different planes.	2.1 Projection of Point 2.2 Projection of Point in different co-ordinate 2.3 Projection of Straight Line 2.4 Projection of Straight Line in different Position w.t.r. H.P. & V.P. 2.5 Projection of Straight Line in different Position w.t.r. H.P. & V.P. 2.6 Projection of Straight Line in different Position w.t.r. H.P. & V.P.	**Unit-2.0** Projection of Point and Line 2.1 Introduction of Projection 2.2 Projection of Point 2.3 Projection of Straight Line	1.Point Projection in different co-ordinate 2. Projection of Straight Line in different Position w.t.r. H.P. & V.P.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Projection of point & Projection of Straight Line

ESC 102.3: Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering viewpoints.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Projection of Planes like circle and polygons in different positions. **SO3.2** Projection of polyhedrons like prisms, pyramids, and solids of revolutions like cylinder, cones in different positions.	3.1 Introduction, Projection of plane 3.2 plane perpendicular to any one and parallel to other 3.3 plane perpendicular to any one and inclined too other 3.4 Introduction, Projection of solid 3.5 Axis of solid perpendicular to any one and parallel to other 3.6 Axis of solid perpendicular to any one and inclined to other Axis of solid inclined to both the plane HP&VP	**Unit-3.0** Projection of Plane & Solid 3.1Introduction of Projection Plane 3.2 Projection of Plane in different position 3.3Introduction of projection of Solid Projection of solid in different position.	1.Preojection of Plane in different Position w.t.r. H.P. & V.P. 2. Projection of solid in different Position w.t.r. H.P. & V.P.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Draw three problems of projection of plane.

II. Draw three problems of projection of solid.

b. Mini Project

I. Make models of plane and solid by thermacol.

ESC 102.4: Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Learn the techniques for sectioning right solids using both normal and inclined planes. **SO4.2** solve practical problems related to the section of solids and planes. **SO4.3** Learn the parallel line method and radial line method for developing surfaces in right solids including how to create accurate representations.	4.1 Sectioning of Cone 4.2 Sectioning of pyramid 4.3 Sectioning of Cylinder & Prism 4.4 Development of cylinder and prism 4.5 Development and sectioning of pyramid 4.6 development and sectioning of cone	**Unit-4.0** Development of Solid & Section of Solid 4.1Introduction of Sectioning and sectioning lines 4.2 Sectioning of Cone 4.3 Sectioning of pyram Sectioning of Cylinder & Prism Development of cylinder and prism Development and sectioning of pyramid development and sectioning of cone	1. Development and sectioning of cylinder 2. Development and sectioning of prism.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Develop prism and cylinder

II. Develop pyramid and Cone

ESC 102.5: To make the student understand the viewing perception of a solid object in Isometric and perspective Projection, Design modulation and simulation by Auto

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Students will learn about the scale and the specific axes used in isometric drawings. **SO5.2** Students will learn the process of converting two dimensional orthographic (multi view) drawings into isometric projections. **SO5.3** Students will learn solving practical design and projection problems using CAD software and how to use CAD tools to create detailed drawings and projections of objects.	5.1 Introduction of isometric scale and views 5.2 Isometric view of circle, cylinder and cone 5.3 Isometric view of prism 5.4 Isometric view of pyramid 5.5 Isometric view by orthographic view 5.6 Drawing of different orthographic view of planes and solid by Auto CAD commands	**Unit-5.0** Isometric projection and Auto CAD 5.1 Introduction of Isometric Projection 5.2 Isometric view of circle, cylinder and cone 5.3 Isometric view of prism and pyramid Isometric view by orthographic view Introduction of Auto CAD Description of Auto CAD commands Drawing of different orthographic view of planes and solid by Auto CAD commands	1. Draw Isometric view of plane and solid 2. Draw Isometric view of plane and solid by using Auto CAD command.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Draw Isometric view of a cone resting centrally on a cube.

II. Explain five edit and draw commands

b. Mini Project:

I. Draw the chart of different types of cable and earthing.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 102.1: Get introduced with Engineering Graphics and visual aspects of design.	3	12	2	2	19
ESC 102.2: Know and use common drafting tools with the knowledge of drafting standards.	3	12	1	2	18
ESC 102.3: Apply computer aided drafting technique to represent line, surface or solid models in different Engineering viewpoints.	3	12	2	2	19
ESC 102.4: Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.	3	12	2	2	19
ESC 102.5: To make the student understand the viewing perception of a solid object in Isometric and perspective Projection, Design modulation and simulation by Auto CAD	3	12	2	2	19
Total Hours	15	60	9	10	94

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 102.1	Engineering Curve & scale	03	01	01	05
ESC 102.2	Projection of Point and Line	02	06	02	10
ESC 102.3	Projection of Plane & Solid	03	07	05	15
ESC 102.4	Development of Solid & Section of Solid	-	10	05	15
ESC 102.5	Isometric projection and Auto CAD	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to building planning office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Isometric projection and Auto CAD	Fitzrald and Higgonbothom	Visvesvar aya Tech. Universit	Revised edition 21 edition 2020
2.	Engineering Drawing	Bhatt N.D., Panchal V.M. & Ingle P.R.,	Charotar Publishing House	1999
3.	Engineering Drawing	R.K. Dawan	S. Chand Publication.	1985
4.	Engineering Drawing	Agrawal and Agrawal	TMH	2018
5.	Training Manual			
6.	Lecture note provided by Dept. of Mechanical engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 102
Course Title: Engineering Graphics and Design

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 102.1: Get introduced with Engineering Graphics and visual aspects of design.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 102.2: Know and use common drafting tools with the	1	2	3	2	3	2	3	2	3	2	3	3	2	3	2	3

knowledge of drafting standards.																
ESC 102.3: Apply computer aided drafting technique to represent line, surface or solid models in different Engineering viewpoints.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 102.4: Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.	2	1	2	3	2	3	2	3	2	3	2	3	2	3	2	3
ESC 102.5: To make the student understand the viewing perception of a solid object in Isometric and perspective Projection, Design modulation and simulation by Auto CAD	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4	**ESC 102.1:** Apply network theorems to solve electrical DC circuits.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1.1,1.2,1.3,1.4, 1.5,1.6,**	**Unit-1.0 ENGINEERING CURVE& SCALE 1.1,1.2,1.3**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4	**ESC 102.2:** Understand the concept of sinusoidal quantities and solve single phase AC circuits.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**2.1, 2.2, 2.3, 2.4, 2.5, 2.6**	**Unit-2 Projection of Point and Line 2.1, 2.2, 2.3**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4	**ESC 102.3:** Analyse the three phase AC circuits and solve series and parallel magnetic circuits.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**3.1,3.2,3.3,3.4,3.5, 3.6**	**Unit-3 : Projection of Plane & Solid 3.1, 3.2,3.3**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4	**ESC 102.4**: Understand the basic operating principle, types, efficiency of Transformers.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**4.1,4.2,4.3,4.4,4.5, 4.6**	**Unit-4 : Development of Solid & Section of Solid 4.1, 4.2,4.3**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4	**ESC 102.5:** Understand the basic operating principle, types of machines.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**5.1,5.2,5.3,5.4,5.5, 5.6**	**Unit 5: Isometric projection and Auto CAD 5.1,5.2,5.3**	

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Curriculum Development Team

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2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
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Semester-I

Course Code: **ESC 103-L**
Course Title: **Design Thinking & Idea Lab**
Pre-requisite: There is no such pre requisite for Design Thinking and Idea. This course is intended for students from any discipline who require an understanding of design thinking for brand, product, and service development.
Rationale: Students will learn a series of design thinking concepts, methods and techniques that are used to bring about innovation in business and in the social sector. The course will be a mix of lecture, case discussions, participative and immersive learning. It will be a predominantly student driven learning to acquire the requisite skills.

Course Outcomes:

ESC 103-L.1: Identify the problems that fall under the purview of human centered design process for creative problem solving.

ESC 103-L.2: Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation techniques

ESC 103-L.3: Build simple prototypes for problems using gathered user requirements.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 103-L	**Design Thinking & Idea Lab**	0	2	1	1	4	1

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Practical

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
ESC	ESC 103-L	Design Thinking & Idea Lab	35	NA	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 103-L.1: Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation techniques.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**10**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Identifying the problem that can be solved using Design Thinking approach. **SO1.2** Obtain the insights into user's problems and make Problem statement. **SO1.3** Carry out Brain storming between the groups and generate as many as ideas possible. SO1.4Obtain the insights to creativity and innovation.	**Unit-1.0INTRODUCTION TO DESIGN THINKING** 1.1 Definition of Design Thinking, 1.2. Need & Objective of Design Thinking 1.3. Stages of Design Thinking Process. 1.4Brainstorming. 1.5 Innovative Triangle		1. Develop ability to express their views.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
Detail explanation of Stages of Design Thinking.

b. Mini Project:
i. To create a prototype of users need using Design Thinking Stages.

ESC 103-L.2: Identify the problems that fall under the purview of human centered design process for creative problem solving

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**10**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Differentiate between Design thinking and Creative thinking. **SO2.2** Learn different	**Unit-2.0: Introduction to Creativity** 2.1 Introduction		1.Different Convergent and divergent thinking tools.

types of creative thinking techniques for generating creative ideas. **SO2.3** Be able to solve a problem using creativity	of Creative Thinking. 2.2 Creative Thinking Process 2.3 Creative Problem Solving. 2.4 Creative Thinking Techniques and Tools. 2.5 Divergent and Convergent Thinking.		

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Presentation by students' team on their own creative work.

b. Mini Project:

II. To create a prototype of a product using their own creativity.

ESC 103-L.3: Build simple prototypes for problems using gathered user requirements.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**10**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1Understanding of Prototyping. **SO3**.2 Develop understanding of various prototype testing methods. **S03**.3 Understanding of Product Design	**Unit-3.0Introduction to Prototype** 3.1 Prototyping as a mindset, prototype examples		1.Solving Practical Engineering Problem through Innovative Product Design & Creative Solution

	3.2 Introduction to Rapid Prototyping. 3.3 Process of prototyping Minimum Viable prototype 3.4Process of Engineering Product Design 3.5 Stages of Product Design		

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Presentation by student teams on their own developed prototype.

b. Mini Project:

I. Make a prototype using stages of product design

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Lab Lecture (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 103-L. 1: Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation techniques.	00	10	02	1	13
ESC 103-L.2: Identify the problems that fall under the purview of human centered design process for creative problem solving.	00	10	02	1	13
ESC 103-L.3: Build simple prototypes for problems using gathered user requirements.	00	10	02	1	13
Total Hours	00	30	06	03	39

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 103-L.1	Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation	07	05	03	15

	techniques.				
ESC 103-L.2	Identify the problems that fall under the purview of human centered design process for creative problem solving.	06	06	03	15
ESC 103-L.3	Build simple prototypes for problems using gathered user requirements.	07	07	06	20
	Total	20	18	12	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to design thinking lab
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Paul Harris, Basics Design-Design Thinking	Gavin Ambrose	AVA Publishing	2010
2.	Prototyping for Designers: Developing the best Digital and Physical Products Engineering Contract	Kathryn McElroy	O'Reilly, 2017	2017

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 103-L
Course Title: Design Thinking & Idea Lab

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 103-L. 1: Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation techniques.	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3

ESC 103-L.2: Identify the problems that fall under the purview of human centered design process for creative problem solving.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 103-L.3: Build simple prototypes for problems using gathered user requirements.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO1,2, 9,10,12 PSO1,2	**ESC 103-L. 1: Create empathy maps to visualize user attitudes and develop innovative products or services for a customer base using ideation techniques.**	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1.0INTRODUCTION TO DESIGN THINKING 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**

PO1,2, 9,10,12 PSO2	**ESC 103-L.2: Identify the problems that fall under the purview of human centered design process for creative problem solving.**	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2Introduction to Creativity 2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**ESC 103-L.3: Build simple prototypes for problems using gathered user requirements.**	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: Introduction to Prototype 3.1. 3.2, 3.3, 3.4, 3.5.**	

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Semester-I

Course Code: **ESC 106**
Course Title: **Basic Civil Engineering**
Pre-requisite: Student should have Basic knowledge of Cement, Concrete, Roads and Infrastructure**.**
Rationale: To study basic civil engineering, you should have a strong foundation in mathematics, including algebra, geometry, and calculus. Understanding basic physics concepts, especially mechanics and forces, is crucial. High school courses in science and technical drawing can be beneficial. Good analytical skills and problem-solving abilities are essential. Familiarity with computer applications and engineering software can also be helpful. Additionally, a keen interest in how structures work and an aptitude for detailed work will aid in your success in the field.

Course Outcomes:

ESC 106.1: Impart the knowledge on importance of Civil Engineering in the infrastructural development of society.

ESC 106.2: Identify the types, uses and properties of various building materials.

ESC 106.3: Identify the type of construction for different components of a building.

ESC 106.4: Establish an idea about the different types of masonry work

ESC 106.5: Analyse various types of roofs and floors.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 106	Basic Civil Engineering	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 106	Basic Civil Engineering	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:
This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 106.1: Importance of Civil Engineering in the infrastructural development of society.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Overview of Civil Engineering. **SO1.2** Types of Structures **SO1.3** Public-private partnership (PPP) **SO1.4** Talent shortage and global trends in workshop mobility. **SO1.5** Skill demands.		**Unit-1.0** Importance of Civil Engineering in the infrastructural development of society 1.1 Types of infrastructures. 1.2 Effect of infrastructure facilities on economy and environment. 1.3 Role of Civil Engineers in the Infrastructural Development Introduction to sub domains of Civil Engineering. 1.4 Industry emerging trends in infra spending through public and public private partnership (PPP) 1.5 global trends in workshop mobility Concise 1.6 Talent Shortage 1.7 Skill Demand 1.8 PPP	1. Advantages of Infrastructure 2. Public Private Partnership

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Industry emerging trends in infra spending through public and public-private partnership (PPP)
II. Role of Civil Engineer for Infrastructure Development

b. Mini Project:

I. Affecting Factors of PPP.

c. Other Activities (Specify):

I. Note on Different fields of Civil Engineering.

ESC 106.2: Acquire knowledge regarding Stages in the life of construction.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**

SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To what extent you are able to Identify the types, uses and properties of various building materials **SO2.2**To learns about Design, Construction & Maintenance. **SO2.3** To Learn About Demolition / Recycling. **SO2.4** To learn about overview of Indian standards **SO2.5** Interdisciplinary nature of civil engineering projects.		**Unit-2** Stages in the life of construction 2.1 Design 2.2 Construction. 2.3 Maintenances 2.4 Repair. 2.5 Recycling; an overview of Indian standards. 2.6 unit and conversion factors for lengths 2.7 areas, volumes and weights 2.8 Opportunities and challenge of India 's Infrastructure 2.9 Interdisciplinary nature of civil engineering projects	1. Construction Life Cycle 2. Unit Conversion

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Recycling of Building Materials
II. Prepare Detail project on Construction Life Cycle.

b. Mini Project:

I. Interdisciplinary nature of civil engineering projects.

c. Other Activities (Specify):
I. Challenges of Indian Infrastructure

ESC 106.3: Gain an understanding of the various types of Road in India and their utilization in infrastructure development.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**

SW	**02**
SL	**02**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Types of Roads used in India **SO3.2** Component and use of Roads **SO3.3** Analyse various types of bridges and Its parts. **SO3.4** To what extent you are able to analyse various types of Dams.		**Unit-3** Types of Roads Used In Construction 3.1 Types of Roads 3.2 Types of Pavements flexible & Rigid. 3.3 Road function & Component, 3.4 Road Plan 3.5 Bridges: important parts 3.6 classification of bridges 3.7 Component of Bridges 3.8 Types of Dams 3.9 Function of Dams 3.10 Uses of Dams	1. History Of Road Development in India 2. Advantages of Bridges & Dams

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. Road Plans in India.
II. Different types of Bridges.

b. Mini Project:
I. Make Project Report on Dams in India

c. Other Activities (Specify):
I. Make Report on Road Plans.

ESC 106.4: analyse the strength and properties of various building materials.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**00**
SW	**02**
SL	**02**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 To what extent you are able to Identify the type of construction for different components of a building. **SO4.2** To what extent you are able to Establish an idea about the different types of masonry work. **SO4.3** Understanding the Building Material **SO4.4** Understand the Different grades of Concrete & Steel		**Unit-4**: Building Materials 4.1 Properties of common building materials 4.2 classification of building materials. 4.3 Rocks 4.4 Types Stones & its properties. 4.5 Types Bricks & its properties. 4.6 Types Sand & its properties. 4.7 Types Lime & its properties. 4.8 Types of Cement 1.9 Uses & Various types of Cement Test 1.10 Concrete Uses & Properties 4.11. Various Grades used in Steel	1. Preparation of process flow chart of Portland Cement manufacture 2. Draw a typical lay out of a cement plant showing various sections.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Identify masonry for the construction of a building

II. Describe briefly the dry process cement manufacture.

b. Mini Project:

I. Set out buildings using modern methods.

d. Other Activities (Specify):

I. Power Point Presentation of Portland cement manufacture.

ESC 106.5: Overview of National Highway Authority of India (NHAI).

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**02**

SL	**01**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To what extent you are able to Impart the knowledge on importance of Civil Engineering in development of society **SO5.2** Overview of Indian Road Congress **SO5.3** Role of the new technologies in the field of civil engineering		**Unit 5:** Indian Road Congress 5.1 History of Indian Road Congress. 5.2 Advantages of IRC 5.3 Overview of National Highway Authority of India (NHAI) 5.4 Various Road Plan introduced in NHAI 5.5 Overview of American Society of Civil Engineers (ASCE) 5.6 Emerging areas a new technology in the field of civil engineering 5.7 advance technology in Civil Engineering	1. History of IRC. 2. Role of ASCE for Civil Engineers.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Identify pavement components and design bituminous mixes

II. Evaluate structural conditions of pavements.

b. Mini Project:

I. Prepare Project Report on Road Development in India.

c. Other Activities (Specify):

I. Advantages of ASCE for Civil Engineers.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 106.1: Importance of Civil Engineering in the infrastructural development of society.	8	2	2	12
ESC 106.2: Acquire knowledge regarding Stages in	9	2	2	13

the life of construction.				
ESC 106.3: Gain an understanding of the various types of Roads in India and their utilization in infrastructure development.	10	2	2	14
ESC 106.4: analyse the strength and properties of various building materials.	11	2	2	15
ESC 106.5: Overview of National Highway Authority of India (NHAI).	7	2	1	10
Total Hours	45	10	09	64

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 106.1	Importance of Civil Engineering in the infrastructural development of society	03	01	01	05
ESC 106.2	Stages in the life of construction	02	06	02	10
ESC 106.3	Types Of Roads Used In Construction	03	07	05	15
ESC 106.4	Building Materials	-	10	05	15
ESC 106.5	Indian Road Congress	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to cement plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Basic Civil Engineering	Dr. R K Bansal	Laxmi Publication Pvt. Ltd	Third Edition 2013
2.	Legal Aspects of Building and Engineering Contract	W. H Duda	Laxmi Publication Pvt. Ltd.	Patil, B.S.(1974)

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 106
Course Title: Basic Civil Engineering

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 106.1: Importance of Civil Engineering in the infrastructural development of society.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 106.2: Acquire knowledge regarding	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Stages in the life of construction.																
ESC 106.3: Gain an understanding of the various types of Roads in India and their utilization in infrastructure development.	2	1	2	3	2	3	2	3	3	2	3	2	3	2	3	3
ESC 106.4: analyse the strength and properties of various building materials.	1	2	3	2	3	2	3	2	1	2	2	3	2	3	2	3
ESC 106.5: Overview of National Highway Authority of India (NHAI).	2	3	2	3	2	3	2	2	3	2	3	2	3	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	ESC 106.1: Importance of Civil Engineering in the infrastructural development of society.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. Importance of Civil Engineering in the infrastructural development of society 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above.**

PO1,2, 9,10,12 PSO2	ESC 106.2: Acquire knowledge regarding Stages in the life of construction.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- Stages in the life of construction** **2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	ESC 106.3: Gain an understanding of the various types of Roads in India and their utilization in infrastructure development.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: Types Of Roads Used In Construction** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	ESC 106.4: analyse the strength and properties of various building materials.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **analyse the strength and properties of various building materials** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	ESC 106.5: Overview of National Highway Authority of India (NHAI).	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **Overview of National Highway Authority of India (NHAI) 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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7. Mr. Satish Tiwari, Teaching Associate, Dept. of Civil Engineering

Semester-I

Course Code: **HSMC 08**
Course Title: **Sustainable Development Goals (SDGs)**
Pre-requisite: Student should have basic knowledge of Environment, Natural resources, Climate change and sustainability.
Rationale: To inculcate the knowledge base on sustainable development with a view to balance our economic, environmental and social needs, allowing prosperity for now and future generations. To train students to undertake major initiatives in the efficient management of natural resources and the prevention of environmental pollution with focus on Sustainable Development. To use environmental management tools that help to improve the quality of environment, to assess local vulnerabilities with respect to climate, natural disasters and to achieve sustainable developmental needs.

Course Outcomes:

HSMC 08.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.

HSMC 08.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability.

HSMC 08.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.

HSMC 08.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.

HSMC 08.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education for sustainable development in educational Programmes and processes.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and social science	HSMC 08	Sustainable Development Goals (SDGs)	2	0	1	1	4	2

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
HSMC	HSMC 08	**Sustainable Development Goals (SDGs)**	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 08.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1Understand about Sustainable Development **SO1.2** Understand the Need and Importance of SDGs **SO1.**3Understand the historical evolution of SDGs **SO1**.4Gain knowledge of SDGs Different goals and their importance **SO1**.5 Explain the Challenges & strategies of attaining SDGs in countries.		**Unit-1.0 Introduction to Sustainable Development** 1.1 Need and Importance of Sustainable Development 1.2 Historical & Policy perspectives of Sustainable Development 1.3 Sustainable Development: World and India Perspective 1.4 Introduction to 17 SDGs 1.5 Specific learning objectives for different SDGs 1.6 Challenges & strategies of attaining SDGs in developed and developing nations	Different SDG goals details and its importance

SW-1 Suggested Sessional Work (SW):

a. Assignments:
I. Overview of SDGs, Sustainable Consumption and Production, Details of 17 SDGs

b. Mini Project:
I. Note down the different challenges in our state and district to achieve SDG.

HSMC 08.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability and measuring.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1ExplainSustainable Development **SO2**.2 Understand the NEP-2020 and SDG **SO2**.3Discuss higher Education role to achieve SDGs **SO2**.4Explain how education for Sustainable Development **SO2.5** Explain the measuring techniques for Sustainability.		**Unit-2**.0 Special focus on SDG 4-Quality Education and Lifelong Learning 2.1 Focus of NEP-2020 on SDG 2.2 Education for Sustainable Development (ESD): 2.3 Berlin Declaration 2021 on ESD 2.4 Integration of ESD in curriculum and textbooks 2.5 Tools, Systems, and Innovation for Sustainability 2.6 Measuring Sustainability: How do we measure sustainability	1 NEP2020 Objectives and concept for SDGs

SW-2 Suggested Sessional Work (SW):

a. Assignments:

Education role to achieve SDGs, the role of education in Sustainable Development, Measuring techniques of sustainability, Sustainability Indicators.

c. Other Activities (Specify):

I. Seminar and group discussion on ESD and measuring sustainability Millennium Development Goals (MDGs)

HSMC 08.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand current economic issues in the context of the global sustainable development debate. **SO3.**2Outline of health, hygiene and water sanitation issues. **SO3**.3 Discuss the renewable energy resources and its importance in present scenario **SO3**.4 Explain the importance of sustainable production and consumption **SO3.**5 Explain the problems and solution in rural and urban areas.		**Unit-3.0 Understanding the SDGs** 3.1 Circular economy (basic model of reuse, recycle, and reduce) 3.2 Rural & urban Problems & Challenges 3.3 Sustainable production and consumption 3.4 Renewable energy 3.5 Health & Hygiene, water, sanitation& water management 3.6 Waste Management	1. Water treatment And management practices

SW-3 Suggested Sessional Work (SW):

a. Assignments:

Ecofriendly energy resources importance, types of waste and its management, Urban Problems & Challenges.

c. Other Activities (Specify):

I. Visit of waste water treatment plant, Visit of water treatment process.

HSMC 08.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Understand environmental sustainability is crucial in reducing the impacts of climate change **SO4**.2Discuss causes of emission of GHGs and its consequences **SO4**.3Explain how climate change and sustainable development both play a role in shaping the human and environmental factors of the world. **SO4**.4 Explain the importance of sustainable production and consumption **SO4.5** Climate change is disrupting national economies and affecting lives and livelihoods, especially for the most vulnerable and its mitigation.		**Unit-4.0 Climate Change, Energy and Sustainable Development** 4.1 The greenhouse effect: Causes and Consequences 4.2 Climate Change: A Threat to Sustainable Development 4.3 Adaptation to Current and Future Climate Regimes 4.4 The consequences: crop failure 4.5 Solutions technology and lifestyle changes 4.6 Mitigating Climate Change	1Agreement on Climate Change, Trade, and Sustainability Carbon Credit, carbon trading :

SW-4 Suggested Sessional Work (SW):

a. Assignments:

Urban Sustainability and Climate Change, Sustainable Development Policies, Agreement on Climate Change, Trade and Sustainability, Resilient cities – What makes a city sustainable, green, and resilient

HSMC 08.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate Values-based education for sustainable development in educational programme and processes.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understand the relevance and the concept of sustainability and the global initiatives in this direction **SO5.**2Understandrole of Corporations and Ecological Sustainability. **SO5**.3Explain role of CSR in Sustainability. **SO5**.4Understand the SD challenge for companies, their responsibility and their potentials for action **SO5**.5Discuss the role of world government for world justice and peace		**Unit-5.0 Sustainable Business Practices:** 5.1 Corporate Social Responsibility 5.2 Sustainable products and services 5.3 Business and Environment 5.4 Corporations and Ecological Sustainability 5.5 Life Cycle Assessment: LCA Overview and Application 5.6 World peace and justice: United nations goals for peace and justice World Government	Local to the Global: Can Sustainable Development Work

SW-5 Suggested Sessional Work (SW):

a. Assignments:

Consumption Patterns and Lifestyles, Company Perspectives for Environmental Sustainability, An Introduction to Economic Growth

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Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 08.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.	6	1	1	08
HSMC 08.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability.	6	1	1	08
HSMC 08.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.	6	1	1	08
HSMC 08.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.	6	1	1	08
HSMC 08.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education or sustainable development in educational Programmes and processes.	6	1	1	08
Total Hours	30	05	05	40

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 08.1	Need and Importance of Sustainable Development	03	01	01	05
HSMC 08.2	Education for Sustainable Development (ESD): Tools, Systems, and Innovation for Sustainability	02	06	02	10
HSMC 08.3	Discuss the sustainable production and consumption	03	07	05	15
HSMC 08.4	How Climate Change may be Threat to Sustainable Development	-	10	05	15
HSMC 08.5	Role of Corporations and Ecological Sustainability	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to cement plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming.

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	The Economics of Sustainable Development: The Case of India (Natural Resource Management and Policy)"	Surender Kumar and Shunsuke Managi	Springer Switzerland	2009
2.	Corporate Social Responsibility in Developing and Emerging Markets Engineering Contract	Onyeka Osuji	Cambridge	New Edition June 2022
3.	Smart Cities for Sustainable Development	Ram Kumar Mishra, Ch Lakshmi Kumari, Sandeep Chachra, P.S. Janaki Krishna	Ram Kumar Mishra, Ch Lakshmi Kumari, Sandeep Chachra, P.S. Janaki Krishna	March 2022
4.	Sustainable Development: Linking Economy, Society, Environment	Tracey Strange and Anne Bayley		

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Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: HSMC 08

Course Title: Sustainable Development Goals (SDGs)

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 08.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

concepts of sustainable development.																
HSMC 08.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 08.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 08.4: Develop skills to understand attitudes on individuals, society and their role	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.																
HSMC 08.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education or sustainable development in educational Programmes and processes.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning(SL)**

PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4,5	**HSMC 08.1**: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit 1: Introduction to Sustainable Development 1.1,1.2,1.3,1.4,1.5,1.6**	**As mentioned above**
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4,5	**HSMC 08.2**: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-2Special focus on SDG 4-Quality Education and Lifelong Learning: 2.1,2.2,2.3,2.4,2.5,2.6**	
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4,5	**HSMC 08.3**: Understand the implications of	SO1.1 SO1.2 SO1.3		**Unit-3.0 Understanding the SDGs 3.1,3.2,3.3,3.4,3.5,3.6**	

	overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.	SO1.4			
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4,5	**HSMC 08.4**: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-4.0 Climate Change, Energy and Sustainable Development 4.1,4.2,4.3,4.4,4.5,4.6**	

PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4,5	**HSMC 08.5:** Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education or sustainable development in educational Programmes and processes.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-5.0 Sustainable Business Practices 5.1,5.2,5.3,5.4,5.5,5.6**	

Curriculum Development Team

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2. Mr. Aditya Budhadhra , Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi , Assistant Professor , Dept. of Civil Engineering
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Semester-II

Course Code: **HSMC 07**
Course Title: **Indian Knowledge System**
Pre-requisite: Creating awareness among the youths about the true history and past rich culture of India.
Rationale: India has very rich and versatile knowledge system and cultural heritage since antiquity. The Indian Knowledge systems was developed on life science, medical science, literature, drama, art, music, dance, astronomy, mathematics, architecture (Sthapatyaveda), chemistry, aeronautics etc, during ancient period. In this basic course, a special attention is given to the ancient and historical perspective of ideas occurrence in the ancient society, and implication to the concept of material world and religious, social and cultural beliefs. On the closer examination, religion, culture and science have appeared epistemological very rigidly connected in the Indian Knowledge System. This land of Bharat Bhumi has provided invaluable knowledge stuff to the society and the world in all sphere of life.

Course Outcomes:

HSMC 07.1: To understand the ancient civilization, Indian Knowledge Systems, Concept of Pancha Maha Bhuta, Origin of name Bharat Varsha, Ancient Rivers, Ancient Universities and ancient agriculture.

HSMC 07.2: Students will have the ability to learn about ancient books, religious places, basic concept of Indian dance, music and arts, and fundamental aspects of Sangeeta and Natyashastra etc.

HSMC 07.3: Student will be able to gain knowledge on Vedic Science, Astronomy, Astronauts, Vedic Mathematics, Aeronautics, Metallurgy, Nakshatras, Panchang, Concept of Zero, Pi and point etc.

HSMC 07.4: Understanding on ancient Engineering, Science and Technology, Town Planning, Temple architecture, Chemistry and Metallurgy, Metal manufacturing etc.

HSMC 07.5: Student will able to understand about the Life, Nature and Health through basic concept of Ayurveda and Yoga, Traditional Medicinal Systems, Ethnomedicine, Nature conservation, World Heritage Sites etc.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and Social Sciences	HSMC 07	Indian Knowledge System	2	-	1	1	4	2

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
Humanities and Social Sciences	HSMC 07	Indian Knowledge System	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 07.1: To understand Indian Civilization and Indian Knowledge Systems.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO, 1.1. Understand Overview of Indian Knowledge Systems (IKS) SO1.2. Understand Classification of Ancient IKS texts **SO, 1.3.** Understand Introduction to pinch Maha Bhutas (Earth, Water, Fire, Sky and Air) **SO, 1.4**. Understand Origin of the name Bharat Varsha: the Land of Natural Endowments **SO, 1.5.** Understand Rivers of ancient India (The Ganga, Yamuna, Godavari, Saraswati, Narmada, Sindhu and Kaveri) **SO, 1.6.** Understand Ancient Agriculture and ancient Universities: Takashia and Nalanda, Gurukul system		**Unit-1. Indian Civilization and Indian Knowledge Systems** 1.1. Overview of Indian Knowledge Systems (IKS) 1.2 Classification of Ancient IKS texts 1.3 Introduction to pinch Maha Bhutas (Earth, Water, Fire, Sky and Air) 1.4 Origin of the name Bharat Varsha: the Land of Natural Endowments 1.5 Rivers of ancient India (The Ganga, Yamuna, Godavari, Saraswati, Narmada, Sindhu and Kaveri) 1.6 Agriculture system in ancient India, Ancient Universities: Takashia and Nalanda, Gurukul system	1 Golden era of ancient India

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Concepts of pinch Maha Bhuta, Classification of ancient texts, origin of ancient rivers

b. Mini Project:

I. Ancient Universities: Takshashila and Nalanda,

HSMC 07.2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1. Understand the Ancient Indian Books: Vedas, Puranas, Shastras, Upanishads, Mahamaya's (Ramayana & Mahabharata), Smritis, Samhitas **SO2.2.** Understand the Religious places: Puris, Dham's, Jyotirlinga, Shaktipeeths, Kumbha Mela **SO,2.3.** Understand the Legendary places of Madhya Pradesh: Ujjain, Chitrakoot, Omkareshwar, Bharhut, Maihar **SO,2.4**. Understand the Basic concept of Indian Art, Music and Dance, Indian Musical Instruments **SO2.5.** Understand the Fundamental aspects of Sangeeta and Natya shastra **SO2.6.** Understand the		**Unit-2. Indian Art, Literature and Religious Places** 2.1. Ancient Indian Books: Vedas, Puranas, Shastras, Upanishads, Mahamaya's (Ramayana & Mahabharata), Smritis, Samhitas 2.2. Religious places: Puris, Dham's, Jyotirlinga, Shaktipeeths, Kumbha Mela 2.3. Legendary places of Madhya Pradesh: Ujjain, Chitrakoot, Omkareshwar, Bharhut, Maihar 2.4. Basic concept of Indian Art, Music and Dance, Indian Musical Instruments 2.5. Fundamental aspects of Sangeeta and Natya shastra 2.6. Different schools of music, dance and painting in different regions of India	1.Indian Art, Music and Dance

different schools of music, dance and painting in different regions of India			

SW-2 Suggested Sessional Work (SW):

a. Assignments:

Visit of Chitrakoot, Maihar and Bhar Huta

b. Mini Project:

I. Kumbh mela, Story of Ramayana and Mahabharata

HSMC 07.3: Student will be able to understand Ancient Science, Astronomy and Vedic Mathematics.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1. Understand Vedic Cosmology **SO3.2**. Understand the Astronomy, Astronauts, ending Jyotish, Nakshatras, Navagraha, Rashi's, Vast shastra and their related plants **SO3.3**. Understand the Time and Calendar, Panchang **SO3.4.** Understand the Concept of Zero, Point, Pi -number system, Pythagoras **SO, 3.5.** Understand the Vedic Mathematics, Vimana-Aeronautics, Basic idea of		**Unit-3. Ancient Science, Astronomy, Mathematics** 3.1. Vedic Cosmology 3.2. Astronomy, Astronauts, Vedanga Jyotish, Nakshatras, Navagraha, Rashi's, Vast shastra and their related plants 3.3. Time and Calendar, Panchang 3.4. Concept of Zero, Point, Pi -number system, Pythagoras 3.5. Vedic Mathematics, Vimana-Aeronautics, Basic idea of planetary model of Aryabhata 3.6. Varanamala of Hindi language based on classification of sounds on the	1. Ancient Science, Astronomy and Vedic Mathematics

planetary model of Aryabhata **SO3.6.** Understand the Varanamala of Hindi language based on classification of sounds on the basis of their origin, Basic purpose of science of Vyakarana		basis of their origin, Basic purpose of science of Vyakarana	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Varanamala of Hindi language based on classification of sounds on the basis of them origin

b. Mini Project:

I. Nakshatras, Navagraha and their related plants.

HSMC 07.4: Understand the Engineering, Technology and Architecture

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO,4.1. Understand the Engineering Science and Technology in Vedic and Post Vedic Era **SO, 4.2**. Understand the Town and home planning, Sthapatyaveda SO, 4.3. Understand the Chemistry and Metallurgy as gleaned from archaeological artifacts **SO, 4.4.** Understand the Chemistry of Dyes, Pigments used in Paintings,		**Unit-4. Engineering, Technology and Architecture** 4.1. Engineering Science and Technology in Vedic and Post Vedic Era 4.2. Town and Home planning, Sthapatyaveda 4.3. Chemistry and Metallurgy as gleaned from archaeological artifacts 4.4 Chemistry of Dyes, Pigments used in Paintings, Fabrics, Potteries and Glass 4.5. Temple Architecture:	1 2. Ancient Science, Astronomy and Vedic Mathematics

Fabrics, Potteries and Glass **SO4.5.** Understand the Temple Architecture: Khajuraho, Sanchi Stupa, Chon Sath Yogini temple **SO4.6.** Understand the Mining and manufacture in India of Iron, Copper, Gold from ancient times		Khajuraho, Sanchi Stupa, Chonsath Yogini temple 4.6. Mining and manufacture in India of Iron, Copper, Gold from ancient times	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Varanamala of Hindi language based on classification of sounds on the basis of them origin.

b. Mini Project:

I. Nakshatras, Navagraha and their related plants.

d. Other Activities (Specify):

I. Power Point Presentation of Portland cement manufacture.

HSMC 07.5: Understand about the Life, Nature and Health

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1. Understand the Fundamentals of Ayurveda (Charaka & Sushrut) and Yogic Science (Patanjali), Vitaharya and Din Acharya **SO5.2.** Understand the Traditional system of Indian medicines (Ayurveda, Siddha, Unani		Unit-5. Life, Nature and Health 5.1. Fundamentals of Ayurveda (Charaka & Sushrut) and Yogic Science (Patanjali), Vitaharya and Din Acharya 5.2. Traditional system of Indian medicines (Ayurveda, Siddha, Unani and	1. Concept of Ayurveda and Yoga 2. Traditional system of Indian medicines 3. Ethnobotany y and Ethnomedical ins of India 4. World Heritage

and Homoeopathy) **SO5.3.** Understand Fundamentals of Ethnobotany and Ethnomedicines of India **SO5.4.** Understand the Nature Conservation in Indian ancient texts **SO, 5.5**. Understand the Introduction to Plant Science in Vrikshayurveda **SO,5.6.** Understand the World Heritage Sites of Madhya Pradesh: Bhimbetka, Sanchi, Khajuraho		Homoeopathy) 5.3. Fundamentals of Ethnobotany and Ethnomedicines of India 5.4. Nature Conservation in Indian ancient texts 5.5 Introduction to Plant Science in Vrikshayurveda 5.6. World Heritage Sites of Madhya Pradesh: Bhimbetka, Sanchi, Khajuraho	Sites

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Visit to world Heritage Site Khajuraho

b. Mini Project:

I. Ritucharya and Dincharya, Ethnomedicinal plants

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 07.1: To understand Indian Civilization and Indian Knowledge Systems	6	2	1	9
HSMC 07.2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places	6	2	1	9
HSMC 07.3: Student will be able to understand the Ancient Science, Astronomy and Vedic Mathematics	6	2	1	9
HSMC 07.4: Understand the Engineering, Technology and Architecture	6	2	1	9
HSMC 07.5: Understand about the Life, Nature and Health	6	2	1	9
Total Hours	30	10	05	45

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution	Total

		R	U	A	Marks
HSMC 07.1	Indian Civilization and Indian Knowledge Systems	02	05	01	08
HSMC 07.2	Indian Art, Literature and Religious Places	-	06	02	08
HSMC 07.3	Ancient Science, Astronomy and Vedic Mathematics	02	06	05	13
HSMC 07.4	Engineering, Technology and Architecture	02	04	04	10
HSMC 07.5	Life, Nature and Health	02	05	02	09
	Total	10	26	14	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to ancient monuments
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	An Introduction of Indian Knowledge Systems: Concept and Applications	Mahadevan, B.; Bhat V. R. and Pavana, Nagendra R. N.	Prentice Hall of India.	2022
2.	Indian Knowledge Systems: Vol. I and II.	Kapoor, Kapil and Singh, A. K.	D.K. Print World Ltd	2005
3.	Science of Ancient Hindus: Unlocking Nature in Pursuit of Salvation	Kumar, Alok	Create pace Independent Publishing	2014
4.	A History of Agriculture in India	Randhawa, M.S.	ICAR, New Delhi	1980

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 07
Course Title: Indian Knowledge System

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 07.1: To understand Indian Civilization and Indian Knowledge Systems	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 07.2: Students will have the ability to	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

apply the knowledge gained about Indian Art, Literature and Religious Places																
HSMC 07.3: Student will be able to Understand the Ancient Science, Astronomy and Vedic Mathematics.	2	1	2	3	2	3	2	3	2	3	2	3	2	3	2	3
HSMC07.4: Understand The Engineering, Technology and Architecture	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
HSMC07.5: Understand about the Life, Nature and Health	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8,9,10,11, 12 PSO1,2,3,4,5	HSMC 07.1: To understand Indian Civilization and	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-1. 1.1,1.2,1.3,1.4,1.5,1.6**	**Asmentionedin page number _to_**

	Indian Knowledge Systems	SO1.5 SO1.6			
PO1,2,3,4,5,6,7,8,9,10,11,12 PSO1,2,3,4,5	HSMC 07.2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-2. 2.1,2.2,2.3,2.4,2.5,2.6**	
PO1,2,3,4,5,6,7,8,9,10,11,12 PSO1,2,3,4,5	HSMC 07.3: Student will be able to understand the Ancient Science, Astronomy and Vedic Mathematics	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-3. 3.1,3.2,3.3,3.4,3.5,3.6**	
PO1,2,3,4,5,6,7,8,9,10,11,12 PSO1,2,3,4,5	HSMC 07.4: Understand the Engineering, Technology and Architecture	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-4. 4.1,4.2,4.3,4.4,4.5,4.6**	
PO1,2,3,4,5,6,7,8,9,10,11,12 PSO1,2,3,4,5	HSMC 07.5: Understand about the Life, Nature and Health	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-5. 5.1,5.2,5.3,5.4,5.5,5.6**	

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Curriculum Development Team

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Semester-II

Course Code: **BSC 103**
Course Title: **Engineering Chemistry**
Pre-requisite: Students must have fundamental knowledge of mathematics, nature of molecule, valence shell electron pair repulsion theory, and different concentration terms to understand the concept of engineering chemistry.
Rationale: The students studying engineering chemistry should possess foundational understanding about basic mathematics, different concentration terms and valence shell electron pair repulsion theory to understand the basic principle of chromatography and spectroscopic analysis.

Course Outcomes:

BSC 103.1: Apply VSEPR theory to predict the three-dimensional shapes of molecules.

BSC 103.2: Describe the concept of symmetry, chirality and optical activity and synthesize chiral drug molecule.

BSC 103.3: Explain and apply the concept of Intermolecular forces, Hydrogen bond, and transition metal complexes.

BSC 103.4: Predict the concept of thermodynamics, free energy & entropy and apply Nernst equation, water chemistry as well as explain concept of acid-base, metallurgy, Emf cell and corrosion.

BSC 103.5: Collectively aim to equip students with a comprehensive understanding of the theoretical principles, practical methodologies, and diverse applications of various spectroscopic techniques.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 103	Engineering Chemistry	3	2	2	1	8	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
BSC	BSC 103	Engineering Chemistry	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
BSC	BSC 103-L	Engineering Chemistry	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 103.1: Apply VSEPR theory to predict the three-dimensional shapes of molecules.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Describe the classification of different types of orbitals. **SO1.2** Discuss the fundamental concept of wave function and probability distribution curve. **SO1.3** Explain and apply Atomic Spectroscopy: Energies of atomic orbital's **SO1.4** Apply concept of VSEPR in the determination of geometry of various molecules. **SO1.5** Restate molecular energy level diagram of N2F2 and O2 molecules.	**LI.1.2**. Determination of viscosity of given liquid **LI.1.3** Paper chromatography, thin layer chromatography.	1.1 Introduction of orbit, orbitals and electronic configuration 1.2. Schrodinger wave equation and its derivation. 1.3. Hybridization and types of Hybridization. Intermixing of orbitals 1.4. VSEPR theory, bond pair and lone pair repulsion, 1.5. Determination of geometry of the molecules 1.6. Molecular orbital theory, 1.7. Molecular energy level diagram and bond order for homo and heteroatomic molecules 1.8. Periodicity of atomic size and ionization energy 1.9. Electron Gain enthalpy and types of electron gain enthalpy	1. Electronegativity and its application

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Applications of molecular orbital theory for the determination of bond order and Magnetic behaviour

b. Mini Project:

I. Hybridization and its application.

c. Other Activities (Specify):

Write an essay on different type of chemical bond.

BSC 103.2: Describe the concept of symmetry, chirality and optical activity and synthesize chiral drug molecule.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand The concept of representations of 3dimensionalstructure s **SO2.2** explain structural isomers Ands stereoisomers **SO2.3** describe symmetry, chirality and optical activity **SO2.4** explain and identify different types of reactions with mechanisms **SO2.5** apply the concept of Mechanism osteosynthesis drug molecules.	**LI.2.1**. To Synthesize drug Molecules and determine its perc Englefield **LI.2.2**. To determine the Acid value or sap Nonfictional e of oil/fat **LI2.3**. To Determine partite Inefficient organic substance between two Immiscible ids.	**UNIT 2: Stereochemistry, Organic reactions and synthesis of a drug molecule** **2**.1 Representations of 3dimensionalstructures **2.2** Structural isomers and stereoisomers 2.3 Symmetry and chirality, optical activity and Absolute configurations 2.4 enantiomers, diastereomers 2.5 Isomerism in transitional metal compounds 2.6 Introduction to Reaction involving substitution reaction 2.7 Addition, elimination, oxidation, redact ion reaction 2.8 cyclization and ring openings 2.9 Synthesis of a commonly Used drug molecule	1. Plane of polarized light 2. Types of symmetry

SW-2 Suggested Sessional Work (SW):

a. Assignments:

Conformational Isomerism and conformational analysis

BSC 103.3: understand the concept of Intermolecular forces, Hydrogen bond, Transition metal complexes by applying this concept

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Describe Ionic, dipolar, London dispersion force, Vander Waal Sint Reaction **SO3.2** explain Hydrogen Bond and types of hydrogen bond **SO3.3** Coordination compounds **SO3.4** describe Metal ligand bonding by VBT **SO3.5** explain Metalling and bonding yacht	LI3.1. Synthesisation of organic metal complex LI3.2. Determinate wo acid and two basics radical LI.2.3. Determination of chloride content of water	Unit- 3: Intermolecular forces and Transition metal complexes 3.1. Ionic, dipolar, London dispersion force 3.2. Vander Waals interactions 3.3. Hydrogen bond, types Of hydrogen bond. 3.4. Coordination compounds 3.5. Metallic and bonding by VBT 3.6. Metallic and bonding by CFT 3.7. The energy level diagrams for transition metal ions and their magnetic properties. 3.8. The energy level diagrams for transition metal ions and Their magnetic properties 3.9. The energy level diagrams for transition metal ions and their magnetic properties	1. Coordination Compounds IUPAC name And Werner theory 2. The energy level diagrams for transition metal ions and their Magnetic properties

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. VBT theory, CFT theory, The energy level diagrams for transition metal ions and their magnetic properties.

b. Mini Project:

II. applications of transition metal complexes.

BSC 103.4: Predict the concept of thermodynamics, free energy & entropy and apply Nernst equation, water chemistry as well as explain concept of acid-base, metallurgy, Emf cell and corrosion.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Restate concept of free energy, Free energy, Enthalpy Entropy and types of different thermodynamic system **SO4.2** Discuss the fundamental concept of cell representation standard EMF of cell **SO4.3** Explain and apply different types of concepts used in softening of water and purification of water **SO4.4** Understand and apply concept of corrosion for the development of green corrosion inhibitors. **SO4.5** Understand different acid-base concepts, ionic and solubility product of salts.	LI.4.1. Determination of hardness of water. LI.4.2. Determination of alkalinity of water LI.4.3. Chemical analysis of a salt.	**Unit4:** Use of free energy in chemical equilibrium 4.1 Introduction energy, Enthalpy Entropy, system and surroundings 4.2 Cell notation of cell, Nernst equation and its application Efficiency 4.3 Water chemistry, Hardness of water, Temporary and permanent hardness. 4.4 Water softening methods. 4.5 Introduction of corrosion, Mechanism of corrosion. 4.6 Factors affecting rate of corrosion. 4.7 Various acid base concepts, Arrhenius concept. 4.8 Lewis acid base concept, Bronsted Lowry concept 4.9 Brief idea about ionic and solubility equilibrium)	I. derivation of Nernst equation.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Applications of green corrosion inhibitors.

b. Mini Project:

I. Analysis of water quality parameters.

c. Other Activities (Specify):

II. Write an essay on acid-base concepts, ionic and solubility product of salts.

BSC 103.5: Collectively aim to equip students with a comprehensive understanding of the theoretical principles, practical methodologies, and diverse applications of various spectroscopic techniques.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understand Identification and classification of different types of EMR and vibrational modes in molecules. **SO5.2** Understand the fundamental principles of vibrational and rotational spectroscopy, including the interaction of light with molecular vibrations, the concept of infrared (IR) **SO5.3** Explain and apply Atomic Spectroscopy: - Energies of atomic orbitals. **SO5.4** Understand and apply concept of NMR, Nuclear spin, nuclear resonance. **SO5.5** Understand	LI.5.1. Verification of Beer-Lambert law LI5.2. Determination of absorption maximum of a given organic compound. LI.5.3. Determination of cell constant and conductance of solutions.	**Unit 5:** Spectroscopic techniques and applications 5.1 Introduction of spectroscopy, discovery, properties and types of electromagnetic radiation**.** 5.2 Classification of different types of vibrational modes in molecules (stretching, bending, torsional, etc.) IR activity. 5.3 Energies of atomic orbitals and electronic transition, frank Condon principle. 5.4 Introduction of NMR, 5.5. Nuclear spin, nuclear resonance. 5.6 Principle and instrumentation of NMR. 5.7. Shielding and de-shielding of magnetic nuclei. 5.8. surface characterization	1. Applications of Nuclear magnetic resonance and magnetic resonance imaging.

introduction of Xray Diffraction determination crystallographic structure of materials.		techniques. 5.9. Diffraction and scattering.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Applications Nuclear magnetic resonance and magnetic resonance imaging.

b. Mini Project:

I. Fluorescence and its applications in medicine.

c. Other Activities (Specify):

II. Writeanessayonsurfacecharacterizationtechniques.Diffractionandscattering.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 103.1: Apply VSEPR theory to predict the three-dimensional shapes of molecules.	9	6	2	1	18
BSC 103.2: Describe the concept of symmetry, chirality and optical activity and synthesize chiral drug molecule.	9	6	2	1	18
BSC 103.3: Explain and apply the concept of Intermolecular forces, Hydrogen bond, and transition metal complexes.	9	6	2	1	18
BSC 103.4: Predict the concept of thermodynamics, free energy & entropy and apply Nernst equation, water chemistry as well as explain concept of acid-base, metallurgy, Emf cell and corrosion	9	6	2	1	18
BSC 103.5: Collectively aim to equip students with a comprehensive understanding of the theoretical principles, practical methodologies, and diverse applications of various spectroscopic techniques	9	6	2	1	18
Total Hours	45	30	10	05	90

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 103.1	Atomic and Molecular Structure & Periodic properties	03	01	01	05
BSC 103.2	Stereochemistry, Organic reactions and synthesis of a drug molecule.	06	02	02	10
BSC 103.3	Intermolecular forces and Transition metal complexes.	03	07	05	15
BSC 103.4	Use of free energy in chemical equilibrium.	-	10	05	15
BSC 103.5	Spectroscopic techniques and applications.	3	02	-	5
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to raw water and waste water testing plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	A textbook of engineering chemistry	Shyamala Sundara	S. Chand	Edition2008
2.	A Textbook of Engineering Chemistry	D.P. Kothari and I. J. Nagrath	Dhanpat Rai Prakasha n	2016 – Second
3.	A Textbook of Engineering Chemistry	PC Jain And Monika J ain	Dhanpat Rai Prakasha n	Edition2018
4.	Suggested Web Sources: 1. https://nptel.ac.in/course.html 2. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=5 3. https://swayam.gov.in/explorer?category=Chemistry Mode of Delivery: Lecture, demonstration, E tutoring, discussion, assignments, quizzes, case study, power point ; LMS/ICT Tools: Digital Classrooms, DLMS, ZOOM, G-Suite, MS Power-Point, Online Resources.			

AKS University

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Department of Civil Engineering

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 103
Course Title: Engineering Chemistry

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 103.1: Apply VSEPR theory to predict the three-dimensional shapes of molecules.	3	2	3	2	3	2	3	3	2	3	2	3	2	3	2	3
BSC 103.2: Describe the concept of symmetry, chirality	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

and optical activity and synthesize chiral drug molecule.																
BSC 103.3: Explain and apply the concept of Intermolecular forces, Hydrogen bond, and transition metal complexes.	1	2	3	2	3	1	2	3	2	3	2	3	2	3	2	3
BSC 103.4: Predict the concept of thermodynamics, free energy & entropy and apply Nernst equation, water chemistry as well as explain concept of acid-base, metallurgy, Emf cell and corrosion	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 103.5: Collectively aim to equip students with a comprehensive understanding of the theoretical principles, practical methodologies, and diverse applications of various spectroscopic techniques	1	2	3	2	3	2	3	2	3	1	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

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Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1, 2,3,4, 5,6, 7,8,9, 10,11,12 PSO1,2,3, 4	**BSC 103.1:** Apply VSEPR theory to predict the three-dimensional shapes of molecules.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**LI.1.1, LI.1 .2,L I.1. 3**	**Unit-1.0 Atomic and Molecular Structure & Periodic properties1.1,1. 2,1.3,1.4,1.5,1.6, 1.7,1.8,1.9**	**History of development of periodic table 2-Elecronegativity and its application**
PO1,2,3,4,5,6,7,8,9, 10,11,12 PSO1,2,3, 4	**BSC 103.2:** Describe the concept of symmetry, chirality and optical activity and synthesize chiral drug molecule.	SO1.1 SO1.2 SO1.3 SO1.4	**LI.2.1, LI.2 .2,L I.2. 3**	**Unit-2 Stereochemistry, Organic reactions and synthesis of a drug molecule 2.1,2.2,2.3,2.4,2. 5,2.6, 2.7,2.8,2.9**	**Resonance Raman Spectroscopy, coherent anti stokes Raman Spectroscopy (CARS).**
PO1,2,3,4,5,67,8,9, 10,11,12 PSO,1,2,3, 4	**BSC 103.3:** Explain and apply the concept of Intermolecular forces, Hydrogen bond, and transition metal complexes.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**LI.3 .1, L I.3. 2 LI.3.3**	**Unit-3 Intermolecular Forces and Transition metal complexes 3.1,3. 2,3.3,3.4,3.5,3.6, 3.7,3.8,3.9**	**Nature of ML bond, coordination number, structure and detection of oxidation state.**
PO1, 2,3,4,5,6 7,8,9,10,11,12 PSO 1,2,3, 4	**BSC 103.4**: Predict the concept of thermodynamics, free energy & entropy and apply Nernst equation, water chemistry as well as explain concept of acid-base, metallurgy, Emf cell and corrosion	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**LI.4.1, LI.4 .2,L I.4. 3**	**Unit-4: Use of free energy in chemical equilibrium 4.1,4.2,4.3,4.4,4.5,4.6,4.7, 4.8,4.9**	**Quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant splitting. Applications**

PO1,2,3,4,5,67,8,9, 10,11,12 PSO1,2,3, 4	**BSC 103.5:** Collectively aim to equip students with a comprehensive understanding of the theoretical principles, practical methodologies, and diverse applications of various spectroscopic techniques	SO1.1 SO1.2 SO1.3 SO1.4	**LI.1.1, LI.1 .2, L I.1. 3**	**Unit5: Spectroscopic techniques and applications. 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	**Low energy electron diffraction and structure of surfaces.**

Curriculum Development Team

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Semester-II

Course Code: **BSC 104**
Course Title: **Engineering Mathematics-II**
Pre-requisite: Objective of this course is to familiarize the prospective engineers with techniques in Ordinary and partial differential equations and Laplace transform. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
Rationale: The program aims to develop the tool of power series and Fourier series for learning advanced engineering mathematics.

Course Outcomes:

BSC 104.1: Understand the importance of Laplace transform and elementary properties of Laplace transform.

BSC 104.2: To introduce effective mathematical tools for the solutions of ordinary differential equations and solutions with Bessel functions and Legendre functions.

BSC 104.3: Demonstrate an understanding of the Vector Calculus.

BSC 104.4: Define and recognize the method to solve Sequences and series.

BSC 104.5: Students will create the concept of a Partial Differential Equations.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 104	Engineering Mathematics-II	4	0	1	1	6	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
BSC	BSC 104	Engineering Mathematics -II	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 104.1: 1Understand the importance of Laplace transform and elementary properties of Laplace transform.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**00**
SW	**01**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the concept of Laplace transform of elementary functions. **SO1.2** Understand the Laplace transform of derivatives **SO1.3** Understand the Inverse Laplace transform **SO1.4** Understand the Application of Laplace transform.		**Unit-1.0** 1.1 Introduction of Laplace transform 1.2 Laplace transform of elementary functions. 1.3 Linearity property 1.4 Properties of Laplace transform, 1.5 Laplace transform of derivatives 1.6 Laplace transform of Integral 1.7 Multiplication by t^n 1.8 Division by t 1.9 Inverse Laplace transform 1.10 First shifting theorem 1.11 Second shifting Property 1.12 Convolution theorem 1.13 Application of Laplace transform	1. Change of scale property

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Example on properties of Laplace transform
2. Example on Laplace transform of derivatives
3. Example on Laplace transform of Integral
4. Example on Multiplication by t^n
5. Example on First shifting theorem

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test.

BSC 104.2: To introduce effective mathematical tools for the solutions of ordinary differential equations and solutions with Bessel functions and Legendre functions.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**00**
SW	**01**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand the concept Solving Second order linear differential, **SO2.2** Understand the Solution by variation of parameters **SO2.3** Understand the Power series solutions: **SO2.4** Understand the Legendre's equations and Legendre polynomials		2.1 Linear differential Equation with constant coefficients 2.2 Complimentary Function and Particular integral Second order linear differential Equations with variable coefficients: 2.3 Solution by Inspection Method 2.4 Solution by change of dependent variable 2.5 Solution by change of independent variable 2.6 Solution by variation of parameters 2.7 Power series solutions (Frobenius method): 2.8 Series for Ordinary Point 2.9 Legendre's equations and 2.10 Bessel's equation and 2.11 Tutorial	1.Examples of Frobenius method

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Example on Solution by variation of parameters
2. Example on Power series solutions:
3. Example on Legendre's equations
4. Example on Legendre polynomials
5. Example on Frobenius method

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test.

BSC 104.3: Demonstrate an understanding of the Vector Calculus.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 understand the scalar and vector point function **SO3.2** Understand the Line integrals, Surface integrals Volume integrals **SO3.3** Understand the Gradient, Curl, divergence **SO3.4** Understand the Gauss Divergence theorems, Stoke's theorems		3.1 Differentiation of vector 3.2 scalar and vector point function 3.3 Directional derivatives 3.4 Gradient 3.5 Curl 3.6 Divergence 3.7 Line integrals, 3.8 Surface integrals 3.9 Volume integrals 3.10 Green's theorems 3.11 Gauss Divergence theorems 3.12 Stoke's theorems	1.Examples on Stoke's theorems.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Example on Directional derivatives
2.Example on Gradient
3.Example on Divergence
4.Example on Surface integrals
5.Stoke's theorems

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation

c. Other Activities (Specify):

I. Quiz, Class Test.

BSC 104.4 Define and recognize the method to solve Sequences and series.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**00**
SW	**01**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Understand Convergence and Divergence of sequence **SO4.2** Understand the Tests for convergence **SO4.3** Understand Fourier series **SO4.4** understand and Calculation of limits		4.1 Limits of sequence of numbers 4.2 Convergence and Divergence of sequence 4.3 Cauchy sequence 4.4 Calculation of limits 4.5 Infinite series 4.6 Tests for convergence 4.7 Rabbe test and logarithmic test 4.8 Comparison test 4.9 Fourier series 4.10 Even and odd function 4.11 Half range sine and cosine series 4.12 Half range cosine series 4.13 Parseval's theorem	1. Some theorem on sequence.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Example on Cauchy sequence
2.Example on Tests for convergence
3.Example on Comparison test
4.Example on Fourier series
5.Example on Even and odd function

b. Mini Project:
I. Oral presentation, Poster presentation, Power Point Presentation.

d. Other Activities (Specify):
I. Quiz, Class Test.

BSC 104.5: Students will create the concept of a Partial Differential Equations

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**00**
SW	**01**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understand the Solutions of first order linear PDE **SO5.2** Understand the Solution to homogenous and non-homogenous linear PDE **SO5.3** Understand the First order PDE **SO5.4** Understand PDE of Second order by particular integral method		5.1 Definition of Partial Differential Equations 5.2 First order PDE 5.3 Solutions of first order linear PDE 5.4 Solution to homogenous PDE 5.5 non-homogenous linear PDE 5.6 PDE of Second order by complimentary function and 5.7 PDE of Second order by particular integral method. 5.8 Lagrange's Linear equation, 5.9 Charpy's method 5.10 Separation of variable method for the solution of heat equations 5.11 wave equations	1 Problems on PDE.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Example on linear PDE
2.Example on Solution to homogenous PDE
3.Example on Lagrange's Linear equation,
4.Example on PDE of Second order by complimentary function and
5.Example on Charpy's method.

b. Mini Project:

I. Oral presentation, Poster presentation, Power Point Presentation.

c. Other Activities (Specify):

I. Quiz, Class Test.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 104.1: Understand the importance of Laplace transform and elementary properties of Laplace transform	13	1	1	15
BSC 104.2: To introduce effective mathematical tools for the solutions of ordinary differential equations and solutions with Bessel functions and Legendre functions	11	1	1	13
BSC 104.3: Demonstrate an understanding of the Vector Calculus	12	2	2	14
BSC 104.4: Define and recognize the method to solve Sequences and series	13	1	1	15
BSC 104.5: Students will create the concept of a Partial Differential Equations	11	1	1	13
Total Hours	60	5	5	70

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 104.1	Understand the importance of Laplace transform and elementary properties of Laplace transform	03	01	01	05
BSC 104.2	To introduce effective mathematical tools for the solutions of ordinary differential equations and solutions with Bessel functions and Legendre functions	02	06	02	10
BSC 104.3	Demonstrate an understanding of the Vector Calculus	03	07	05	15
BSC 104.4	Define and recognize the method to solve Sequences and series	-	10	05	15

BSC 104.5	Students will create the concept of a Partial Differential Equations	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Engineering Mathematics-II	D.K, Jain	Shree Ram Prakashan.	7th Edition 2015-16.
2.	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	36th Edition, 2010
3.	Engineering Mathematics-II	D.C.Agrawal	Shree Sai Prakashan	10th Edition 2018
4.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw Hill	11th Reprint, 2010

AKS University

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 104
Course Title: Engineering Mathematics-II

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 104.1: Understand the importance of Laplace transform and elementary properties of Laplace transform	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 104.2: To introduce effective	2	1	2	3	2	3	2	3	2	3	2	3	2	1	2	3

mathematical tools for the solutions of ordinary differential equations and solutions with Bessel functions and Legendre functions																
BSC 104.3: Demonstrate an understanding of the Vector Calculus	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 104.4: Define and recognize the method to solve Sequences and series	2	1	2	3	2	3	2	3	2	3	2	3	2	1	2	3
BSC 104.5: Students will create the concept of a Partial Differential Equations	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	BSC 104.1: Importance of Civil Engineering in the infrastructural	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**

	development of society.				
PO1,2, 9,10,12 PSO2	BSC 104.2: Acquire knowledge regarding Stages in the life of construction.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-** **2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	BSC 104.3: Gain an understanding of the various types of Roads in India and their utilization in infrastructure development.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	BSC 104.4: analyse the strength and properties of various building materials.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	BSC 104.5: Overview of National Highway Authority of India (NHAI).	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Semester-I

Course Code: **ESC 104**
Course Title: **Programming for Problem Solving**
Pre-requisite: Student should have basic knowledge programming.
Rationale: Problem solving skills can help people develop more skills and build a promising career.

Course Outcomes:

ESC 104.1: Understand the basic concept of Programming languages, software, algorithm and flowchart.

ESC 104.2: Acquire knowledge regarding the building blocks of programming language.

ESC 104.3: Apply python for solving basic programming solutions.

ESC 104.4: Create algorithms using learnt programming skills

ESC 104.5: Understand real world problems and developing computer solutions for those.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 104	Programming for Problem Solving	3	4	2	1	10	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 104	Programming for Problem Solving	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva 1 & 2	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
ESC	ESC 104	Programming for Problem Solving	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 104.1: Understand the basic concept of Programming languages, software, algorithm and flowchart.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**12**
SW	**02**
SL	**01**
Total	**22**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1. Understand types of programming languages. **SO1.2.** Utilize Operating System **SO1.3.** Compare compiler, linker, loader **SO1.4**. Create algorithm and flow charts for problem	LI.1.1. Running instructions in Interactive interpreter and a Python Script. LI.1.2. Write a program to purposefully raise Indentation Error and Correct it. LI.1.3. Create Flow chart for an organization LI.1.4. Create Flow chart for an education system LI.1.5. Compare various operating systems LI.1.6. Write five features of Notepad	**Unit-1 Introduction to Programming** **1**.1 Evolution of languages: Machine languages, Assembly languages, High-level languages construction eras. 1.2 Software requirements for programming 1.3 System software like operating system 1.4 compiler, linker, loader 1.5 Application programs like editor. 1.6 Algorithm specification of algorithm 1.7. Flowcharts	1. Different types of programming languages examples. 2. Learn about various operating systems

SW-1 Suggested Sessional Work (SW):

a. Assignments:
1. Create algorithms for some real-life problems.
2. Create flowcharts for problems.

b. Mini Project:
I. Flow diagram of working of a university.

ESC 104.2: Acquire knowledge regarding the building blocks of programming language.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**12**
SW	**02**
SL	**01**
Total	**27**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1. To Understand the datatypes **SO2.2.** Identify Expressions **SO2.3.** Apply operators **SO2.4**. Use list, string tuples	LI.2.1. Write a program to demonstrate basic data type in python. LI.2.2. Write a program to compute distance between two points taking input from the user LI.2.3. Write a program add.py that takes 2 numbers as command 1. Study about different types of connection in	**Unit-2 Datatypes and Operators, Variables, Sequences and Iteration** 2.1. Data Types 2.2. Different types of Data types 2.3. Expressions, Precedence Rules 2.4. Operators 2.5. Types of Operators 2.6. Local Variables 2.7. Global Variables 2.8. List 2.9. String 2.10. Tuples 2.11. Sequence Mutations 2.12. Accumulation Patterns.	1. Operator precedence 2. Scope of variables

	AC circuit. line arguments and prints its sum. LI.2.4. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, 1/10. LI.2.5. Write a program using a for loop that loops over a sequence. What is sequence? LI.2.6. Write a program using a while loop that asks the user for a number, and prints a countdown from that number		

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Compare List and Tuples.
2. String functions with example.

b. Mini Project:

I. Create a Calculator.

ESC 104.3: Gain an understanding of the various types of Conditional Statements, Loops, Arrays and Strings.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**12**
SW	**02**
SL	**01**
Total	**25**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1. To Understand the loop types **SO3.2**. Identify the looping Expressions **SO3.3**. Apply arrays **SO3.4.** Use of user defined datatype	LI.3.1. Write a Program for checking whether the given number is an even number or not. Using a for loop. LI.3.2. Write a program using a while loop that asks the user for a number, and LI.3.3. prints a countdown from that number to zero. LI.3.4. Write function to compute God, lcm of two numbers. LI.3.5. Write a program to implement Merge sort. LI.3.6. Write a program to implement Selection sort.	**Unit-3: Conditional Statements, Loops, Arrays and Strings, User Defined Datatypes** 3.1 If-else statement, 3.2 For loop, 3.3 While Loop, 3.4 Nested Iteration, 3.5 Concept and use of arrays 3.6 Declaration and usage of arrays, 3.7, 2-dimensionalarrays, 3.8 Different types of user defined datatypes 3.9 Structure 3.10Union	i.Loops to access array elements ii.Member access in user defined data type .

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Compare the looping statements
2. Use of user defined data type with example.

b. Mini Project

Create a stopwatch

ESC 104.4: Familiarize with a concise overview of the Dictionaries and methods.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**12**
SW	**02**
SL	**01**
Total	**25**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1. Understand the concepts of Dictionaries and Dictionary Accumulation **SO4.2.** Identify the Functions/Metho ds S**O4.3.** Apply functions **SO4.4**. Use of Functions/Methods	LI.4.1. Write a program to count the numbers of characters in the string and LI.4.2. store them in a dictionary data structure. LI.4.3. Write a program to use split and join methods in the string and LI.4.4. trace a birthday of a person with a dictionary data structure. LI.4.5 Write a program for user define function. LI.4.6. Write a program to demonstrate the use of Array.	**Unit-4: Dictionaries and Dictionary Accumulation, Functions/Methods** 4.1 Dictionary Basics 4.2 Operations 4.3 Methods, accumulation. 4.4 Advantage of modularizingprogra m into functions. 4.5 Function definition. 4.6 Function invocation. 4.7 Positional Parameter Passing 4.8 Passing arrays to functions 4.9 Recursion 4.10 Library Functions	I. Preparation of process Dictionary ii. A typical Positional Parameter Passing.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Write a program that reads a string from keyboard and prints the unique words 2. Use of user defined function with example.

b. Mini Project:

Map Two Lists into A Dictionary.

ESC 104.5: Comprehend the functions of different File Handling and Memory Management

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**12**
SW	**02**
SL	**01**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understanding the file handling task **SO5.2** know the functions of file handling **SO5**.3 Importance of .csv file **SO5.4** Use of Memory Management	LI.5.1. Write a program to count frequency of characters in a given file. LI.5.2. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file? LI.5.3Write a program to read data from a file. LI.5.4. Write a program to write data into a file. LI.5.5. Write a program to copy data from one file to another. LI.5.6. Write a program for memory management	**Unit 5: File Handling and Memory Management** 5.1 File Handling 5.2 Memory Management 5.3 Concepts of files and basic file operations. 5.4 Writing Data to a .csv File. 5.5 Reading Data to from a .csv File. 5.6Memory Management Operations.	1. Role of file handling. 2.Working of .csv file

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. List the different file handling functions.

b. Mini Project:

I. Draw the chart of different types of cable and earthing.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 104.1: At the end of this chapter the student will know the basic concept of programming.	7	12	2	1	22
ESC 104.2: At the end of this chapter the student will use Operators n programs.	12	12	2	1	27
ESC 104.3: At the end of this chapter the student will describe the control flow statements.	10	12	2	1	25
ESC 104.4: At the end of this chapter the student will make function and dictionary.	10	12	2	1	25
ESC 104.5: Comprehend the functions of .csv and file handling functions.	06	12	2	1	21
Total Hours	45	60	10	05	120

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 104.1	Understand the basic concept of Programming languages, software, algorithm and flowchart.	02	08	01	11
ESC 104.2	Acquire knowledge regarding the building blocks of programming language	02	06	01	09
ESC 104.3	Apply python for solving basic programming solution	02	03	04	09
ESC 104.4	Create algorithm using learnt programming skills.	02	04	04	10
ESC 104.5	Understand real world problems and developing computer solutions for those.	03	05	03	11
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Programming for Problem Solving	R.S. Salaria, Khanna	Khanna Publishing House	2021, 4thEdition
2.	Taming Python by Programming	Jeeva Jose	Jeeva Jose	2019, 3rdEdition

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Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: ESC 104

Course Title: Programming for Problem Solving

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 104.1: At the end of this chapter the student will know the basic concept of programming.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
ESC 104.2: At the end of this chapter the student will use	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Operators n programs.																
ESC 104.3: At the end of this chapter the student will describe the control flow statements.	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
ESC 104.4: At the end of this chapter the student will make function and dictionary.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 104.5: Comprehend the functions of .csv and file handling functions.	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4	**ESC 104.1:** At the end of this chapter the student will know the basic concept of programming.	SO1.1 SO1.2 SO1.3 SO1.4	**1, 2, 3, 4, 5, 6**	**Unit-1Introduction to Programming 1.1,1.2,1.3,1.4,1.5,1.6,1.7**	**As mentioned above**
PO1,2,3,4,5,6,7,8	**ESC 104.2:** At	SO1.1	**1**	**Unit-2Datatypes and Operators, Variables,**	

,9,10,11,12 PSO1,2,3,4	the end of this chapter the student will use Operators n programs.	SO1.2 SO1.3 SO1.4		**Sequences and Iteration 2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9,2.10,2.11,2.12**	
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4	**ESC 104.3:** At the end of this chapter the student will describe the control flow statements.	SO1.1 SO1.2 SO1.3 SO1.4	**1, 2**	**Unit-3Conditional Statements, Loops, Arrays and Strings, User Defined Data Types 3.1,3.2,3.3,3.4,3.5,3.6**	
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4	**ESC 104.4**: At the end of this chapter the student will make function and dictionary.	SO1.1 SO1.2 SO1.3 SO1.4	**1, 2, 3, 4**	**Unit-4Dictionaries and Dictionary Accumulation, Functions/Methods: 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,**	
PO1,2,3,4,5,6,7,8 ,9,10,11,12 PSO1,2,3,4	**ESC 104.5:** Comprehend the functions of .csv and file handling functions.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit-5 File Handling and Memory Management: 5.1,5.2,5.3,5.4,5.5,5.6**	

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Semester-II

Course Code: **ESC 105**
Course Title: **Manufacturing Practice workshop**
Pre-requisite: Basic knowledge of mathematical skill with some scientific temperament.
Rationale: It is a place of work for preparing variety of jobs/products by using different kinds of Instruments, hand tools and Machines. In order to prepare the products in workshop, the workshop is divided into many branches according to nature of work. Ex: 1.Fitting shop 2. Welding shop 3. Sheet metal shop 4. M/c Shop 5. Foundry & Forging shop etc

Course Outcomes:

ESC 105.1: Understand various production processes, selecting appropriate methods for different material, optimizing manufacturing efficiency and ensuring product quality.

ESC 105.2: Develop fundamental skills such as measuring, cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.

ESC 105.3: Develop fundamental skills such as measuring, cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.

ESC 105.4: Appreciate and access the use of casting processes in manufacturing and understand the working of various casting processes.

ESC 105.5: Analyze and access the importance of welding processes in manufacturing and apply knowledge to select appropriate welding process based on the type of industrial application.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 105	Manufacturing Practice workshop	1	4	1	1	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 105	Manufacturing Practice workshop	15	20	5	5	5	50	50	100

Scheme of Assessment:

Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
ESC	ESC 105	Manufacturing Practice workshop	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 105.1: Understand various production processes, selecting appropriate methods for different material, optimizing manufacturing efficiency and ensuring product quality.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand various manufacturing processes, materials and technologies. **SO1.2** Acquire knowledge in cost estimation resource management and sustainable manufacturing practices.	1.1 Safety aspects pertaining to common manufacturing practices. 1.2 Introduction of tools and machines used in each process. 1.3 Basic instructions and procedures for using lathe and drilling machine. 1.4 Drawing of a simple workpiece for carrying out various lathe drilling operations 1.5Demonstration of different operations during	**Unit-1.0** Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods, CNC machining, Additive manufacturing. 1.1 Define manufacturing and various methods. 1.2 Introduction to casting, forming, machining, joining and advanced manufacturing methods. 1.3 Introduction to CNC machine.	1. Introduction to additive manufacturing .

	actual performance of work. 1.6 Fire Safety Instructions during the work.		

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Mechanical properties of engineering materials. Explain advanced manufacturing methods.

ESC 105.2: Acquired proficiency in using hand tools, understanding different types of fits and tolerances, interpreting engineering drawing and precision measurement techniques.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand different cutting tools like hacksaw, chisels etc. **SO2.2** acquire knowledge of various fitting and assembly techniques.	2.1 Safety instructions for using various fitting hand tools. 2.2 Tools Introduction 2.3 Instructions for using proper tools in the correct way 2.4 Drawing of a simple workpiece for carrying out different fitting operations. 2.5 Demonstration of different	**Unit-2** Fitting operations & power tools 2.1 Tools used in fitting shop 2.2 types of clamping tools, marking tools, cutting tools, striking tools. 2.3 Various operations performed on fitting shop	1. Types of drilling tools and threading tools.

	inspection, checking and measuring methods used for proper fitting work. 2.6 Actual performance of a small simple job.		

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Explain different striking tools with neat sketch.

II. Explain different types of vices used in fitting shop.

ESC 105.3: Develop fundamental skills such as measuring, cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 proficiency in measuring cutting and assembling wood. **SO3.2** acquire knowledge in using various tools like saws, drills and planes **SO3.3** understand joinery techniques, wood finishing and safety practices	3.1 Safety instructions for using various carpentry tools. 3.2 Carpentry tools introduction. 3.3 Instructions for using proper tools in the correct way 3.4 Drawing of a simple workpiece for preparation of common	**Unit-3:** Carpentry shop 3.1 Introduction to carpentry shop 3.2 different methods of seasoning of timber 3.3 carpentry tools	1. Defects in timber

	carpentry joinery work. 3.5Demonstration of different inspection, checking and measuring methods used for proper carpentry work. 3.6 Production of any one type of joints listed below-Dovetail Joint/Corner Joint/Mortise and Tenon Joint etc		

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Explain the different operation performed in wood working.
II. Sketch and describe the different joints made in carpentry shop.
III. Explain the different types of wood working machines used in modern wood work

b. Mini Project:

I. Production of a simple utility item using different carpentry tools and methods

ESC 105.4: Understand the basic operating principle, types, efficiency of Transformers.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO4.1 The production of cast metal component, quality control measures and adherence to manufacturing standards.	4.1 Safety instructions for foundry shop, pattern making, mould preparation. 4.2 Foundry tools introduction. 4.3 Instructions for using proper tools in the correct way 4.4 Drawing of a simple work piece for preparation of a pattern. 4.5 Instructions for sand preparation, mould preparation, melting and casting properly in the safe manner. 4.6 Production of a simple casting.	**Unit-4**: Metal casting 4.1 Introduction to foundry shop. 4.2 Pattern, Mold, Casting, pattern allowances, molding sand. 4.3 Casting procedure, core, gating system.	I.Types of molding sand.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Explain different defects in casting

II. Explain different casting terms like runner, riser , mold etc.

ESC 105.5: Analyze and access the importance of welding processes in manufacturing and apply knowledge to select appropriate welding process based on the type of industrial application.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**12**
SW	**01**
SL	**01**

Total	**17**

Session Outcomes (SOs)	**Laboratory Instructions (LI)**	**Classroom Instructions (CI)**	**Self Learning (SL)**
SO5.1 Performing set up, adjustment of flame and gas pressure, and shutdown procedure for oxyacetylene welding and cutting equipment. **SO5.2** Acquire knowledge about setting up and shutting down SMAW equipment.	5.1 Safety instructions for welding shop. 5.2 Welding tool's introduction for Electric Arc Welding process. 5.3 Instructions for using proper tools in the correct way. 5.4 Drawing of a simple welded joint viz. square butt joint, T joint, Lap joint etc. 5.5Demonstration of producing a square butt joint using MMAW process. 5.6 Actual production of a welded joint as described above.	**Unit 5:** welding shop 5.1 introduction to welding shop, classification of welding process 5.2 gas welding and its equipment's and techniques 5.3 electric arc welding and brazing process	1. Study of TIG and MIG welding process

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. What are different types of joints in welding shop.

II. What is the function of flux in gas welding.

b. Mini Project:

I. Preparing lap joint using arc welding process.

Brief of Hours suggested for the Course Outcome

Course Outcomes	**Class Lecture (Cl)**	**Laboratory Instructions (LI)**	**Sessional Work (SW)**	**Self Learning (Sl)**	**Total hour (Cl+SW+Sl)**

ESC 105.1: Understand various production processes, selecting appropriate methods for different material, optimizing manufacturing efficiency and ensuring product quality.	3	12	1	1	17
ESC 105.2: Acquired proficiency in using hand tools , understanding different types of fits and tolerances, interpreting engineering drawing and precision measurement techniques.	3	12	1	1	17
ESC 105.3: Develop fundamental skills such as measuring , cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.	3	12	1	1	17
ESC 105.4: Appreciate and access the use of casting processes in manufacturing and understand the working of various casting processes.	3	12	1	1	17
ESC 105.5: Analyze and access the importance of welding processes in manufacturing and apply knowledge to select appropriate welding process based on the type of industrial application.	3	12	1	1	17
Total Hours	15	60	5	5	85

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 105.1	Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods, CNC machining, Additive manufacturing	04	05	01	10
ESC 105.2	Fitting operations & power tools	05	04	01	10
ESC 105.3	Carpentry shop	-	05	05	10
ESC 105.4	Metal casting	04	04	02	10
ESC 105.5	Welding shop	05	03	02	10
	Total	18	21	11	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture

2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to mechanical workshops
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Elements of Workshop Technology	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K	Media promoters and publishers private limited, Mumbai	Vol. I 2008 and Vol. II 2010
2.	Manufacturing Engineering and Technology.	Kalpakjian S. And Steven S. Schmid	Pearson Education India	Edition, 2002
3.	Manufacturing Technology	Rao P.N	Tata McGraw Hill House	Vol. I and Vol. II 2007
4.	Processes and Materials of Manufacture	Roy A. Lindberg	Prentice Hall India	4 th edition, 1998
5.	Lecture note provided by Dept. of Mechanical engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 105
Course Title: Manufacturing Practice workshop

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 105.1: Understand various production processes, selecting appropriate methods for different material, optimizing manufacturing efficiency and	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

ensuring product quality.																
ESC 105.2: Acquired proficiency in using hand tools , understanding different types of fits and tolerances, interpreting engineering drawing and precision measurement techniques.	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2	3
ESC 105.3: Develop fundamental skills such as measuring , cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 105.4: Appreciate and access the use of casting processes in manufacturing and understand the working of various casting processes.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
ESC 105.5: Analyze and access the importance of welding	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

processes in manufacturing and apply knowledge to select appropriate welding process based on the type of industrial application.																

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 105.1:** Understand various production processes, selecting appropriate methods for different material, optimizing manufacturing efficiency and ensuring product quality.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1.1 1.2 1.3 1.4 1.5 1.6**	**Unit-1.0 Manufacturing Methods casting, forming, machining, joining, advanced manufacturing methods, CNC machining, Additive manufacturing 1.1,1.2,1.3**	**As mentioned above**

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 105.2:** Acquired proficiency in using hand tools , understanding different types of fits and tolerances, interpreting engineering drawing and precision measurement techniques.	SO1.1 SO1.2 SO1.3 SO1.4	**2.1 2.2 2.3 2.4 2.5 2.6**	**Unit-2 Fitting operations & power tool 2.1, 2.2, 2.3**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 105.3:** Develop fundamental skills such as measuring , cutting and joining wood. Gain expertise in handling various carpentry tools and machinery.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**3.1 3.2 3.3 3.4 3.5 3.6**	**Unit-3 : Carpentry shop 3.1, 3.2,3.3**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 105.4**: Appreciate and access the use of casting processes in manufacturing and understand the working of	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**4.1 4.2 4.3 4.4 4.5 4.6**	**Unit-4 : Metal casting 4.1, 4.2,4.3**	

	various casting processes.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 105.5:** Analyze and access the importance of welding processes in manufacturing and apply knowledge to select appropriate welding process based on the type of industrial application.	SO1.1 SO1.2 SO1.3 SO1.4	**5.1 5.2 5.3 5.4 5.5 5.6**	**Unit 5: Welding Shop 5.1,5.2,5.3**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
4. Mr. Devendra Singh, Assistant Professor, Dept. of Civil Engineering
5. Mrs. Shraddha Panday, Teaching Associate, Dept. of Civil Engineering
6. Mrs. Garima Panday, Teaching Associate, Dept. of Civil Engineering
7. Mr. Satish Tiwari, Teaching Associate, Dept. of Civil Engineering

Semester-II

Course Code: **HSMC 01**
Course Title: **Communication Skill (English)**
Pre-requisite: Students must have basic knowledge of English language.
Rationale: In order to compete in this fast-growing world, LSWR skills of the students should be well developed and enhanced. Besides, they must have effective communication skills as it plays a vital role in shaping individual's personality and career. It also boosts the confidence and prepares them to face the audience fearlessly.

Course Outcomes:

HSMC 01.1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them.

HSMC 01.2: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work

HSMC 01.3: Students will be able to communicate effectively in Hindi and English languages without hindrances.

HSMC 01.4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills

HSMC 01.5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and Social Science	HSMC 01	Communication Skill (English)	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
HSMC	HSMC 01	Communication Skill (English)	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 01.1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**

SW	**01**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1Students will be able to introduce themselves **SO1**.2Understand the concept of Oral Presentation **SO1.**3 Students will be able to dress and present effectively **SO1.4** Understand the importance of Body Language **SO1.**5 Students will be able to influence mass through skit and dramas.		**grooming, Basic Etiquettes and Presentation Skill Self-** 1.1 Self-introduction 1.2 Practice Sessions 1.3 Oral Presentation 1.4 Characteristics of presentation. 1.5 Presentation topics (The importance of Education, The importance of English in Today's World and Necessity of uniforms in a college) 1.6 Professional dressing and grooming etiquettes. 1.7 Body Language tips and techniques. 1.8 Role play sessions on following topics: Classroom interaction, Hospital Scene and Scene at Railway station 1.9 Performance by Students	(1) Prepare a presentation on the given topics. (2) Prepare a play on the given topics.

HSMC 01.2: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand the		**UNIT 2 – Confidence**	Prepare debate on

techniques of Group Discussion **SO**2.2Understand the concept of Debate **SO2**.3 Students will be able to design a professional resume and crack interview SO2.4 Explain the concept of how to ace in an interview.		**building skills, Interview Skills and Resume Writing** 2.1- Group Discussion 2.2Do's and Don'ts of GD 2.3 Group Discussion sessions on impact of Covid 19 on mental health, impact of social media on lives, pros and cons of technology 2.4 Difference between GD and Debate. 2.4 Debate 2.5 Do's and Don'ts of Debate 2.6 Debate topics on Should the Use of Plastic Be Banned? Should Parents Decide Which Career Their Children Will Pursue? Is Artificial Intelligence Useful or Dangerous? 2.7 Interviews and their Kinds 2.8 Mock Interview Session 2.9 Resume Writing.	given topics Prepare a Resume

HSMC 01.3: Students will be able to communicate effectively in Hindi and English languages without hindrances

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**01**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1Students will be able to organize and prepare speeches. **SO3**.2 Students will be able to think and speak instantaneously. **SO3**.3 To make them understand the inquiry procedure at public places.		**Unit-3: Public Speaking Skills& Conversational Skills** 3.1 Speech 3.2 Types of Speech 3.3 Speech /Anchoring on (National Science Day, Valedictory Speech, Patriotic speech). 3.4 Performance in the class.	1. Prepare a speech on the following topics. 2. Prepare on the following conversation nil topics.

SO3.4 To enable them to communicate effectively through phones.		3.5 Extempore 3.6 Extempore Topics on (Pros and Cons of Online teaching, Environment Conservation and Education of a Girl Child) 3.7 Practice Session 3.8 Conversational Topics (Inquiry at bank, Airport, Station and Hospitals). 3.9 Telephonic Conversation (Describing about Your College Day to Your Parents from Hostel, Talking with Customer Care Executive of Any E-Commerce company). 3.10 Revision	

HSMC 01.4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Understanding about the use of Prepositions. **SO4.2** Students will be able to understand the usage of Tenses **SO4**.3Undesrtand the concept of Active and Passive Voice **SO4**.4To understand the usage of Modals		**Unit-4: Functional Grammar and Vocabulary Building** 4.1 Prepositions (Place, Time and Direction) 4.2 MCQ based Questions on Prepositions. 4.3 Gap filling using prepositions. 4.4 Tenses 4.5Present Tense 4.6Past Tense 4.7 Future Tense 4.8 Voice (Active and Passive) 4.9 Modals.	Prepare the structure of Tenses and Active Passive. Prepare 250 vocabularies.

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HSMC 01.5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**01**
SL	**01**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Students will be able to understand the value of Indian Literature (R.K. Narayan) **SO5.2** Students will be able to understand the value of Indian Literature (Nissim Ezekiel) **SO5.3** Students will be able to understand the value of Indian Literature (Khushwant Singh) **SO5.4** Students will be able to understand the value of Indian Literature (Mulk Raj Anand) **SO5.5** Students will be able to understand the value of Indian Literature		**Unit 5-Indian Writing in English& Hindi** 5.1 The Axe- R.K. Narayan 5 .2 About the Author - R.K. Narayan 5.3 The Night of the Scorpion Nissim Ezekiel 5.4 About the Poet - Nissim Ezekiel 5.5 The Portrait of a Lady – Khushwant Singh 5.6 About the author- Khushwant Singh 5.7 The Lost Child- Mulk Raj Anand 5.8 The Shroud- Premchand	Prepare the summary of all the topics(The Axe, The Night of the Scorpion, The Portrait of a Lady, The Lost Child he Shroud).

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 01.1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them. Importance of Civil Engineering in the	9	1	1	11

infrastructural development of society.				
HSMC 01.2: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.	9	1	1	11
HSMC 01.3: Students will be able to communicate effectively in Hindi and English languages without hindrances.	10	1	1	12
HSMC 01.4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills.	9	1	1	11
HSMC 01.5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers	8	1	1	10
Total Hours	45	5	5	55

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 01.1	Self-Grooming, Basic Etiquettes and Presentation.	03	01	01	05
HSMC 01.2	Confidence Building and Interview Skills.	02	06	02	10
HSMC 01.3	Public Speaking Skills and Conversational Skills	03	07	05	15
HSMC 01.4	Functional Grammar and Vocabulary Building	-	10	05	15
HSMC 01.5	Indian Writings in English and Hindi	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to communication labs
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Communication Skills	Dr. Meenu Pandey	Nirali Prakashi	Third Edition 2013
2.	A Practical Guide to English Grammar	K.P. Thakur	Bharti Bhawan Publishers & Distributors.	
3.	Living English Structure	W. Stannard d Allen	Dorling Kindersley India Pvt. Ltd.	Fifth Edition,

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 01
Course Title: Communication Skill (English)

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 01.1: Importance of Civil Engineering in the infrastructural development of society.	1	2	3	2	3	2	3	2	3	2	1	2	2	3	2	3
HSMC 01.2: Acquire knowledge regarding	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Stages in the life of construction.																
HSMC 01.3: Gain an understanding of the various types of Roads in India and their utilization in infrastructure development.	1	2	3	2	3	2	3	2	3	2	1	2	3	2	3	2
HSMC 01.4: analyse the strength and properties of various building materials.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 01.5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2	**HSMC 01.1**: Students will be able to speak	SO1.1 SO1.2 SO1.3		**Unit-1.0Self-Grooming, Basic Etiquettes and Presentation. 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9**	**As mentioned above**

	confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them. Importance of Civil Engineering in the infrastructural development of society.	SO1.4 SO1.5			
1PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2	**HSMC 01.2**: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit2Confidence Building and Interview Skills. 2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9**	
PO1,2,3,4,5,6 7,8,9,10,11,12	**HSMC 01.3**: Students will be	SO1.1 SO1.2		**Unit3: Public Speaking Skills and Conversational Skills**	

PSO1,2	able to communicate effectively in Hindi and English languages without hindrances.	SO1.3 SO1.4		**3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2	**HSMC 01.4**: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit4: FunctionalGrammaranVoc pabulary Building 4.1,4.2,4.3,4.5,4.6,4.7,4.8,4.9**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2	**HSMC 01.5:** The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit5: Indian Writings in English and Hindi 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8**	

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Curriculum Development Team

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Revised as on 01 August 2023

Semester-II

Course Code: **HSMC 09**
Course Title: **Sports And Yoga**
Pre-requisite: Student should have basic knowledge of Sports and Yoga concepts
Rationale: Students of Yoga should have a legal understanding of Yoga and its original text Yoga. At the same time, they should also have adequate knowledge Yoga practices in which they should have knowledge of its basic principles and elements.

Course Outcomes:

HSMC 09.1: A make the students understand the importance of Introduction of Yoga.

HSMC 09.2: To make the students understand the importance of Fundamentals of Yoga.

HSMC 09.3: To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.

HSMC 09.4: To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of injury and Yoga & Lifestyle

HSMC 09.5: To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and social science	HSMC 09	Sport And Yoga	2	0	0	0	2	NC

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
HSMC	HSMC 09	Sport And Yoga	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 09.1: To make the students understand the importance of Introduction of Yoga.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**00**
SL	**03**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO1.1 Student will able to Understand the Meaning & Importance of Yoga **SO1.2** Student will able to Describe the Elements of Yeasting yoga **SO1.**3Student will able to Describe Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas **SO1**.4Student will able to Understand the Concept of Yoga for concentration & related Asanas **SO1**.5Student will able to Understand the Concept of Relaxation Techniques for improving concentration - Yog-Nidra.		**Unit-1. Introduction of Yoga –** 1.1 Meaning & Importance of Yoga 1.2 Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas 1.3Yoga for concentration & related Asanas (Sukh asana; Tad asana; Padmasana&Shashankasana) 1.4Relaxation Techniques for improving concentration - Yog-Nidra 1.5Relaxation Techniques for improving concentration - Yog-Nidra 1.6 Relaxation Techniques for improving concentration - Yog-Nidra	1.Meaning & Importance of Yoga 2- Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas 3-Relaxation Techniques for improving concentration - Yogendra

HSMC 09.2: To make the students understand the importance of Fundamentals of Yoga

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**00**
SL	**02**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Student will able to Understand Fundamentals of Yoga. **SO2**.2Student will able to Understand the Effect of yoga on the functioning of Various Body Systems.		**Unit-2. Fundamentals of Yoga** 2.1 Purpose yoga, definition of yoga, need and use of yoga for students. 2.2 Effect of yoga on the functioning of Various Body Systems. 2.3 Effect of yoga on the functioning of Various Body Systems 2.4Circulatory System, 2.5Respiratory System,	1. Effect of yoga on the functioning of Various Body Systems 2. Fundamentals of Yoga

		2.6 Neuro- System, Muscular System etc.	

HSMC 09.3: To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**00**
SL	**02**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Student will able to Understand Meaning & Importance Physical Fitness, Wellness & Lifestyle **SO3**.2Student will able to Understand the Components of Physical fitness **SO3**.3 Student will able to Describe **SO3.4** Student will able to Understand of Health-related fitness **SO3.5** Student will able to Understand of Preventing Health **SO3.6** Student will able to Describe Concept of Positive Life		**Unit-3. Physical Fitness, Wellness & Lifestyle** **3**.1 o Meaning & Importance of Physical Fitness & Wellness **3.2** Components of Physical fitness **3.3** Components of Health-related fitness **3.4** Components of wellness **3.5** Preventing Health Threats through Lifestyle Change **3.6** Concept of Positive Lifestyle	1. Physical Fitness 2. Wellness & Lifestyle

HSMC 09.4: To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of injury and Yoga & Lifestyle

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**

SW	**00**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Student will able to Understand Asanas as preventive measures **SO4**.2Student will able to Understand the Hypertension, Obesity, Back Pain, Diabetes, Asthma,		Unit-4. Yoga & Lifestyle 4.1 Asanas as preventive measures. 4.2 Hypertension: Tad asana, Vajrayana, PavanMuktasana, Ardha Chakras Ana, Bhilangana, Sharasana. 4.3 Obesity: Procedure, Benefits & contraindications for Vajrayana, Hastasana, Trikonasana, ArdhMatsyendrasana 4.4 Back Pain: Tadasana, ArdhMatsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. 4.5 Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, PavanMuktasana, ArdhMatsyendrasana. 4.6 Asthema: Procedure, Benefits & contraindications for Sukh asana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana	1. Asanas as preventive measures

HSMC 09.5: To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health Postures.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**00**
SL	**01**
Total	**07**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To what extent you are able to Impart the knowledge on importance of Civil Engineering in development of society **SO5.2** Overview of Indian Road Congress **SO5.3** Role of the new technologies in the field of civil engineering		**Unit 5:** Indian Road Congress 5.1 History of Indian Road Congress. 5.2 Advantages of IRC 5.3 Overview of National Highway Authority of India (NHAI) 5.4 Various Road Plan introduced in NHAI 5.5 Overview of American Society of Civil Engineers (ASCE) 5.6 Emerging areas a new technology in the field of civil engineering	1. History of IRC. 2. Role of ASCE for Civil Engineers.

SW-5 Suggested Sessional Work (SW):
a. Assignments:

i. Yoga & Lifestyle
ii. Physical Fitness, Wellness & Lifestyle

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 09.1: To make the students understand the importance of Introduction of Yoga	6	0	3	9
HSMC 09.2: To make the students understand the importance of Fundamentals of Yoga	6	0	2	8
HSMC 09.3: To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.	6	0	2	8
HSMC 09.4: To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of injury and Yoga & Lifestyle	6	0	1	7
HSMC 09.5: To develop among students an appreciation of physical activity as a lifetime	6	1	1	8

pursuit and a means to better health Postures				
Total Hours	30	02	09	40

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 09.1	Introduction of Yoga	10	10	00	20
HSMC 09.2	Fundamentals of Yoga	10	10	00	20
HSMC 09.3	Physical Fitness, Wellness & Lifestyle	10	10	00	20
HSMC 09.4	Yoga & Lifestyle	10	10	00	20
HSMC 09.5	Postures	10	10	00	20
	Total	50	50	00	100

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Modern Trends and Physical Education	Prof. Ajmer Singh.		
2.	Light On Yoga	B.K.S. Iyengar		
3.	Health and Physical Education	– NCERT (11th and 12th Classes)		

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 09
Course Title: Sport And Yoga

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 09.1: To make the students understand the importance of of Yoga	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 09.2: To make the students understand the Fundamentals of Yoga	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

HSMC 09.3: To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 09.4: To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of inj	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 09.5: To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health Postures.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**

PO:1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2	**HSMC 09.1**: To make the students understand the importance of of Yoga	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1.0 Introduction of Yoga 1.1,1.2,1.3,1.4,1.5,1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2	**HSMC 09.2**: To make the students understand the Fundamentals of Yoga	SO2.1 SO2.2		**Unit-2 Fundamentals of Yoga 2.1, 2.2, 2.3, 2.4,2.5,2.6**	
PO:1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2	**HSMC 09.3**: To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5 SO3.6		**Unit-3: Physical Fitness, Wellness & Lifestyle 3.1, 3.2, 3.3, 3.4, 3.5 ,3.6,3.7,3.8,3.9,3.10,3.11,3.125.**	
PO:1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2	**HSMC 09.4**: To create a safe, progressive, methodical and efficient activity-based plan to enhance	SO1.1 SO1.2		**Unit-4: Yoga & Lifestyle 4.1, 4.2, 4.3, 4.4, 4.5, 4.6**	

	improvement and minimize risk of injury				
PO:1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2	**HSMC 09.5:** To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health Postures.	SO1.1 SO1.2 SO1.3		**Unit-5: Postures Equations5.1, 5.2, 5.3, 5.4, 5.5, 5.6**	

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AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Semester-III

Course Code: **PCC CE 02**
Course Title: **Surveying**
Pre-requisite: 1. Knowledge of Surveying Practice – I & Surveying-II
2. Basic knowledge of mathematics
3. A determination of the Field survey and data collection
4. A laboratory course that acquaints students with experimental techniques and approaches used to prepare plan and map of area.

Rationale: In surveying aim is to prepare a plan and a section of an area to be covered by the project. From these prepared maps and sections, the best possible alignment, amount of earthwork and other necessary details depending upon the nature of the project can be calculated.

Course Outcomes:

PCC CE 02.1: Explain Basic surveying instruments and techniques.

PCC CE 02.2: Apply skills in using basic surveying instruments and analyze data.

PCC CE 02.3: Apply skills to conduct traverse survey & to find the area.

PCC CE 02.4: Describe the principles and various methodologies involved in tachometry.

PCC CE 02.5: Identify the various parts of equipment used in theodolite and Tachometer.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 02	Surveying	3	1	2	1	7	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 02	Surveying	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 02	Surveying	35	10	5	50	50	100

Course-Curriculum Detailing:
This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom

Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 02.1: Surveying & Levelling.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**03**
SW	**02**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 What do you mean by Survey and their application? **SO1.2** Explain Basic terms and importance of survey operation. **SO1.3** Define the term of plane table and levelling **SO1.4** What do you mean by linear measurement and how it can be use to calculate the length **SO1.5** What do you mean Levelling and Countering Laboratory-	1. Ranging & Chaining of Survey lines. 2. Field work & Plotting of Chain survey 3. Compass Surveying- Prismatic Compass& Surveyor compass Uses, Bearings, Local attraction, Fieldwork & Plotting. 4. Determination of linear measurement 5. Determination of leveling 6. Determination of Area calculation	**UNIT-I** Surveying & Levelling: 1.1- Basic Definitions of Surveying and Principles 1.2- Classification of surveying 1.3 Methods of Linear Measurement Ranging 1.4- Principles of Surveying 1.5 Accessories for linear measurement 1.6- Chain Surveying, Compass Surveying 1.7 Plane Table Surveying, Correction and Errors Definition of Levelling 1.8- types of levelling operations 1.9 Computation of Area and Volumes	1. Introduction, Types of Chains. 2. Elaborate the Calculation of area 3. How to use leveling work in ground.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
I. Write the basic principle of surveying and also write the various uses of surveying

b. Mini Project:
I. Sketch the plotting an area of project site.

c. Other Activities (Specify):
I. Quiz

PCC CE 02.2 Theodolite Traversing.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**02**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand the setting out of theodolite. **SO2.2** how to setting out and how to calculate angle difference between two point. **SO2.3** What do you mean by latitude & Departure. **SO2.4** how to plotting and adjustment of theodolite. **SO2.5** measurement of EDM by different of equipment. **SO2.6** how to use of Trigonometric Levelling	1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles 2. Trigonometric leveling – heights and distances problem. 3. Trigonometric leveling – heights and distances problem.	**Unit –II** Theodolite Traversing 2.1 Types of theodolites 2.2 Temporary and permanent Adjustment of Theodolite. 2.3 latitude & Departure 2.4 plotting & Adjustment 2.5 Omitted Measurements EDM 2.6 Trigonometric Levelling	i. Discuss the various type of theodolite ii. Give a brief description of plotting and adjustments of EDM equipment

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. compare the ODM equipment and EDM Equipment.

b. Mini Project:

I. Calculate the elevation of different points by Trigonometric Levelling.

c. Other Activities (Specify):

I. Group Discussion

PCC CE 02.3: Tacheometry.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**03**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Apply the knowledge of principles and purpose of Tacheometry in finding out the constants. **SO3.2** use of tacheometry for traversing and contouring. SO3.3 Uses of counter plan.	1. Determine horizontal distance by Horizontal sight 2. Determine Horizontal distance and elevation for inclined sight with staff held vertical by Stadia hair method. 3. Measurement of horizontal distance. 4. preparation of contour map.	**Unit-3:** Tacheometry 3.1 Tachometric systems and principles 3.2- stadia system 3.3- uses of analytic lens, 3.4- tangential system, 3.5- subtense system 3.6 instrument constant 3.7- field work reduction 3.8- direct-reading tachometer, 3.9-use of tacheometry for traversing and contouring 3.10 Tachometric contouring 3.11 Tangential and Stadia Tachometry surveying 3.12 Uses of counter plan and map	i. Prepare the contour maps of the given area in your locality ii. Prepare a topographical map by using total station

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. List the accepted standards of water used for domestic purposes on the points discussed.

b. Mini Project:
I. Sketch a Collar joint for Concrete and Asbestos cement pipe jointing.

c. Other Activities (Specify):
I. Class test

PCC CE 02.4: Understand the basic operating principle, types, efficiency of Transformers.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**02**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Formulate the setting out of curve by linear and angular methods. **SO4.2.** a knowledge of different type of curve **SO4.3** setting out. Of different type of curve	1. Collection of data for different type of curve. 2. Setting out Compound curves given two Radii by Deflection angle method.	**Unit-4:** Curves 4.1 Classification and use of curve 4.2 Elements of circular curves 4.3 Calculations 4.4 setting out curves by offsets and 4.5 theodolites 4.6 compound curves 4.7 reverse curves transition curves 4.8 vertical curves, 4.9 setting out. Of different type of curve	i.Find out the parameters of a curve for an existing road in your locality. ii. Detailed study report on telescope used in surveying instrument.

SW-4 Suggested Sessional Work (SW):

b. Mini Project:
I. prepare the detailed note and experiment of different type of curve.

c. Other Activities (Specify):
I. poster making in WTP.

PCC CE 02.5: Hydrographic Survey.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Prepare a report on any one of the following. Arial survey, photogrammetric survey, hydrographic survey, military survey and mine survey. **SO5.2** with the help of photographic survey find out the location of construction site and ground feature **SO5.3** One of the most important reasons for photographic survey collection of data in photo frame	1. Determination of an aerial survey by photographic survey 2. to prepare a map and plan by using AutoCAD	**Unit 5:** Hydrographic Survey 5.1- Principles of photographic Surveying 5.2- aerial photography 5.3 tilt and height distortions 5.4- tilt and height distortions 5.5 computations 5.6- plotting 5.7 methods of observations 5.8 methods of observations 5.9- Soundings	i. State the requirements of a plotting of area ii. State the functions of a photographic survey

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. List the components of total station.

b. Mini Project:

I. basic knowledge of Total station and how to set out in the field.

c. Other Activities (Specify):

I. Quiz

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)

PCC CE 02.1: Apply the knowledge of in different operations in civil engineering projects.	9	3	2	1	15
PCC CE 02.2: Able to understand the different methods and techniques of surveying lIKS101e levelling, compass survey, contouring and curve settings etc. and their applications in surveying	6	2	2	2	12
PCC CE 02.3: Able to use survey instruments in carrying out survey, collect data, write reports and able to perform required calculations to achieve the objective for different types of surveying for different Engineering projects.	12	3	2	2	19
PCC CE 02.4: Able to apply the concept of Tacheometry for surveying in difficult and hilly areas to obtain the topographical map of area.	9	2	2	2	15
PCC CE 02.5: Able to control the accumulation of errors in projects.	9	4	2	2	17
Total Hours	45	14	10	09	78

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 02.1	Surveying & Levelling	03	01	01	05
PCC CE 02.2	Theodolite Traversing	02	02	06	10
PCC CE 02.3	Tacheometry	02	03	10	15
PCC CE 02.4	Curves	-	05	10	15
PCC CE 02.5	Hydrographic Survey	03	02	-	05
	Total	10	13	27	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to surveying site
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)

8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Fundamentals of Surveying	S.K.Roy	Vol.IKS101hann a Publishers New Delhi,	2010
2.	Surveying Vol 1 & 2	B.C.Punmia	Vol.I Standard Book House New Delhi,	2010

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 02
Course Title: Surveying

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 02.1: Explain Basic surveying instruments and techniques.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 02.2: Apply skills in using basic surveying instruments and analyze data	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

PCC CE 02.3: Apply skills to conduct traverse survey & to find the area	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 02.4: Describe the principles and various methodologies involved in tachometry	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 02.5: Identify the various parts of equipment used in theodolite and Tachometer	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 02.1:** Explain Basic surveying instruments and techniques.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 02.2:** Apply skills in using basic surveying	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	

	instruments and analyze data				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 02.3:** Apply skills to conduct traverse survey & to find the area	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 02.4**: Describe the principles and various methodologies involved in tachometry	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 02.5:** Identify the various parts of equipment used in theodolite and Tachometer	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
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Semester-III

Course Code: **BSC 201**
Course Title: **Engineering Mathematics-III**
Pre-requisite: Students should review the fundamentals of calculus, linear algebra, and differential equations, and matrix operations
Rationale: The program aims to develop advanced problem- solving and analytical skills and prepares students for careers in academia, research, industry, or other sectors that require advanced mathematical expertise.

Course Outcomes:

BSC 201.1: By the end of the course students are expected to have deep understanding in complex analysis with a focus on Cauchy-Riemann equations, analytic functions, harmonic functions, and conformal mappings.

BSC 201.2: By the end of the course students are expected to understand the concept of a contour integral in the complex plane, concept of zeros of analytic functions and behavior of functions near essential singularities.

BSC 201.3: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course in elementary probability theory and random variables.

BSC 201.4: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course covering measures of central tendency and measures of dispersion.

BSC 201.5: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course covering correlation and regression, rank correlation, curve fitting, and various tests of significance.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 201	Engineering mathematics-III	4	0	1	1	6	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
BSC	BSC 201	Engineering mathematics -III	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 201.1: By the end of the course students are expected to have deep understanding in complex analysis with a focus on Cauchy-Riemann equations, analytic functions, harmonic functions, and conformal mappings.

Approximate Hours

Item	Approx. Hours

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CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand and state the Cauchy-Riemann equations for a complex-valued function. **SO1.2** Determine the real and imaginary parts of a complex function and check for analyticity using the Cauchy- Riemann equations **SO1.3** Identify and define analytic functions in the complex plane **SO1.4** Understand the concept of Represent functions as Taylor and Laurent series; classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.		**Unit-1.0** Complex Variable 1.1Definition of Analytic function. 1.2 Cauchy-Riemann equations in Cartesian form and polar form. 1.3 Questions of Analytic function based on Cartesian form 1.4 Questions of Analytic function based on polar form 1.5 Harmonic function and orthogonal functions 1.6 Conjugate Method for construction of an analytic function 1.7 Milne's method for construction of an analytic function 1.8 Totorial- 1 1.9 Conformal mappings, 1.10 questions of Conformal mappings 1.11 Mobius transformations 1.12 properties of Mobius transformations.	SL.1 Apply the Cauchy- Riemann equations to verify the analyticity of a given function. SL.2 Explore the properties of trigonometric functions in the context of complex analysis SL.3 Define logarithmic functions and explore their behavior in the complex plane

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Write the application of complex function.

ii. Properties of Complex Variables.

iii. Write all formula of complete unit.

c. Other Activities (Specify):

I. Quiz, Class Test.

BSC 201.2: By the end of the course students are expected to understand the concept of a contour integral in the complex plane, concept of zeros of analytic functions and behavior of functions near essential singularities.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand the concept of a contour integral in the complex plane. **SO2.2** Evaluate contour integrals using parametrization and integration techniques. **SO2.3** Apply contour integrals to evaluate complex integrals. **SO2.4** State and understand the Cauchy Integral formula for analytic functions **SO2.5** Apply the Cauchy Integral formula to calculate values of analytic functions		**Unit-2.0** Complex Variable (Integration). 2.1 Cauchy's integral formula for analytic function 2.2Questions of Cauchy's integral formula for simple poles. 2.3 2Questions of Cauchy's integral formula for order poles. 2.4 Residues of an analytic function 2.5 Questions of Residues for simple poles 2.6 5 Questions of Residues for order poles 2.7 Residue theorem and based questions 2.8 Poles and singularities of analytic function 2.9 Zeros of analytic function 2.10 questions of Singularity. 2.11 tutorial 1 2.12 tutorial 2	SL.1 Apply contour integrals to evaluate complex integrals. SL.2 Compute Taylor series expansions for given functions SL.3 Define residues of complex functions and understand their significance

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. write a short notes on singularities.

ii. Define poles and zeros with example.

b. Mini Project:
I. Oral presentation, Power Point Presentation.

c. Other Activities (Specify):
I. Quiz, Class Test.

BSC 201.3: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course in elementary probability theory and random variables.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand the fundamental concepts of probability theory **SO3.2** Develop an appreciation for the role of probability in modeling uncertainty and randomness **SO3.3** Define probability using a mathematical framework. **SO3.4** Understand probability axioms and laws governing probability measures **SO3.5** Classify events as mutually exclusive, exhaustive, dependent, or independent		**Unit-3.0** Probability and Random Variable 3.1 definition of probability 3.2 Mathematical definition of probability 3.3 Various types of events 3.4 Additive law of probability 3.5 Multiplicative law of probability 3.6 Compound probability 3.7 Conditional probability 3.8 Bays rule of probability 3.9 Discrete random variable 3.10 Continuous random variable 3.11 Binomial distribution 3.12 illustrations	SL.1 Analyze compound probability involving multiple events SL.2 Define and understand conditional probability SL.3 Define and understand the concept of a random variable

SW-3 Suggested Sessional Work (SW):

a. Assignments:
i) Define probability using a mathematical framework.

ii) write the application of probability in daily life.

b. Mini Project:

I. Oral presentation, Power Point Presentation.

BSC 201.4: Students will compute the expression of permutation groups by using permutation multiplication.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Define arithmetic mean and understand its significance. **SO4.2** Compute the arithmetic mean for both grouped and ungrouped data. **SO4.3** Apply different methods (direct method, assumed mean method) for calculating the arithmetic mean. **SO4.4** Understand the properties of the arithmetic mean, including its sensitivity to extreme values. **SO4.5** Define the median and understand its interpretation**.**		**Unit-4**: Measures of Central Tendency 4.1 methods of calculating Arithmetic mean 4.2 methods of calculating median. 4.3 properties of mean and median 4.4 Nnumerical of mean for different data. 4.5 4 numerical of median for different data 4.6 methods of calculating mode. 4.7 relation-based question of mean median and mode 4.8 Measures of dispersion 4.9 Range 4.10 quartile deviation 4.11 standard deviation and its properties 4.12 Illustrations	1. Define mode and recognize its applications 2. Understand the concept of unimodal, bimodal, and multimodal distributions. 3. Explore the relationships and patterns among the mean, median, and mode.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Write the application of mean median and mode.
ii. Explain mean with real life example.

b. Other Activities (Specify):
I. Quiz, Class Test.

BSC 201.5: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course covering correlation and regression, rank correlation, curve fitting, and various tests of significance.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**01**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Define correlation and understand its significance in statistical analysis. **SO5.2** Recognize the types of relationships between variables (positive, negative, or none) based on correlation. **SO5.3** Calculate and interpret Pearson's correlation coefficient. **SO5.4** Define and calculate rank corelation coefficient. **SO5.5** Understand the use of rank correlation in cases where variables may not have a linear relationship.		**Unit-5.0** 5.1 Definition of Correlation 5.2 formula of correlation coefficient 5.3 Questions of correlation coefficient 5.4 Definition of regression 5.5 question of line of regrattion 5.6 rank correlation 5.7 fitting of a straight line 5.7 fitting of a second degree parabola 5.8 fitting of different curves 5.9 Tutorial-1 5.10 Test of significance for large sample 5.11 Test of significance for small sample 5.12 Tutorial-2	1. Define regression analysis and understand its purpose in modelling relationships between variables. 2. Apply the method of least squares to fit straight lines, second degree parabolas, and more general curves to datasets. 3. Test the difference between two proportions

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Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 201.1: By the end of the course students are expected to have deep understanding in complex analysis with a focus on Cauchy-Riemann equations, analytic functions, harmonic functions, and conformal mappings.	12	1	1	14
BSC 201.2: By the end of the course students are expected to understand the concept of a contour integral in the complex plane, concept of zeros of analytic functions and behavior of functions near essential singularities.	12	1	1	14
BSC 201.3: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course in elementary probability theory and random variables.	12	1	1	14
BSC 201.4: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course covering measures of central tendency and measures of dispersion.	12	1	1	14
BSC 201.5: The course provides a comprehensive overview of the skills and understanding that students are expected to gain from a course covering correlation and regression, rank correlation, curve fitting, and various tests of significance.	12	1	1	14
Total Hours	60	5	5	70

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 201.1	Complex Variable – Differentiation	03	03	04	10
BSC 201.2	Complex Variable – Integration	05	04	01	10
BSC 201.3	Probability and Random Variable	03	04	03	10
BSC 201.4	Measures of Central Tendency and Measures of Dispersion	05	03	02	10
BSC 201.5	Statistics	04	04	02	10
	Total	20	18	12	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Engineering Mathematics-III	D. K. Jain.	Shree Ram Prakashan	1st edition, 2018
2.	Engineering Mathematics-III	D.C.Agrawal	Shree Sai Prakashan	2022
3.	Introduction to Engineering	H.K.Dass	S Chand Prakashan	2nd edition, 2014
4.	Engineering Mathematics-III	Sonendra Gupta	Dhanpat Rai Publishing	

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 201
Course Title: Engineering Mathematics-III

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 201.1: By the end of the course students are expected to have deep understanding in complex analysis with a focus on Cauchy-Riemann equations,	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

analytic functions, harmonic functions, and conformal mappings.																
BSC 201.2: By the end of the course students are expected to understand the concept of a contour integral in the complex plane, concept of zeros of analytic functions and behavior of functions near essential singularities.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 201.3: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course in elementary probability theory and random variables.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 201.4: The course provide a comprehensive overview of the skills and understanding that students are expected	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

to gain from a course covering measures of central tendency and measures of dispersion .																
BSC 201.5: The course provides a comprehensive overview of the skills and understanding that students are expected to gain from a course covering correlation and regression, rank correlation, curve fitting, and various tests of significance.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**BSC 201.1**: By the end of the course students are expected to have deep understanding in complex analysis with a focus on	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**

	Cauchy-Riemann equations, analytic functions, harmonic functions, and conformal mappings.				
PO1,2, 9,10,12 PSO2	**BSC 201.2**: By the end of the course students are expected to understand the concept of a contour integral in the complex plane, concept of zeros of analytic functions and behavior of functions near essential singularities.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**BSC 201.3**: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course in	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5.**	

	elementary probability theory and random variables.				
PO1,2, 9,10,12	**BSC 201.4**: The course provide a comprehensive overview of the skills and understanding that students are expected to gain from a course covering measures of central tendency and measures of dispersion .	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**BSC 201.5:** The course provides a comprehensive overview of the skills and understanding that students are expected to gain from a course covering correlation and regression, rank correlation, curve	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

	fitting, and various tests of significance.				

Curriculum Development Team

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Semester-III

Course Code: **BSC 106 AU**

Course Title: **Environment Science (Audit)**

Pre-requisite: To study this course, the student must have a knowledge about the environmental components, pollution, biodiversity and ecosystem at senior secondary, Class 12'h level

Rationale: Environmental awareness is today's need as pollution impact is highly increasing. Environmental legislation and Audit is the mechanism to enforce environment friendly techniques/methods to business and industries. And hence knowledge of environmental legislation and audit is an essential requirement for environment engineers. This course therefore aims to develop in students, knowledge of the legal concepts, procedures and techniques which have evolved. The course also provides knowledge of tools about the environmental audit. The course will also help students to understand and carry out the environmental auditing and life cycle assessment.

Course Outcomes:

BSC 106 AU.1: Gain an understanding of the fundamental of industrial pollution.

BSC 106 AU.2: To educate, train about environmental laws and policies.

BSC 106 AU.3: Implement critical thinking toward Environmental Management System.

BSC 106 AU.4: Develop, Implement, maintain Environmental Audit for Organizations

BSC 106 AU.5: For environmental protection, social equity and sustainable development.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Basic Science Course	BSC 106 AU	Environment Science (Audit)	2	0	1	1	4	0

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
BSC	BSC 106 AU	Environment Science (Audit)	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

BSC 106 AU.1: Gain an understanding of the fundamental of industrial pollution.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**01**
SL	**02**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand air pollution and its sources. **SO1.2** Know about gaseous and particulate pollutants. **SO1.3** Observe the sources of water pollution. **SO1.4** Learn about water quality parameter. **SO1.**5 Evaluate the effects of noise pollution.		**Unit-1** Industrial pollution and its mitigation 1.1 Air Pollution: Sources, classification of air pollutants 1.2 Mitigation and control measures of Particulate matters and gaseous pollutants 1.3 Water Pollution: sources, classification 1.4 Water quality parameters, 1.5 Control measures of water pollution 1.6 Soil pollution and impacts, soil conservation, 1.7 Noise pollution: sources, effects and control measures.	1. Difference between pollution and pollutants. 2. Water quality standards.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Classify the air pollutants on different basis.

ii. Describe control measures of noise pollution

b. Mini Project:

I. Enlist the PPEs which used to minimize the effects of noise pollution.

c. Other Activities (Specify):

I. Measure the air quality of different places by using Sammer App.

BSC 106 AU.2: To educate /train about environmental Laws and policies.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO2.1 Know about the environmental acts. **SO2.2** To learn about Water Pollution act. **SO2.3** To understand the air Pollution Act. **SO2.4** To discuss about Environmental protection act. **SO2.**5 To lean about the waste management act.		**Unit-2** Environmental Law and Policy 2.1 Highlights of the Environmental Acts. 2.2 Institutional arrangements for The water (Prevention & Control of pollution) Act 1974. 2.3 The Air (Prevention & Control of pollution) Act 1981. 2.4 The Environmental Protection Act 1986, 2.5 The waste management Act 1996, 2.6 The National Green Tribunal act.	i.What is the difference between law and policies

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Mention the measure provisions of air pollution control act.

ii. Describe waste management act.

BSC 106 AU.3: Implement critical thinking toward Environmental Management System

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Know about ISO 14000 & 14001. **SO3.2**Learn applications of EMS **SO3.3**Know the methods of EIA **SO3.4**Apply the methods		**Unit-3:** Environmental Management System 3.1 ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS 3.2 Concept of continual improvement and pollution	i. ISO Certification

of EIA **SO3.**5 Discuss about sustainable development.		prevention. 3.3 Applications of EMS, Environmental Management plan. 3.4 Introduction and Principle – purpose of EIA 3.5 Sustainable development and EIA 3.6 The EIA Process – methodologies and practice.	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Methods of EIA
ii. Applications of EMS
iii. Environmental Management Plan

b. Mini Project:
Study the EIA reports of different developmental Projects and create a EIA report for nearby zoos and safari.

BSC 106 AU.4: Develop, Implement, maintain Environmental Audit for Organizations.

Approximate Hours

Item	Approx. Hours
CI	**05**
LI	**00**
SW	**01**
SL	**01**
Total	**07**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Define environmental auditing. **SO4.2** Know the Scopes of Environmental auditing. **SO4.3** learn the objectives of environmental auditing. **SO4.4** Apply the methods of Auditing. **SO4.5** Create the auditing		**Unit-4:** Environmental Audit-Scope and Requisites 4.1 Introduction to Environmental Auditing, 4.2 Objectives and scope, Types, Basic structure of Environmental Auditing, General Audit Methodology 4.3 Elements of Audit	i. Process / methods of environmental auditing in any industry.

reports.		Process: coverage- GOI notification on environmental audit- benefits to industry. 4.4 Reporting environmental audit findings- 4.5 Importance of environmental audit report to industry, public and the government.	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Objectives, scope& Types of environmental auditing.

b. Other Activities (Specify):

I. Create an environmental audit report for nearby zoos and safari.

BSC 106 AU.5: For environmental protection, social equity and sustainable development

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**01**
SL	**00**
Total	**07**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Learn to prepare electricity consumption report of any institution. **SO5.2** known to prepare water consumption report. **SO5.3** apply survey skills of any institution. **SO5.4** Examine environmental related services. **SO5.**5 Acquire Skill to compile data& results for audit report.		**Unit 5:** Practical Hands-on Exercise: Attempt any three 5.1 Prepare an interpretive electricity consumption report of the organization/ institution over a five-year period (both actual or arbitrary data can be used). 5.2 Prepare an interpretive water consumption report of the organization/ institution over a five-year period (both actual or arbitrary data can be used). Also, identify the	

		sources of wastewater discharge and its management, if any. 5.3 Survey the campus and prepare a list of the plant/ animal (or both) diversity, highlighting its importance and threats faced. 5.4 Prepare a comprehensive assessment report of Solid Waste Management at the organization/ institution highlighting compliance to Waste Management Acts, 2019. 5.5 Examine various environment- related practices and activities of the organization/ institution that have impacted the neighbouring communities and prepare a social audit questionnaire for studying the impact. 5.6 Compile the data, results, and analysis of all previous practical and prepare a detailed environmental audit report of your selected organization/ institution.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I Prepare an interpretive electricity consumption report of the organization/ institution over a five-year period (both actual or arbitrary data can be used).

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
BSC 106 AU.1: Gain an understanding of the fundamental of industrial pollution.	7	1	2	10
BSC 106 AU.2: To educate train about environmental laws and policies.	6	1	1	8
BSC 106 AU.3: Implement critical thinking toward	6	1	1	8

Environmental Management System.				
BSC 106 AU.4: Develop, Implement, maintain and Audit Environmental Management systems for Organizations.	5	1	1	7
BSC 106 AU.5: For environmental protection, social equity and sustainable development.	6	1	0	7
Total Hours	30	05	05	40

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
BSC 106 AU.1	Gain an understanding of the fundamental of industrial pollution	03	01	01	05
BSC 106 AU.2	To educate train about environmental laws and policies	02	06	02	10
BSC 106 AU.3	Implement critical thinking toward Environmental Management System	03	07	05	15
BSC 106 AU.4	Develop, Implement, maintain and Audit Environmental Management systems for Organizations.	-	10	05	15
BSC 106 AU.5	For environmental protection, social equity and sustainable development	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to nearby zoos and safari
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Environmental Health and Safety Audits: A Compendium of Thoughts and Trends	Cahill, L.B	Bernan Press.	2017
2.	Handbook of Energy Audits	Thuman, A., Niehus, T., Younger, W.J.		2012
3.	Environmental Audits. Mercury Learning &Information.	Taylor and Francis Van Guilder, C.V		2014
4.	A Guide to Local Environmental Auditing	Barton, H., and Bruder N.,		1993
5.	Lecture note provided by Dept. of Cement Technology, AKS University, Satna			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: BSC 106 AU
Course Title: Environment Science (Audit)

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
BSC 106 AU.1: Gain an understanding of the fundamental of industrial pollution.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
BSC 106 AU.2: To educate train about environmental laws and policies.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

BSC 106 AU.3: Implement critical thinking toward Environmental Management System.	2	1	2	3	2	3	2	3	2	3	2	3	2	3	2	3
BSC 106 AU.4: Develop, Implement, maintain and Audit Environmental Management systems for Organizations.	3	2	3	2	2	1	2	1	2	3	2	3	2	3	2	3
BSC 106 AU.5: For environmental protection, social equity and sustainable development.	2	1	2	3	2	3	2	3	2	3	2	1	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**BSC 106 AU.1**: Gain an understanding of the fundamental of industrial pollution.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**BSC 106 AU.2**: To educate train	SO1.1 SO1.2		**Unit- 2 2.1,2.2,2.3,2.4,2.5.**	

	about environmental laws and policies.	SO1.3 SO1.4 SO1.5			
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**BSC 106 AU.3**: Implement critical thinking toward Environmental Management System.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**BSC 106 AU.4**: Develop, Implement, maintain and Audit Environmental Management systems for Organizations.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**BSC 106 AU.5:** For environmental protection, social equity and sustainable development.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 (NHAI) 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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2. Mr. Aditya Budhadhra , Assistant Professor, Dept. of Civil Engineering
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Semester-III

Course Code: **ESC 201**
Course Title: **Basic Electronics Engineering**
Pre-requisite: Student should have knowledge of fundamental principles of analog electronics.
Rationale: In current scenario the diode, transistors, op-amp is extensively used in various electronic circuits. Such systems are required to design and maintain by engineer. Therefore, the goal of this course is for students to become competent to understand design and maintenance of such type of systems.

Course Outcomes:

ESC 201.1: Understanding of the concept of semiconductor materials, pn junction diodes and BJT and its types.

ESC 201.2: Understanding of Operational amplifier its construction working and its different types.

ESC 201.3: Explain the principle, construction and working of different timing circuits and oscillator with its types.

ESC 201.4: Explain the basic concepts of digital electronics, Boolean algebra, logic gates and different logic circuits.

ESC 201.5: Explain the principle of Electronics Communication System its types and different modulation techniques.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 201	Basic Electronics Engineering	4	2	1	1	8	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 201	Basic Electronics Engineering	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
ESC	ESC 201-L	Basic Electrical Engineering	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 201.1: Understanding of the concept of semiconductor materials, pn junction junction diodes and BJT and its types.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**06**
SW	**01**
SL	**01**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the concept of semiconductor material **SO1.2** Understand the concept of PN junction diode and its characteristics **SO1.3** Understand the concept of BJT and its working **SO1.4** understand the different type of BJT and characteristics	1. Study of PN junction diode. 2. Study of half wave and full wave rectifier. 3. study of CB CE CC of BJT	**Unit-1.0** Devices and Applications 1.1 Introduction to semiconductor 1.2 Introduction to P-N Junction Diode and V-I characteristics, 1.3 Half wave and Full-wave rectifiers, capacitor filter. 1.4 Tutorial-1 1.5 Zener diode and its characteristics, Zener diode as voltage regulator. 1.6 Regulated power supply IC based on 78XX and 79XX series, 1.7 Introduction to BJT, its input-output and transfer characteristics, 1.8 Tutorial-2 1.9 BJT as a single stage CE amplifier, frequency response and bandwidth. 1.10 Tutorial-3	1. Semiconductor and its types 2. Concept of PN junction

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Explain forward biasing and reverse biasing of PN junction.
ii. Describe the application of rectifier.

ESC 201.2: Understand the concept of sinusoidal quantities and solve single phase AC circuits.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**06**
SW	**01**
SL	**01**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understanding of operational amplifier **SO2.2** Learn the working of OP-AMP as open loop and feedback circuit **SO2.3** Understand the construction and working of OP-AMP as inverting non inverting amplifier **SO2.4** Understand the different application of OPAMP	1. study of operational amplifier as summing and differential 2. study of OP-AMP as integrator and differentiator 3. Study of OPAMP as inverting and non-inverting amplifier	**Unit-2:** Operational amplifier and its applications 2.1 Introduction to operational amplifiers, 2.2 Op-amp input modes and parameters, 2.3 Op-amp in open loop configuration, op-amp with negative feedback, 2.4 Tutorial-1 2.5 study of practical op-amp IC 741, 2.6 inverting and noninverting amplifier 2.7 applications: summing and difference amplifier, 2.8 unity gain buffer, comparator, 2.9 Tutorial-2 2.10 integrator and differentiator. 2.11 Tutorial-3	1. Concept of BJT as an amplifier 2. Concept of feedback circuit 3. Operation Of integrators and differentiators

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Theoretical Assignment related to different types of OP-AMP
ii. Explain the working principle of OP-AMP as inverting and Non inverting OP-AMP.

b. Mini Project:
i. Draw a Poster of different operations of OP-AMP.

ESC 201.3: Explain the principle, construction and working of different timing circuits and oscillator with its types.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**06**
SW	**01**
SL	**01**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To study of timing circuits and their types **SO3.2** To understand the Design and Characteristic of Timing circuit **SO3.3** To learn about the Oscillator **SO3.4** To understand the Design and Characteristic of oscillator and its types.	1. study of Actable multi vibrator 2.study of R-C phase shift oscillator 3. study of Wein bridge oscillator	**Unit-3** Timing Circuits and Oscillators 3.1 RC-timing circuits, 3.2 Introduction to IC 555 3.3 IC 555 and its applications 3.4 IC 555 astable, IC 555 mono-stable 3.5 Tutorial-1 3.6 multi-vibrators, 3.7 Introduction of oscillators and positive Feedback oscillators 3.8 Tutorial-2 3.9 Burkhouse's criteria for oscillation, 3.10 R-C phase shift and Wein bridge oscillator. 3.11 Tutorial-3	1.Significance of timing circuits 2.Uses of oscillator

SW-3 Suggested Sessional Work (SW):

a. Assignments:
i. Make a poster of IC 555 timer.
ii. Explain different types of oscillators.

ESC 201.4: Explain the basic concepts of digital electronics, Boolean algebra, logic gates and different logic circuits.

Approximate Hours

Item	Approx. Hours
CI	**15**
LI	**06**
SW	**01**
SL	**01**
Total	**23**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Understand the building Blocks of digital electronics **SO4.2** Understand the building Blocks of Boolean algebra **SO4.3** Understand the concepts of logic gates and circuits **SO4.4** Understand the applications of logic gates and circuits	4.1. study of Microprocessor . 4.2. Study of Microcontroller 4.3. Identification of different logic gates.	**Unit-4**: Digital Electronics Fundamentals 4.1 Difference between analog and digital signals, 4.2 Boolean algebra, 4.3 examples of Boolean algebra 4.4 Tutorial-1 4.5 Basic and Universal Gates, Symbols, Truth tables, logic expressions, 4.6 Logic simplification using K- map, 4.7 Logic ICs, 4.8 half and full adder, half and full subtractor 4.9, Tutorial-2 4.10 multiplexers, de-multiplexers, 4.11 flip-flops and its types 4.12 shift registers, counters, 4.13 Tutorial-3 4.14 Block diagram of microprocessor and their applications. 4.15 microcontroller and their applications	1. Difference between analog electronics and digital electronics 2. Difference between logic gates and logic circuits

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Theoretical Assignments Based on Different types logic gates and circuits

ii. Numerical Problems Based on Boolean algebra.

ESC 201.5: Explain the principle of Electronics communication System its types and different modulation techniques.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**06**
SW	**01**
SL	**01**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Discussion about the communication system and its types **SO5.2** Understand the concept of modulation techniques **SO5.3** Understand the Building blocks of communication system **SO5.4** Study of different types of modulation techniques	5.1. Study of Amplitude Modulation. 5.2. study of Frequency modulation 5.3. Study of AM and FM modulator	**Unit5**: Electronic Communication Systems 5.1intoduction of communication system 5.2 block diagram of communication system 5.3 The elements of communication system, IEEE frequency spectrum 5.4 Tutorial-1 5.5 Transmission media: wired and wireless, 5.6 Introduction of Modulation 5.7 need of modulation, types of modulation 5.8 Tutorial-2 5.9 Introduction to AM 5.10 Introduction FM modulation schemes, 5.11 Mobile communication systems, cellular concepts 5.12 Tutorial-3 5.13 block diagram of GSM system.	1. Basic Structure and operation of communication system 2. Types of communication system

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i. Theoretical Assignment based on Different types of communication system

ii. Explain different types of modulation techniques.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 201.1: Understanding of the concept of semiconductor materials, pn junction diodes and BJT and its types.	10	6	1	1	18
ESC 201.2 Understanding of Operational amplifier its construction working and its different types**.**	11	6	1	1	19
ESC 201.3: Explain the principle, construction and working of different timing circuits and oscillator with its types.	11	6	1	1	19
ESC 201.4: Explain the basic concepts of digital electronics, Boolean algebra, logic gates and different logic circuitS.	15	6	1	1	23
ESC 201.5: Explain the principle of Electronics communication System its types and different modulation techniques.	13	6	1	1	21
Total Hours	60	30	5	5	100

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 201.1	Semiconductor Devices and Applications	04	03	01	08
ESC 201.2	Operational amplifier and its applications	06	03	02	11
ESC 201.3	Timing Circuits and Oscillators	04	03	01	08
ESC 201.4	Digital Electronics Fundamentals	05	04	02	11
ESC 201.5	Electronic Communication Systems	04	04	04	12
	Total	23	17	10	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial

3. Case Method Group Discussion
4. Role Play
5. Visit to sitpura power grid station
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Integrated Electronics	Millman and Halkias	Tata McGraw-Hill	2017
2.	Electronics Devices and Circuits	R. Boylestedand L. Nashelsky	Prentice Hall India	2009
3.	Electronics Devices and Circuits	Millman and Halkias	TMH Edition	2017
4.	Analog Electronics	Malcolm Goodge	TMH Edition	1990
5.	Communication Electronics: Principles	Frenzel,	Tata Mc Graw Hill	2001
6.	Lecture note provided by Dept. of electrical engineering, AKS University, Satna.			

AKS University

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Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: ESC 201

Course Title: Basic Electronics Engineering

Course Outcomes	**Program Outcomes**												**Program Specific Outcomes**			
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
	Engineering Knowledge	**Problem analysis**	**Design/development of solutions**	**Conducting investigations of complex problems**	**Modern tool usage**	**The engineer and society**	**Environment and sustainability**	**Ethics**	**Individual and team work:**	**Communication**	**Project management and finance**	**Lifelong learning**	**Survey, map and layout of structures**	**Specify, analyse and design structures**	**Plan, analyse and design water structures**	**Modern tools usage for research & employability**
ESC 201.1: Understanding of the concept of semiconductor materials, pn junction diodes and BJT and its types.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 201.2 Understanding of Operational amplifier	1	2	3	2	3	2	3	2	3	2	1	3	2	3	2	3

its construction working and its different types**.**																
ESC 201.3: Explain the principle, construction and working of different timing circuits and oscillator with its types.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 201.4: Explain the basic concepts of digital electronics, Boolean algebra, logic gates and different logic circuitS.	1	2	3	2	3	2	3	2	3	1	2	3	2	3	2	3
ESC 201.5: Explain the principle of Electronics communication System its types and different modulation techniques.	2	3	2	3	2	3	2	3	2	2	3	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 201.1:** Understanding of the concept of	SO1.1 SO1.2 SO1.3	**1, 2, 3, 4, 5, 6**	**Unit-1: DC Network 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

	semiconductor materials, pn junction diodes and BJT and its types.	SO1.4 SO1.5			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 201.2** Understanding of Operational amplifier its construction working and its different types**.**	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: Single-Phase AC Circuit** **2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 201.3:** Explain the principle, construction and working of different timing circuits and oscillator with its types.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :Three-Phase AC Circuit** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 201.4**: Explain the basic concepts of digital electronics, Boolean algebra, logic gates and different logic circuitS.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4:Single-Phase Transformer** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12	**ESC 201.5:** Explain the	SO1.1 SO1.2	**1,2**	**Unit 5: DC Machines** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

PSO 1, 2	principle of Electronics communication System its types and different modulation techniques.	SO1.3 SO1.4			

Curriculum Development Team

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Semester-III

Course Code: **ESC 202**
Course Title: **Engineering Mechanics**
Pre-requisite: Student should have basic knowledge of mathematics and Physics up to higher secondary level.
Rationale: As a bridge between theory and application, engineering mechanics is used to formulate new ideas and theories, discover and interpret phenomena and develop experimental and computational tools.

Course Outcomes:

ESC 202.1: Understanding of term Mechanics and its classification.

ESC 202.2: Understanding Resolution and composition of force acting on the rigid body.

ESC 202.3: Compute the resultant of force for different system of force and study of different laws related to different force system.

ESC 202.4: Compute the different types of load acting on different types of beam.

ESC 202.5: Compute the centroid, second moment of area, center of gravity, moment of inertia and mass moment of inertia.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	ESC 202	Engineering Mechanics	4	2	1	1	8	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
ESC	ESC 202	Engineering Mechanics	15	20	5	5	5	50	50	100

Scheme of Assessment:

Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
ESC	ESC 202	Engineering Mechanics	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

ESC 202.1: Understanding of term Mechanics and its classification.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understanding of basic knowledge of term Mechanics. SO1.2 Understanding how objects move when forces are applied to them. Newton's laws lay the foundation for comprehending how forces interact with objects to cause motion. SO1.3 Describing motion without considering its causes. This includes concepts lIKS101e velocity, acceleration, displacement, and time. Static and dynamics classification of dynamics Kinetic and kinematic Fundamental laws of mechanics Gravitational law Newton Laws Numerical SO1.4 Understanding the	Introduction to laboratory Introduction to Tools and Equipments	**Unit-1.**0 Introduction to Mechanics 1.1 Introduction of term mechanics 1.2 classification of mechanics static and dynamics 1.3 classification of dynamics Kinetic and kinematic 1.4 Fundamental laws of mechanics 1.5 Gravitational law 1.6 Newton Laws 1.7 Numerical 1.8 Numerical 1.9 Numerical	1. Numerical problem related to classification of mechanics 2. Numerical problem related to basic laws

causes of motion, mainly through the study of forces. This involves concepts lIKS101e friction, tension, gravitational forces, and how they affect objects.			

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Explain Newton 2nd law of motion and its application.

II. Write the definition of basic term related to static and dynamic

ESC 202.2: Resolution and composition of force acting on the rigid body.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**12**
SW	**00**
SL	**01**
Total	**26**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Ability to breakdown a single force into its horizontal and vertical components. This involves understanding trigonometric concepts lIKS101e sine and cosine functions to determine the components of a force along different axes. **SO2.2** Ability to determine the resultant of multiple forces acting on an object. This includes finding the net force and direction when multiple forces are applied simultaneously. **SO2.3** Applying these	1. Introduction to Laws of forces 2. Verification of Parallelogram law of forces 3. Verification of Triangle law of forces 4. Verification of Polygon law of forces 5. Introduction to Lami's theorem 6. To verify the lami's theorem	**Unit-2.0** Resolution and Composition of Forces 2.1 Forces and its type 2.2 Pressure and Stress 2.3 Concept of free body diagram 2.4 Characteristics and Effects of a Force 2.5 System of Forces 2.6 Resolution of a Force 2.7. Composition of Forces, Resultant / Equilibrant Force, 2.8 Law of Parallelogram of Forces, 2.9. Law of Triangle of Forces, Polygon Law of Forces. 2.10 Lami's Theorem 2.11 Equilibrium of a Body	1.Numericals resolution forces 2. Numerical problem of Law of Parallelogram of Forces

concepts to real-world scenarios, such as analyzing the forces acting on structures, machines, or systems. This could involve calculating the forces involved in bridges, buildings, or mechanical devices SO4. Understanding how to add multiple vectors together using the Polygon Law. This involves arranging vectors head-to-tail to form a closed polygon, where the resultant vector is the vector closing the polygon from the starting point to the end point		Under Two / Three/More Than Three Forces 2.12. Law of Superposition of Forces. 2.13Practice class	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Derivation of lami's theorem and its numerical problem
2. Derivation of Parallelogram law and its numerical

ESC 202.3: Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering view points.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**04**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Calculating the resultant force by summing up all the individual forces	1. Introduction to moment and couple.	**Unit-3:** System of forces 3.1 Introduction of system of forces	1. Explanation nature of moment and its types

acting on an object. The resultant force represents the net effect of all forces combined. **SO3.2** Identifying the point where the resultant force is applied on the object or structure. This may involve finding the moment or torque caused by the forces and locating the resultant force's line of action. **SO.3** Checking whether the system of forces is in equilibrium. If the resultant force is zero, the system is in equilibrium; otherwise, the object or structure will experience acceleration or movement in the direction of the resultant force.	2. To verify the principle of moment using by bell crank lever.	3.2 Moment of a force 3.3 Varignon's Theorem. 3.4 Resultant of Parallel Forces 3.5 Moment of a Couple 3.6 Resolution of Force into a Couple 3.7 Resultant of Coplanar, On Con-Current Forces 3.8 Numerical on Moment. 3.9 Numerical on Couple. 3.10 Numerical on system of forces 3.11 Practice class	2. Numerical resultant force

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Classify system of forces
2. Explain the concept of couple.

ESC 202.4: Compute the different types of load acting on a different types of beam.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**04**
SW	**02**
SL	**02**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Calculating the forces and moments at support points. This includes determining the	4.1 Introduction to Trusses 4.2 To calculate the forces in	**Unit-4.0** Beams and Trusses 4.1 define beam and its type 4.2 Simply Supported Beam, Overhanging Beam, Cantilever	1. Numerical problem support reaction calculation in cantilever beam

vertical and horizontal reactions as well as any moments generated at these locations due to applied loads. **SO4.2** Supported at both ends and can carry loads between the supports. They experience maximum bending moment at the center and zero shear at the ends **SO4.3** Fixed at one end and free at the other. They carry loads at the free end and experience maximum shear at the fixed end. **SO4.4** Assemblies of beams connected by joints, commonly used in bridges and roofs. They rely on the framework of triangles to distribute loads efficiently.	members of simple roof truss and find the percentage error between the observed and calculated values.	Beam 4.3 Simply Supported Beam, Overhanging Beam, Cantilever Beam 4.4 concept of load 4.5 Load on the Beam or Frame 4.6 Load on the Beam or Frame 4.7 Calculation of support reaction and its type Support reaction calculation in cantilever beam 4.8 Support reaction calculation in simple supported beam 4.9 Concept of truss 4.10 Analysis of truss by analytical method (Joint method) 4.11 Analysis of truss by analytical method (Section method) 4.12 Practice class 4.13 Numericals	simply supported beam. 2. Numerical problem truss analysis by j method.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Classify Beams and Load acting on it.
2. Explain types of trusses.

ESC 202.5: Compute the centroid, second moment of area, center of gravity, moment of inertia and mass moment of inertia.

Approximate Hours

Item	Approx. Hours
CI	**14**
LI	**06**
SW	**01**
SL	**02**
Total	**23**

Session Outcomes (SOs)	Laboratory Instructions	Classroom Instructions (CI)	Self Learning

	(LI)		(SL)
SO5.1 Determining the point where the entire weight of an object or system appears to act. **SO5.2** Quantifying an object's resistance to rotational motion around a specific axis.	1. Introduction to Moment of inertia 2. To determine the moment of inertia of a flywheel about its own axis of rotation 3. Viva practice	**Unit-5.0** Center of gravity and moment of inertia 5.1 Concept of Centroid, Centre of Gravity. 5.2 Difference between Centroid, Centre of Gravity Centroid of Triangle Centroid of I section Centroid of angle section Centroid of channel section 5.3 Theorems of Moment of Inertia 5.4 Radius of Gyration Polar Moment of Inertia of Standard Sections 5.5 Moment of Inertia of Composite Section 5.6 Principal Moment of Inertia 5.7 Concept of mass moment of inertia 5.8 Mass moment of inertia of basic solid figures. 5.9 Practice class 5.10 Numerical 5.11 illustrations 5.12 Numerical 5.13 Practice class 5.14 Numerical	1. Numerical problem related to center of gravity 2. Numerical of MIT section 3. Numerical of section.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Find the CG and Mi of Circle, semicircle, and Rectangle and Triangle

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
ESC 202.1: Understanding of term Mechanics and its classification.	9	4	2	2	17
ESC 202.2: Resolution and composition of force acting on the rigid body.	13	12	0	1	26
ESC 202.3: Apply computer aided drafting techniques to represent line,	11	4	2	2	19

surface or solid models in different Engineering view points.					
ESC 202.4: Compute the different types of loads acting on a different type of beam.	13	4	2	2	21
ESC 202.5: Compute the centroid, second moment of area, center of gravity, moment of inertia and mass moment of inertia.	14	6	1	2	23
Total Hours	60	30	7	9	106

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
ESC 202.1	Introduction to Mechanics	03	01	01	05
ESC 202.2	Resolution and Composition of Forces	02	06	02	10
ESC 202.3	System of forces	03	07	05	15
ESC 202.4	Beams and Trusses	-	10	05	15
ESC 202.5	Center of gravity and moment of inertia	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to mechanics lab
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Engineering Mechanics	Dr. R.Kbansal	Laxmi Publication n(p) ltd	4th and 2016
2.	Engineering Mechanics	R.KRajpoot	Laxmi Publication(p) ltd	3rd and 2016

3.	Engineering Mechanics: Statics& Dynamics	Russell C. Hibbeler	Pearson	14th Edition,2015
4.	Engineering Mechanics	Timoshenko, and Young	TMH	5th 2017
5.	TrainingManual			
6.	Lecture note provided by Dept. of mechanical engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: ESC 202
Course Title: Engineering Mechanics

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
ESC 202.1: Understanding of term Mechanics and its classification.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 202.2: Resolution and composition of force acting on the rigid	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

body.																
ESC 202.3: Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering view points.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
ESC 202.4: Compute the different types of loads acting on a different type of beam.	2	2	1	2	3	2	3	2	3	2	3	2	3	2	2	3
ESC 202.5: Compute the centroid, second moment of area, center of gravity, moment of inertia and mass moment of inertia.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 202.1:** Understanding of term Mechanics and its classification.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 202.2:** Resolution and composition of force acting on the rigid body.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2:** **2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 202.3:** Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering view points.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 202.4**: Compute the different types of loads acting on a different type of beam.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4:** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**ESC 202.5:** Compute the centroid, second moment of area, center of gravity, moment of inertia and mass moment of inertia.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

AKS University

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Semester-III

Course Code: **PCC CE 03**
Course Title: **Fluid Mechanics-I**
Pre-requisite: Students are expected to know the fundamentals of engineering mechanics, resolving of forces, Statics, Dynamics and flow kinematics.
Rationale: Fluid mechanics and hydraulics are core to engineering, offering vital insights into liquid and gas behavior for efficient system design across industries lIKS101e power generation, aerospace, and infrastructure. Understanding fluid dynamics drives innovation, impacting energy, transportation, and environmental sectors globally, with applications reaching into fields like medicine and meteorology.

Course Outcomes:

PCC CE 03.1: Grasp fluid properties (density, viscosity, surface tension) and understand static principles (pressure laws, buoyancy).

PCC CE 03.2: Analyze fluid motion using Lagrangian/Eulerian methods, study flow lines and particle acceleration.

PCC CE 03.3: Apply Euler's/Bernoulli's equations, understand Venturi meter, Orifice meter, and implications of momentum equations.

PCC CE 03.4: Differentiate between laminar/turbulent flow, study pipe flow, energy losses, configurations, and pipe phenomena.

PCC CE 03.5: Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core Course	PCC CE 03	Fluid Mechanics-I	4	2	1	1	8	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 03-L	Fluid Mechanics-I	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 03	Fluid Mechanics-I	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 03.1: Grasp fluid properties (density, viscosity, surface tension) and understand static principles (pressure laws, buoyancy).

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**04**
SW	**01**
SL	**01**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand fluid characteristics like density, viscosity, and surface tension. **SO1.2** Master pressure laws, buoyancy, and equilibrium in liquids. **SO1.3** Apply fluid knowledge to solve real-world engineering challenges. **SO1.4** Develop problem-solving skills in fluid statics scenarios. **SO1.5** Use fluid principles for efficient system design across industries.	1.1 Determination of Metacentric Height of Flat-bottomed pontoon. 1.2 Study of Pressure Gauge	1.1 Introduction to fluid mechanics 1.2 Properties of fluid: Mass density, Weight density. Specific volume, specific gravity, Viscosity, Surface tension. 1.3 Numerical on properties of fluid. 1.4 Capillarity, Vapor pressure, Compressibility and bulk modulus. 1.5 Newtonian and non-Newtonian fluids. 1.6 Fluid statics: Pressure, Pascal's law 1.7 Hydrostatic law, 1.8 Pressure measurement 1.9Hydrostatic force on submerged plane 1.10 Hydrostatic force on curved surface 1.11 Buoyancy	1. Solve a set of practice problems related to hydrostatic law to reinforce your problem-solving skills. 2. Explore Online simulations or Virtual labs related to Fluid Properties, Buoyancy and Floatation.

		1.12 Floatation, Liquid in relative equilibrium. 1.13 Tutorial 1	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Explore and differentiate between Newtonian and non-Newtonian fluids. Provide real-world examples of each type and explain how their behavior diverges from conventional Newtonian fluid dynamics.

ii. Discuss the concept of pressure measurement in fluid systems. Explain at least three different methods of measuring fluid pressure and compare their advantages and limitations.

b. Mini Project:

1. a) Select diverse scenarios from everyday life where fluid dynamics play a crucial role (e.g., water flow in pipes, movement of liquids in different vessels, surface tension effects, etc.).

b) Document and observe these scenarios, noting down relevant data such as fluid types, dimensions, and observed behaviors.

PCC CE 03.2: Analyze fluid motion using Lagrangian/Eulerian methods, study flow lines and particle acceleration.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**06**
SW	**01**
SL	**01**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand Lagrangian/Eulerian approaches, various flow types, and characteristics of flow lines. **SO2.2** Grasp continuity equations, fluid particle motion, accelerations, rotational flow, vorticity, and circulation. **SO2.3** Apply knowledge to create and analyze flow	2.1 Determination of performance characteristics of centrifugal pump. 2.2 Determination of performance characteristics of Pelton wheel. 2.3 Study of	2.1 Fluid Kinematics: Description of fluid motion, Langragian and Eulerian approach, 2.2 Type of fluid flow, 2.3 Type of flow lines-path line, Streak line, Stream line, Stream tube. 2.4 Continuity equation 2.5 Acceleration of a fluid particle 2.6 Motion of fluid particle	1. Watch youtube videos on langragian and eulerian approach 2. Draw Stream Line pattern for various flows.

nets, understanding their utility in fluid systems. **SO2.4** Explore vortex dynamics and its significance in fluid systems.	different types of fluid flows	along curved path 2.7 Normal and tangential acceleration. 2.8 Rotational flow, Rotation 2.9 Vorticity, Circulation, 2.10 Stream and potential function, 2.11 Flow net, Its characteristics and utilities 2.12 Vortex motion. 2.13 Numerical on Vortex Motion.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

a) Explain the differences between the Langragian and Eulerian approaches in describing fluid motion. Provide examples to illustrate situations where each approach is more applicable and why.

b) Define laminar, turbulent, and transitional flow. Compare and contrast these types of flow, highlighting their characteristics and the factors influencing their occurrence. Provide real-world examples for each type of flow.

b. Mini Project:

a) Discuss the continuity equation and its significance in fluid dynamics.

b) Explore the acceleration of a fluid particle, considering both normal and tangential components along curved paths. Provide examples to illustrate these concepts.

PCC CE 03.3: Apply Euler's/Bernoulli's equations, understand Venturi meter, Orifice meter, and implications of momentum equations.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**08**
SW	**01**
SL	**01**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Grasp Euler's and Bernoulli's equations and their practical applications	3.1 Verification of Bernoulli's Theorem	3.1 Fluid dynamics: Euler's Equation 3.2 Bernoulli's equation and its	1. Choose a real-life example and demonstrate how

in fluid dynamics. **SO3.2** Explore Venturi meter, Orifice meter, Nozzle, and Pitot tube functionalities in measuring fluid flow. **SO3.3** Apply impulse momentum and momentum of momentum equations for fluid behavior analysis. **SO3.4** Understand kinetic energy and momentum correction factors in fluid systems' energy analysis. **SO3.5** Apply Reynold's transport theorem to understand property transport in flowing fluids.	experimentally. 3.2 Determination of coefficient of Discharge of venturi meter. 3.3 To determine hydraulic Coefficients Cd, Cv and Cc of an Orifice. 3.4 Study of Reynolds transport theorem	practical application, 3.3 Venturi meter 3.4 Orifice meter 3.5 Nozzle 3.5 Pitot tube 3.6 Impulse momentum equation 3.7 Momentum of Momentum equation 3.8 Kinetic energy 3.9 Momentum correction factor 3.10 Reynold's transport theorem 3.11Tutorial 1.	Bernoulli's Equation can be applied to analyze the fluid mechanics. 2. Choose a fluid flow scenario and apply the Renyold's Transport Theorem to analyze the changes in mass, Momentum and energy within the system.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Derive and explain the impulse momentum equation for a control volume. Discuss its significance in analyzing fluid flow problems and provide examples demonstrating its application.

b. Mini Project

a) Collect and compile the data obtained from each flow measurement device.

b) Analyze the data to calculate flow rates and compare the measurements obtained from different devices.

PCC CE 03.4 Differentiate between laminar/turbulent flow, study pipe flow, energy losses, configurations, and pipe phenomenon.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**08**
SW	**02**
SL	**01**
Total	**22**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4:1 Understanding flow	4.1 To	4.1 Laminar & Turbulent flow:	1. Explore the

transitions from Reynold's experiment to viscous fluid behavior in pipes. **SO4:2** Exploring shear stress and pressure gradient in Couette flow for parallel plate systems **SO4:3** Grasping energy loss in pipes, hydraulic gradient, and optimizing pipe configurations. **SO4:4** Applying equivalent pipe power transmission and managing water hammer effects in pipes	determine the minor head loss coefficient of different pipe fittings. 4.2 Determine the Reynold's no in different flow conditions. 4.3 Determination of Coefficient of Discharge of Rectangular and Triangular Notch. 4.4 Study of fluid flow through pipes	Reynold's experiment 4.2 Flow of viscous fluids in circular pipe 4.3 Shear stress & velocity distribution for turbulent flow. 4.4 Shear stress pressure gradient between two parallel plates 4.5 Couette flow 4.6 Flow through pipes: Loss of energy in pipes 4.7 Hydraulic gradient and total energy line 4.8 Pipe in series and parallel. 4.9 Equivalent pipe power transmission through pipe 4.10 Water hammer in pipes. 4.11 Tutorial 1	phenomenon of cavitation in fluid flow. Investigate the condition under which cavitation occurs, its effects and equipment's, and methods to prevent or mitigate cavitation. 2. Explore the principles of Syphon Systems in Fluid Transport.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i) Describe the characteristics of turbulent flow concerning shear stress and velocity distribution in a pipe. Compare and contrast these characteristics with those of laminar flow. Provide explanations supported by equations and graphical representations

b. Mini Project:

i) Study the behavior of pipe configurations in series and parallel, measuring flow rates and pressure differences.

ii) Simulate and analyze the occurrence and effects of water hammer in the pipe network.

PCC CE 03.5: Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**04**
SW	**01**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Use Darcy - Weisbach and Moody's diagram for internal flow friction calculations. **SO5.2** Differentiate laminar and turbulent layers, explore growth, and solutions for momentum layers. **SO5.3** Solve equations, grasp momentum principles, and separation factors. **SO5.4** Use Rayleigh's and Buckingham's methods for fluid behavior using dimensionless numbers. **SO5.5** Explain Reynold's, Fraude's, Euler's, Weber's, and Mach's laws in predicting varied fluid behaviors.	5.1 Determination of Friction Factor 'f' for G.I pipes. 5.2 Study of Boundary Layer theory	5.1 Internal flows: Friction factor, Darcy - Weisbach friction factor 5.2 Moody's diagram 5.3 Boundary Layer theory 5.4 Boundary layer equation 5.5 Laminar and turbulent boundary layer and its growth over flat plat. 5.6 Momentum boundary layer and its solutions, separation of boundary layer and its control. 5.7. Dimensional analysis: Methods of dimensional analysis, Rayleigh's method 5.8 Buckingham's theorem, Limitations 5.9 Model analysis, Dimensionless number and their significance 5.10 Model laws, Reynolds model law, 5.11Fraude's model law, Euler's model law, Weber's model law, 5.12 tutorial	1. Investigate methods to control and prevent boundary layer separation. 2. Investigate the limitations of dimensional analysis. 3. Choose a specific flow scenario and use Moody's Diagram to determine the friction Factor.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i) Discuss real-world applications where understanding friction factors and boundary layer theory is crucial.

b. Mini Project:

Construct a setup simulating flow over a flat plate using a wind tunnel or a controlled airflow system.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 03.1: Grasp fluid properties	13	4	1	1	19

(density, viscosity, surface tension) and understand static principles (pressure laws, buoyancy).					
PCC CE 03.2: Analyze fluid motion using Lagrangian/Eulerian methods, study flow lines and particle acceleration.	13	6	1	1	21
PCC CE 03.3: Apply Euler's/Bernoulli's equations, understand Venturi meter, Orifice meter, and implications of momentum equations.	11	8	1	1	21
PCC CE 03.4: Differentiate between laminar/turbulent flow, study pipe flow, energy losses, configurations, and pipe phenomena	11	8	2	1	22
PCC CE 03.5: Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.	12	4	1	2	19
Total Hours	60	30	06	06	102

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 03.1	Properties of Fluid and Fluid Statics	03	01	01	05
PCC CE 03.2	Fluid Kinematics	02	06	02	10
PCC CE 03.3	Fluid Dynamics	02	07	06	15
PCC CE 03.4	Laminar and Turbulent Flow and Flow through Pipes	02	07	06	15
PCC CE 03.5	Internal Flows and Dimensional Analysis	01	02	02	05
	Total	10	23	17	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to hydro power plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Fluid Mechanics & Hydraulic Machines	S.S. Rattan	Khanna Book Publishing	2019
2.	Fluid Mechanics	F.M. White	Tata McGraw Hill	2011
3.	"Introduction to Fluid Mechanics and Fluid Machines	S. K. Som, G. Biswas and S. Chakraborty	Tata McGraw Hill	2017
4.	A Textbook of Fluid Mechanics and Hydraulic Machines	R. K. Bansal	Laxmi Publication	2005
5.	Mechanics of Fluids	Shames	McGraw Hill Book Co. New Delhi	1988

AKS University

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Curriculum of B.Tech.(Civil Engineering) Program

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 03
Course Title: Fluid Mechanics-I

Course Outcomes	Program Outcomes												Program Specific outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 03.1: Grasp fluid properties (density, viscosity, surface tension) and understand static principles (pressure laws, buoyancy).	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 03.2:	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

Analyze fluid motion using Lagrangian/Eulerian methods, study flow lines and particle acceleration.																
PCC CE 03.3: Apply Euler's/Bernoulli's equations, understand Venturi meter, Orifice meter, and implications of momentum equations.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 03.4: Differentiate between laminar/turbulent flow, study pipe flow, energy losses, configurations, and pipe phenomena	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PCC CE 03.5: Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

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Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 03.1:** Grasp fluid properties (density, viscosity, surface tension) and understand static principles (pressure laws, buoyancy).	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 03.2:** Analyze fluid motion using Lagrangian/Eulerian methods, study flow lines and particle acceleration.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 03.3:** Apply Euler's/Bernoulli's equations, understand Venturi meter, Orifice meter, and implications of momentum equations.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 03.4**: Differentiate between	SO1.1 SO1.2 SO1.3	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	laminar/turbulent flow, study pipe flow, energy losses, configurations, and pipe phenomena	SO1.4 SO1.5 SO1.6			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 03.5:** Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
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Semester-III

Course Code: **HSMC 301**
Course Title: **Universal Human Values**
Pre-requisite: Creating awareness among the students on a holistic perspective about life.
Rationale: The purpose is to help develop a holistic perspective about life. A self-reflective methodology of teaching is adopted. It opens the space for the student to explore his/her role (value) in all aspects of living – as an individual, as a member of a family, as a part of the society and as an unit in nature. Through this process of self-exploration, students are able to discover the values intrinsic in them.

Course Outcomes:

HSMC 301.1: To understanding Value Education**.**

HSMC 301.2: Students will have the ability to learn about Harmony in the Human Being.

HSMC 301.3: Student will be able to gain knowledge on Harmony in the Family and Society.

HSMC 301.4: Understanding Harmony in the Nature/Existence.

HSMC 301.5: Student will able to understand about Implications of Holistic Understanding- A Look at Professional Ethics

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and social Science Course	HSMC 301	Universal Human Values	3	0	2	1	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
HSMC	HSMC 301	Universal Human Values	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 301.1: To understanding Value Education.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**00**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand Self exploration as the Process for Value Education. **SO1.2** Understand Continuous Happiness and Prosperity – the Basic Human Aspirations. **SO1.3** Understand Right Understanding. **SO1.4** Understand Relationship and Physical Facility. **SO1.5** Understand Happiness and Prosperity – Current Scenario.		**Unit-1** Understanding Value Education 1.1 Self-exploration as the Process for Value Education. 1.2 Continuous Happiness and Prosperity – the Basic Human Aspirations 1.3 Recognizing and articulating fundamental human values 1.4 Right Understanding 1.5 Relationship and Physical Facility 1.6 Happiness and Prosperity – Current Scenario 1.7 Method to Fulfill the Basic Human Aspirations 1.8 Connect values education to community service 1.9 Understanding of values through various assessment methods	SL.1 Human values to become a good man. SL.2. Identify Core Human Values.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Continuous Happiness and Prosperity–the Basic Human Aspirations

b. Mini Project:

i. Relationship and Physical Facility.

c. Other Activities (Specify):

i. Quiz, Class Test.

HSMC 301.2: Students will have the ability to apply the gained knowledge on Harmony in the Human Being.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**

SW	**00**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1. Understanding Human being as the Coexistence of the Self and the Body **SO2.2.** Understand the Distinguishing between the Needs of the Self and Body **SO2.3.** Understand the Body as an Instrument of the Self. **SO2.4.** Understanding Harmony in the Self **SO2.5.** Understanding Harmony of the Self with the Body		**Unit-2:** Harmony in the Human Being 2.1 Module-II Harmony in the Human Being 2.2 Human being as the Coexistence of the Self and the Body 2.3 Distinguishing between the Needs of the Self and Body 2.4 Body as an Instrument of the Self 2.5 Harmony in the Self 2.6 Harmony of the Self with the Body 2.7 Programmed to ensure self-regulation and Health 2.8 Explore techniques for improving concentration and mental clarity 2.9 self-control	SL.1 Harmony in and among human being. SL.2 Mindfulness and Self-Awareness

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Harmony in the self

b. Mini Project:

I. Body an instrument.

c. Other Activities (Specify):

I. Quiz, Class Test.

HSMC 301.3: Learn the basic concepts of dual nature of matter and wave packet and apply them to analyze various relevant phenomenon and to solve related numerical problem.

Approximate Hours

Item	Approx. Hours
CI	**09**

LI	**00**
SW	**00**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1. Understand Harmony in the Family – the Basic Unit of Human Interaction **SO3.2.** Understand the Values in Human- to Human Relationship **SO3.3**. Understand the 'Trust' – the Foundational Value in Relationship **SO3.4.** Understand the 'Respect' – as the Right Evaluation **SO3.5.** Understanding Harmony in the Society		**Unit-3:** Harmony in the Family and Society 3.1 Harmony in the Family – the Basic Unit of Human Interaction 3.2 Values in Human-to-Human Relationship 3.3 'Trust' – the 3.4 Foundational Value in Relationship 3.5 'Respect' – as the Right Evaluation 3.6 Understanding Harmony in the Society 3.7 practice class 3.8 practice class 3.9 practice class	SL.1 Harmony in the society SL.2 Reflect on Social Responsibilities

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Respect the right evaluation.

b. Mini Project:

I. Trust is the fundamental value of relationships

c. Other Activities (Specify):

I. Quiz, Class Test..

HSMC 301.4: Student will be able to understand Harmony in the Nature/Existence.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**00**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1. Understanding Harmony in the Nature, Interconnectedness **SO4.2.** Understand self-regulation and Mutual Fulfillment among 4 orders of Nature. **SO4.3.** Understand the Exploring Four Orders of Nature **SO4.4.** Understand the Realizing Existence as Coexistence at All Levels **SO4.5.** Understand the holistic Perceptions of Harmony in Existence		**Unit-4:** Harmony in the Nature/Existence 4.1 Harmony in the Nature, Interconnectedness 4.2 Self-regulation and Mutual Fulfillment among 4 orders of Nature 4.3 Exploring Four Orders of Nature 4.4 Realizing Existence as Coexistence at All Levels 4.5 The holistic Perceptions of Harmony in Existence 4.6 The Exploring Coexistence in Existence 4.7 Introduce environmental ethics principles 4.8 Study different ecosystems 4.9 Address the challenges posed by climate change and human activities on natural harmony	SL.1 Harmony in the nature SL.2 Study Ecological Principles.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
i. Harmony in nature.

b. Mini Project:
i. Exploring orders of nature.

c. Other Activities (Specify):
I. Quiz, Class Test.

HSMC 301.5: Students will have the ability to apply the gained knowledge in Implications of Holistic Understanding- A Look at Professional Ethics.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**

SW	**00**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1. Understand Natural acceptance of Human Values. **SO5.2** Understand Definitiveness of (Ethical) Human Conduct **SO5.3.** Understand A Basis for Humanistic Education **SO5.4.** Understand the Humanistic Constitution and Universal Human Order **SO5.5.** Understand Competence in Professional Ethics		**Unit 5** Implications of Holistic Understanding- A Look at Professional Ethics 5.1 Introduce the concept of professional ethics 5.2 Natural acceptance of Human Values 5.3 Definitiveness of (Ethical) Human Conduct 5.4 A Basis for Humanistic Education 5.5 Humanistic Constitution and Universal Human Order 5.6 Competence in Professional Ethics 5.7 Strategies for Transition towards value-based Life and Profession 5.8 Explore major ethical theories 5.9 Analyze case studies to illustrate ethical decision making using different frameworks	SL.1 Holistic understanding of human values SL.2 Read case studies and real-life examples from various profession.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Human conduct.

b. Mini Project:

I. Humanistic constitution.

c. Other Activities (Specify):

I. Quiz, Class Test.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 301.1: To understanding Value Education.	9	0	0	11
HSMC 301.2: Students will have the ability to learn about Harmony in the Human Being.	9	0	0	11
HSMC 301.3: Student will be able to gain knowledge on Harmony in the Family and Society.	9	0	0	11
HSMC 301.4: Understanding Harmony in the Nature/Existence.	9	0	0	11
HSMC 301.5: Student will able to understand about Implications of Holistic Understanding- A Look at Professional Ethics.	9	0	0	11
Total Hours	45	00	00	55

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 301.1	Understanding Value Education	02	04	05	11
HSMC 301.2	Harmony in the Human Being	03	07	04	14
HSMC 301.3	Harmony in the Family and Society	02	06	02	10
HSMC 301.4	Harmony in the Nature/Existence	03	03	02	08
HSMC 301.5	Implications of Holistic Understanding a Look at Professional Ethics	03	02	02	07
	Total	13	22	15	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Jeevan Vidya: EkParichaya	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	1998
2.	Human Values	A.N.Tripathi	New Age Intl. Publishers, New Delhi,	2004
3.	Universal Human Values		AICTE	2021
4.	Human Values and Professional Ethics	R.R.Gaur,R Sangal andG P Bagaria	Excel Book Publisher	2009
5.	Vyavaharvadï. Samajshastra	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	1999
6.	Manava Vyavahara Darsana	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	2003
7.	Foundations of Ethics and Management	BP Banerjee	ExcelBook	2005
8.	Fundamentals of Ethics for Scientists & Engineers.	E G Seebauer & Rober tL Berry	Oxford University Press	2000
9.	Engineering Ethics (including Human Values)	M Govindrajran, S Natrajan and V.S. SenthilKumar	Eastern Economy Edition, Prentice Hall of IndiaLtd.	

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 301
Course Title: Universal Human Values

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 301.1: To understanding Value Education.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 301.2: Students will have the ability to learn about Harmony in the Human Being.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

HSMC 301.3: Student will be able to gain knowledge on Harmony in the Family and Society.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 301.4: Understanding Harmony in the Nature/Existence.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 301.5: Student will able to understand about Implications of Holistic Understanding- A Look at Professional Ethics.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**HSMC 301.1**: To understanding Value Education.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**HSMC 301.2**: Students will have the ability	SO1.1 SO1.2 SO1.3		**Unit-2.1,2.2,2.3,2.4,2.5.**	

	to learn about Harmony in the Human Being.	SO1.4 SO1.5			
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**HSMC 301.3**: Student will be able to gain knowledge on Harmony in the Family and Society.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**HSMC 301.4**: Understanding Harmony in the Nature/Existence.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**HSMC 301.5:** Student will able to understand about Implications of Holistic Understanding- A Look at Professional Ethics.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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Semester-IV

Course Code: **PCC CE 04**
Course Title: **Construction Technology**
Pre-requisite: Construction technology refers to the advanced technologies and innovative solutions the construction industry uses to enhance workplace efficiency and safety, improve project sustainability, and adopt more cost-effective procedures.
Rationale: Using high-tech tools and technology ensures greater precision. This means more accurate measurements for foundations, corners, or perimeters but also more detailed mapping of existing structures. All of this greatly contributes to creating and delivering high-quality buildings.

Course Outcomes:

PCC-CE 04.1. Students who successfully complete this course will be able to understand various Types of foundation and reason behind the structure and foundation failure.

PCC-CE 04.2. The course will provide basic knowledge in calculation and design of masonry structures and masonry buildings.

PCC-CE 04.3. Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.

PCC-CE 04.4. Identify the factors to be considered in planning and construction of buildings.

PCC-CE 04.5. Understand the practices and techniques for Temporary/Special construction Works.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core Course	PCC CE 04	CONSTRUCTION TECHNOLOGY	3	1	1	1	6	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 04	Construction Technology	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 04-L	Construction Technology	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 04 .1: Foundation

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**03**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.Types of soil and its bearing capacity of soil. SO1.2 To understand Basic terms and importance of foundations. **SO1.3** Define the various components of the building. **SO1.4** Learn about deep and shallow type of foundations. **SO1.5.** To understand of damp proof courses used in a construction work.	**Testing on Bricks (I)** Water **(ii)**absorption. Dimensional Tolerance. (iii) Compressive strength.	Unit-I: Foundation 1.1 Type of soils, bearing capacity 1.2 Spread foundations, wall footings, grillage, foundations well foundation, 1.3- causes of failure and remedial measures. 1.4- under reamed piles, foundation, 1.5 black cotton soil, timbering for trenches. 1.6- dewatering of foundations. 1.7 Hyperbolic parboiled footing 1.8- Brick arch foundation 1.9- Damp proof courses 1.10- Repairs Techniques foundations.	1) Write the detail note on types of Foundations.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Prepare notes on types of building structures.

b. Mini Project:
I. draw a neat diagram of under reamed piles, foundation.

PCC CE 04 .2: Masonry and Walls

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**03**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To find out actual difference between load bearing walls and non-load bearing walls. **SO2.2.** To understand the different types of building components. **SO2.3** To understand the difference between brick and stone masonry bond. **SO2.4.** To learn about plastering and pointing **SO2.5** To know about distempering and dampness.	Testing on Fine **Aggregates** **(I) Sieve** analysis of sand (ii) Bulking of sand iii) Revision.	**Unit-II: Masonry and Walls** 2.1 Brick masonry, Bonds, Jointing 2.2 Stone masonry, casting and laying, masonry work. 2.3 Brick cavity walls, 2.4 code provisions regarding load bearing and non-load bearing walls designed 2.5 Brick masonry, 2.6 precast stone masonry block Hollow concrete block, 2.7 plastering and pointing white and color washing, distempering, dampness and its protection 2.8 Design of hollow block masonry walls Revision	1) what is seasoning? Write all the types of seasoning of timber

SW-2 Suggested Sessional Work (SW):

a. Assignments:
what is defect in timber and explain all types of defects in timber?

b. Other Activities (Specify): Quiz

PCC CE 04 .3: Doors, Windows and Ventilators.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**02**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To understand the importance of doors, windows and ventilators. **SO3.2** To know about the different types of Doors, Windows and Ventilators. **SO3.3** To learn about types of stairs in building construction. **SO3.4** To understand the repairs techniques of masonry walls.	Testing on Coarse Aggregates (i) Crushing value of aggregates. (ii) Impact value of aggregates. (iii) Water absorption of aggregates. (iv) Sieve analysis of Aggregates. stairs in building construction. SO3.4 To understand the repairs techniques of masonry walls.	**Unit-III: Doors, Windows Ventilators.** 3.1- Types of Doors based on material. 3.2- size location, fittings, doors & windows 3.3- construction sunshades, sills and jambs, RCC doors/windows frames. 3.4- Introduction of stair 3.5- Stairs types 3.6-rule of proportionality etc. 3.7 repairs techniques for mas walls. 3.8- Revision.	1.. What is brick cavity walls? ii. Common defect in construction and their effect on strength and performance of walls.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Write about the types of doors and windows.

b. Mini Project:

Draw a neat diagram of types of doors

PCC CE 04 .4: Asphalt, Bitumen and Tar

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**02**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 To understand the types of floors and roof. SO4.2 To learn about types of floor finishing. **SO4.3** To understand the importance of water supply and drainage system in construction. **SO4.4** To learn about all the types of materials used in roofs. **SO4.5** To understand the Repairs techniques for floors & roofs.	Testing on Coarse Aggregates (i) Sieve analysis of Aggregates. (ii) Grading of aggregates Testing on Cement Normal Consistency of cement.	**Unit IV: Floors and Roofs** 4.1 Types, minimum thickness, construction, floor finishes. 4.2 Flat roofs, RCC jack arch, reinforced brick concrete solid slab and 4.3 timber roofs, pitched roofs, false ceiling, 4.4 cement roofing units, water proofing. Services: 4.5 Water supply Drainage & plumbing services, Electrification, 4.6 Fire protection thermal insulation, Air Conditioning 4.7 Acoustics & Sound insulation, 4.8 techniques and materials for low-cost housing Repairs 4.9 techniques for flooring 4.10 Repairs to damaged & cracked buildings 4.11 roof coverings	I. Remember different parts of transformer. Calculate Losses and Efficiency of transformer.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Write the importance of Electrification, fire protection and thermal insulation in building construction.

b. Mini Project:

I. Visit to a construction site and writing a report on finishing work of floor.

PCC CE 04 .5: Construction Equipment's

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**03**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To understand the types of construction equipment's. SO5.2 To learn about factors affecting of Construction Equipment's. SO5.3 Associate the knowledge (ii) Compressive of construction of substructures and superstructures. SO5.4 To know about the function of construction equipment's SO5.5 To understand the significance of equipment in construction industry.	Testing on Coarse Aggregates (i) Sieve analysis of Aggregates. (ii) Grading of aggregates (iii) Testing on Cement Normal Consistency of cement.	Unit V: Construction Equipm 5.1- Factors affecting & selection of construction equipment's 5.2- investment and operating cost output of various equipment's, 5.3brief study of equipment's required for various 5.4jobs such as earth work, dredging, conveyance 5.5concreting, hoisting 5.6 pile driving, 5.7compaction grouting. Revision.	1 Planning of earthquake resistant building, Construction of walls.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain all the types of construction Equipment's used in buildings.

b. Mini Project:

I. Write the Factors affecting of Construction equipment's.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 04 .1: Students who	10	03	2	1	16

successfully complete this course will be able to understand various Types of foundation and reason behind the structure and foundation failure.					
PCC CE 04 .2: The course will provide basic knowledge in calculation and design of masonry structures and masonry buildings.	8	3	2	1	14
PCC CE 04 .3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice	8	2	2	1	13
PCC CE 04.4. Identify the factors to be considered in planning and construction of buildings.	11	2	2	1	16
PCC CE 04 .5: Understand the practices and techniques for Temporary/Special construction Works	07	03	2	1	13
Total Hours	44	13	10	05	73

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 04 .1	foundation	03	01	01	05
PCC CE 04 .2	Masonry and Walls	02	03	02	07
PCC CE 04 .3	Doors, Windows and Ventilators.	02	04	04	10
PCC CE 04 .4	Floors and Roofs	03	07	05	15
PCC CE 04 .5	Construction equipment's	01	06	06	13
	Total	11	21	18	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to pwd office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Construction Technology	Fitzrald and Higginbotham	Tata McGraw-Hill	Fifth
2.	Theory and Problems of Construction Technology	D.P. Kothari and I. J. Nagrath	Prentice Hall India Learning Private Limited	2016 - Second
3.	Construction Technology	D. C. Kulshreshtha	McGraw Hill	2009
4.	Fundamentals of Electrical Engineering	Ashfaq Hussain	Dhanpati Rai and Co	Third
5.	Lecture note provided by Dept. of electrical engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 04
Course Title: Construction Technology

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 04 .1: Students who successfully complete this course will be able to understand various Types of foundation and reason behind the structure	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

and foundation failure.																
PCC CE 04 .2: The course will provide basic knowledge in calculation and design of masonry structures and masonry buildings.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PCC CE 04 .3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice	2	3	2	3	2	3	2	3	2	2	3	2	2	3	2	3
PCC CE 04.4. Identify the factors to be considered in planning and construction of buildings.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 04 .5: Understand the practices and techniques for Temporary/Special construction Works	2	3	2	3	2	3	2	3	2	2	3	2	3	2	3	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4,5	**PCC CE 04 .1:** Students who successfully complete this course will be able to understand various Types of foundation and reason behind the structure and foundation failure.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: Foundation 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4,5	**PCC CE 04 .2:** The course will provide basic knowledge in calculation and design of masonry structures and masonry buildings.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: Masonry and Walls 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4,5	**PCC CE 04 .3:** Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : Doors, Windows and Ventilate 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4,5	**PCC CE 04.4**. Identify the factors to be considered in planning and construction of buildings.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4: Floors and Roofs 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2,3,4,5	**PCC CE 04 .5:** Understand the practices and techniques for Temporary/Special construction Works	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: Construction equipment's 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

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AKS University

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Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Semester-IV

Course Code: **PCC CE 05**
Course Title: **Theory of Structures**
Pre-requisite: Structural analysis is vital in predicting and interpreting how structures respond to varying forces to ensure stability, strength, and rigidity
Rationale: The theory of structures is a field of knowledge that explains how loads affect structures. The theory helps designers create efficient, elegant, and economic structures. A structure, as it relates to civil engineering, is a system of interconnected members used to support external loads. Structural analysis is the prediction of the response of structures to specified arbitrary external loads. During the preliminary structural design stage, a structure's potential external load is estimated, and the size of the structure's interconnected members are determined based on the estimated loads. Structural analysis establishes the relationship between a structural member's expected external load and the structure's corresponding developed internal stresses and displacements that occur within the member when in service. This is necessary to ensure that the structural members satisfy the safety and the serviceability requirements of the local building code and specifications of the area where the structure is located.

Course Outcomes:

PCC CE 05.1: Find the force in members of trusses by method of joints.

PCC CE 05.2: Ability to analyze indeterminate structures.

PCC CE 05.3: Analysis beams and frames by slope deflection method.

PCC CE 05.4: Ability to analysis arches, cables and suspension bridges**.**

PCC CE 05.5: Ability to use influence line diagrams as a valid tool for structural analysis.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 05	Theory of Structures	3	0	2	1	6	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 05	Theory of Structures	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 05.1: Virtual work and Energy Principles.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**

SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Identify that the principle of virtual work is equivalent to static equilibrium **SO1.2** Employ the principle of virtual work to calculate an approximate solution for a beam system **SO1.3** Differentiate between the requirement for an approximate solution and an exact solution. **SO1.4** Employ the principle of virtual work to calculate the reaction in simple beam system.		**Unit-1.** Virtual work and energy principle 1.1 Principles of Virtual work applied to deformable bodies 1.2 strain energy 1.3 complementary energy 1.4 Energy theorems 1.5 Maxwell's Reciprocal theorem, 1.6 Analysis of Pin-Jointed frames for static loads. 1.7 Tutorial 1 1.8 Tutorial 2 1.9 Tutorial 3 1.10 Tutorial 4	1- Explain the relation between work done by external loads and internal loads. 2- State and prove Principle of virtual work.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
I. Explain the Energy theorem.

b. Mini Project:
I. To determine the flexural rigidity of the beam and verify it theoretically.

c. Other Activities (Specify):
I. Seminar.

PCC CE 05.2: Indeterminate Structure-1.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Apply knowledge of mathematics and engineering in calculating slope, deflection, bending moment and shear force using moment distribution method **SO2.2** Identify, formulate and solve problems in structural analysis **SO2.3** Analyze structural system and interpret data **SO2.4** communicate effectively in design of structural elements **SO2.5** use the techniques, such as stiffness and flexibility methods to solve engineering problems		**Unit-2** Indeterminate Structures-I 2.1 Static 2.2 Kinematics indeterminacy, 2.3 Analysis of Fixed beams by theorem of three moments, 2.4 Analysis of continuous beams by theorem of three moments. 2.5 Effect of sinking 2.6 Effect of rotation of supports 2.7 Moment distribution method (without sway) 2.8 Tutorial 1 2.9 Tutorial 2 2.10 Tutorial 3	i. Differentiate between determinacy and indeterminacy. ii. Write the advantage and disadvantage of indeterminate structure.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Explain all types of beams and frame

b. Mini Project:

I. To determine the deflection of pin joined truss and verify the result theoretically and graphically.

c. Other Activities (Specify):

I. Class Test

PCC CE 05.3: Analysis beams and frames by slope deflection method.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Identify the formulation and sign conventions associated with the Slope Deflection method **SO3.2** Derive the Slope Deflection Method equations using mechanics and mathematics **SO3.3** Describe the concept of fixed-end moments **SO3.4** Column analogy method: It is a method used to analyze indeterminate structures specifically fixed beams, frames, and arches		**Unit-3**: Indeterminate Structures-II 3.1 Analysis of beams and frames by slope Deflection method 3.2 Column Analogy method 3.3 Tutorial 1 3.4 Tutorial 2 3.5 Tutorial 3 3.6 Tutorial 4	

SW-3 Suggested Sessional Work (SW):

b. Mini Project:
I. To study the behavior of a portal frame under different end condition.

c. Other Activities (Specify):
I. Power point presentation.

PCC CE 05.4: Study of arches and suspension cables.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**04**
SL	**02**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 student will be able to differentiate between rigid and deformable		**Unit-4:** Arches and Suspension Cables 4.1 Three hinged arches of	i - What is the degree of indeterminacy and how? Explain it.

structures. **SO4.2** student will be able to define funicular structure **SO4.3** student will be able to state the type stress in a cable. **SO4.4** student will be able to analyze cables subjected to uniformly distributed load. **SO4.5** student will be able to analyze cables subjected to concentrated loads.		different shapes 4.2 Eddy's Theorem, 4.3 Suspension cable, 4.4 stiffening girders, 4.5 Two Hinged and Fixed Arches 4.6 Rib shortening 4.7 temperature effects. 4.8 Tutorial 1 4.9 Tutorial 2 4.10 Tutorial 3	ii. Calculate the horizontal thrust for the two hinged parabolic arch loaded uniformly throughout with distributed load.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Derive the equation of determination of internal forces in a three-hinge arch.

b. Mini Project:

I. To study two hinged arch for the horizontal displacement.

d. Other Activities (Specify):

I. Visit to Cable stayed Bridge construction site.

PCC CE 05.5: Rolling Loads and influence line.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 learn the Construction of influence line for maximum shear at sections in a beam supporting two concentrated loads. **SO5.2** Construction of		**Unit 5:** Rolling loads and Influence Lines 5.1 Maximum SF and BM curves for various types of Rolling loads 5.2 focal length, 5.3 EUDL,	1.What are the types of rolling loads? 2.What are the types of influence line?

influence line for maximum moment at sections in a beam **SO5.3** Understand the series of moving concentrated loads **SO5.4** Construction of influence line for maximum shear at a section in a beam **SO5.5** Understanding about the envelopes of maximum influence line values		5.4 Influence Lines for Determinate Structures-Beams 5.5 Three Hinged Arches 5.6 Tutorial 1 5.7 Tutorial 2 5.8 Tutorial 3 5.9 Tutorial 4	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain influence line for moving load

b. Mini Project:

I. Prepare PPT on influence line (Structure analysis theories).

c. Other Activities (Specify):

I. Quiz.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 05.1: Find the force in members of trusses by method of joints.	10	2	1	13
PCC CE 05.2: Ability to analyse indeterminate structures.	10	2	1	13
PCC CE 05.3: Analysis beams and frames by slope deflection method.	6	2	1	9
PCC CE 05.4: Analysis the Arches, Cables and suspension bridges.	10	4	2	16
PCC CE 05.5: Ability to use influence line diagrams as a valid tool for structural analysis.	9	2	2	13
Total Hours	45	12	06	63

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 05.1	Virtual work and energy principle	03	01	01	05
PCC CE 05.2	Indeterminate Structures-I	02	06	02	10
PCC CE 05.3	Indeterminate Structures-II	03	07	05	15
PCC CE 05.4	Arches and Suspension Cables	-	10	05	15
PCC CE 05.5	Rolling loads and Influence Lines	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5 Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Structure analysis	Devdas Menon	Alpha Science Intl Ltd	2008
2.	Structural Analysis	Amin Ghali and Adam Neville	CRC Press	2017
3.	Structural analysis	Russell C. Hibbler	Pearson	2017
4.	Dynamics of Structure	A.K Chopra		

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 05
Course Title: Theory of Structures

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 05.1: Find the force in members of trusses by method of joints.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 05.2: Ability to analyse indeterminate structures.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

PCC CE 05.3: Analysis beams and frames by slope deflection method.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 05.4: Analysis the Arches, Cables and suspension bridges.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 05.5: Ability to use influence line diagrams as a valid tool for structural analysis.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**PCC CE 05.1**: Find the force in members of trusses by method of joints.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**PCC CE 05.2**: Ability to analyse indeterminate structures.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6	**PCC CE 05.3**:	SO1.1		**Unit-3:**	

7,8,9,10,11,12 PSO1,3	Analysis beams and frames by slope deflection method.	SO1.2 SO1.3 SO1.4		**3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**PCC CE 05.4**: Analysis the Arches, Cables and suspension bridges.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**PCC CE 05.5:** Ability to use influence line diagrams as a valid tool for structural analysis.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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2. Mr. Aditya Budhadhra , Assistant Professor, Dept. of Civil Engineering
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Semester-IV

Course Code: **PCC CE 06**
Course Title: **Transportation-I**
Pre-requisite: Railway engineering is a specialized branch of civil engineering that revolves around the planning, design, construction, operation, and maintenance of railway systems and infrastructure.
Rationale: Railway engineering is a multi-faceted engineering discipline dealing with the design, construction and operation of all types of rail transport systems. country. Speed movement of the commodities is possible through railways.

Course Outcomes:

PCC CE 06.1: At the end of this course students will be able to apply the knowledge of railway track components, materials and fixtures and fastenings.

PCC CE 06.2: Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.

PCC CE 06.3: Solve problems of railway track geometrics, train resistance, points and crossings, Signaling and control system.

PCC CE 06.4: Identify the factors to be considered in planning and construction of railway tracks.

PCC CE 06.5: Understand the practices and techniques for Temporary/Special construction Works.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core Course	PCC CE 06	Transportation-I	3	2	2	2	9	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
PCC	PCC CE 06	Transportation-I	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
PCC	PCC CE 06	Transportation-I	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course

progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 06.1: At the end of this course students will be able to apply the knowledge of railway track components, materials and fixtures and fastenings.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1. To understand the difference between railway and highway transportation. **SO1.2** To understand Basic terms of railway terminology. **SO1.3** Define the various components of the railway. **SO1.4** Learn gauge and different types of gauges. **SO1.5.** To understand coning of wheel with advantages and disadvantages.	1. Collection of different types of photographs showing a. Various bridge types. b. Rail tracks c. Tunnels 2.Hydraulic design of bridges. 3. Various modern large span bridges: Pre stressed bridges and launching process.	**Unit-1.** Introduction 1.1 Brief history of railways, Role of railways in transportation, its advantages and disadvantages. 1.2- Comparison of railways and highway transportation, Classification of Indian railways. 1.3- Classification of railway line based on speed criteria, Railway terminology. 1.4- Permanent way and its components. 1.5- Requirements of ideal permanent way, Gauges in railway track. 1.6- Selection of gauges, Uniformity of gauges, Necessity of adopting different gauges. 1.7- Demerits of adopting different gauges, Railway track cross-sections, Cross section in cutting and filling, 1.8 Single line double line drainage in railway tracks and yards. 1.9 Coning of wheels.	1. Write the merit and demerit of railway. 2. Write the comparison of railway and highway transportation.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Prepare a note on coning of wheels with neat diagram.

b. Mini Project:

I. draw a neat diagram of Permanent way of railway track in a chart paper.

c. Other Activities (Specify):

I. Quiz

PCC CE 06.2: Railway Track.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To find out actual difference between all the types of sleepers and their importance. **SO2.2.** To understand the different types of rails and sleepers. **SO2.3** To understand the difference between BH and FF rails. **SO2.4.** To learn about creep of rails and effects of creep. **SO2.5** To know about the welding and methods of welding in rails.	1. Visit of Railway bridges for rehabilitation. 2. Visit of Railway Over Bridges and Under Bridges	**Unit-2** Railway Track 2.1 Ballast, Functions of ballast, requirement of good ballast 2.2 different materials used as ballast, size and section of ballast, scissors method of packing ballast. 2.3 Sleepers, Functions of sleepers, requirements of good sleeper, 2.4 types of sleepers, their advantages and disadvantages, comparison, of wooden metal and concrete sleepers. 2.5 spacing of sleepers and sleeper density. 2.6 Rails, Functions of rails, requirement of rails 2.7 types of rail sections, DH BH and FF rails, their standard	1. renewal of ballast and quantity

		nomenclature, and comparison. 2.8 purpose of welding, methods of welding and its advantages, length of welded rails. 2.9 creep of rails, indications of creep, theories of creep, effects of creep, prevention of creep	

SW-2 Suggested Sessional Work (SW):

a. Assignments:
I. what is ballast? Write 5 types of ballast used in railway track?

b. Mini Project:
I. Visit to a railway construction site in your locality and writing a report.

c. Other Activities (Specify):
I.: Quiz.

PCC CE 06.3: Rail Fixtures and Fastenings.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**00**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To understand the importance of rail fixtures and fastenings. **SO3.2** To know about the different types of railway joints. **SO3.3** To learn about types of gradients in railway track. **SO3.4** To understand the		**Unit-3** Rail Fixtures and Fastenings 3.1 Purpose and types of fixtures and fastenings. 3.2 fishplates, Spikes, Chairs for BH and DH rails, 3.3- keys, Bearing joints and staggered joints. 3.4 Geometrics: Necessity of geometric design of a railway	I What is Cant deficiency, Negative cant explain? II. Write the Types of curves and Transition curves.

point and crossing of railway track		track, Gradient and grade compensation, 3.5 Types of Gradients, Grade compensation on curves, Extra clearance on curves. 3.6 Super elevation or cant, Objects of providing super elevation 3.7 Necessity of points and crossings, Functions Components of turnouts- Left hand turnout 3.8 right hand turnout, Working of turnout 3.9 Points or switches, Type of switches. 3.10 Crossings- types of crossings and crossing number, crossing used in Indian railways. 3.11 Introduction, Modernization of tracks, Track electrification, Speed trends.	

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. Write about the types of fixtures and fastening.

b. Mini Project:
I. Draw a neat diagram of left & right-hand turnout.

c. Other Activities (Specify):
I. Class test.

PCC CE 06.4: Bridges.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 To understand the difference between bridge and culvert. **SO4.2** To learn about types of bridge. **SO4.3** To understand the importance of piers and abutments in bridge construction. **SO4.4** To learn about all types of Approaches, Bridge bearings and joints in bridges. **SO4.5** To understand the Repairs techniques of suspension bridge.		**Unit-4: Bridges** 4.1 Difference between bridge and culvert, Components of a bridge. 4.2 Various terminologies used in bridges, Selection of bridge site. 4.3 Main classification of bridges, Requirements of an ideal bridge. 4.4 Bridge alignment and collection of bridge design data, 4.5 Determination of flood discharge water way, Economic span, Scour depth. 4.6 Afflux standard valves of clearance and free board as per IRC. 4.7 Types of bridge super structure, Bridge floorings and their selection. 4.8 Bridge piers, Abutments, Wing walls. 4.9 Approaches, Bridge bearings and joints in bridges. 4.10 truss bridges, Erecting of RCC bridges and suspension bridges, Maintenance method.	i) Characteristics of an ideal bridge site.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I Write the importance of Bridge piers, Abutments, Wing walls.

b. Mini Project:

I. Write in brief classification of bridge with neat diagram.

PCC CE 06.5: Tunnels.

Approximate Hours

Item	Approx. Hours

CI	**04**
LI	**00**
SW	**02**
SL	**01**
Total	**07**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To understand the types of tunnels. **SO5.2** To learn about factors affecting of Construction of tunnel. **SO5.3** Associate the knowledge of different types of lining. **SO5.4** To know about the function of mucking operation. **SO5.5** To understand the significance of equipment in construction industry.	1.Study different components of DC Motor and Three Phase Starter. 2. Study of different components of Induction Motor and Star	**Unit 5**: Construction Equipments 5.1 Selection of route, Engineering surveys, alignment, shape and size of tunnel 5.2 Construction of tunnels in soft soil, hard soil and rock, 5.3 Different types of lining, methods of lining, Mucking operation. 5.4 Drainage and ventilation, Examples of existing important tunnels in India and abroad.	i. Define Tunnel approaches, Shafts, pilot shafts.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain all the shape and size of tunnel with their diagram.

b. Mini Project:

I. Write the Factors affecting of Construction of tunnel.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 06.1: At the end of this course students will be able to apply the knowledge of railway track components, materials and fixtures and fastenings.	9	0	2	1	12
PCC CE 06.2: Be able to apply theoretical and practical aspects of	11	0	2	1	14

project management techniques to achieve project goals.					
PCC CE 06.3: Solve problems of railway track geometrics, train resistance, points and crossings, Signaling and control system.	11	0	2	1	14
PCC CE 06.4: Identify the factors to be considered in planning and construction of railway tracks.	10	0	4	2	16
PCC CE 06.5: Understand the practices and techniques for Temporary/Special construction Works.	4	0	2	1	7
Total Hours	45	0	12	6	63

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 06.1	Introduction	03	01	01	05
PCC CE 06.2	Railway Track	02	06	02	10
PCC CE 06.3	Rail Fixtures and Fastenings	03	07	05	15
PCC CE 06.4	Bridges	-	10	05	15
PCC CE 06.5	Tunnels	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to city traffic control office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Railway Engineering	Arora &Saxena	Dhanpat Rai Publishing Company	4th edition, published in 2019
2.	Elements of Bridge ,tunnel & Railway Engineering	S.P. Bindra	Dhanpat Rai Publication	1st edition, revised edition 2015
3.	Transportation Engineering	A.K Upadhyay	S.K Katariya & Sons	2nd edition January 2010

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 06
Course Title: Transportation-I

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 06.1: At the end of this course students will be able to apply the knowledge of railway track components, materials and fixtures and fastenings.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

PCC CE 06.2: Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 06.3: Solve problems of railway track geometrics, train resistance, points and crossings, Signaling and control system.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 06.4: Identify the factors to be considered in planning and construction of railway tracks.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 06.5: Understand the practices and techniques for Temporary/Special construction Works.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 06.1:** At the end of this course students will be able to apply the knowledge of railway track components, materials and fixtures and fastenings.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1:** **1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 06.2:** Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2:** **2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 06.3:** Solve problems of railway track geometrics, train resistance, points and crossings, Signaling and control system.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 06.4**: Identify the factors to be considered in	SO1.1 SO1.2 SO1.3 SO1.4	**1, 2, 3, 4**	**Unit-4:** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	planning and construction of railway tracks.	SO1.5 SO1.6			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 06.5:** Understand the practices and techniques for Temporary/Special construction Works.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

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Semester-IV

Course Code: **PCC CE 07**
Course Title: **Geo-Technical Engineering**
Pre-requisite: Student should have basic understanding of geology, mathematics and physics. In addition to this student should have basic knowledge of soil mechanics and foundation engineering. Students should have laboratory skills too
Rationale: Studying Geotechnical engineering is justified for several reasons i.e. Infrastructure Development, Safety and risk mitigation, Environmental Considerations, Resource Exploration, Urban Planning, Resilience to natural disasters and innovations and research. A student, after studying civil engineering should have thorough understanding about all the above aspects

Course Outcomes:

PCC CE 07.1: Understand the various index properties of soil, determine them experimentally and classify the soil accordingly.

PCC CE 07.2: Evaluate the permeability of soil and also compute analytically the vertical stress in a semi-infinite soil mass.

PCC CE 07.3: Determine the compactive effort required to obtain necessary degree of compaction and also various consolidation parameters of soil.

PCC CE 07.4: Understand the significance of shear strength parameters in various geotechnical analyses.

PCC CE 07.5: Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 07	Geo-Technical Engineering	4	2	1	1	8	5

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 07	Geo-Technical Engineering	15	20	5	5	5	50	50	100

Scheme of Assessment:

Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 07-L	Geo-Technical Engineering	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 07.1: Understand the various index properties of soil, determine them experimentally and classify the soil accordingly.

Approximate Hours

Item	Approx. Hours
CI	**17**
LI	**14**
SW	**02**
SL	**01**
Total	**34**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Introduction to soil, formation and its types. **SO1.2** Index properties of soil. **SO1.3** Representation of phase systems of soils. **SO1.4** Plasticity Characteristics of Soil. **SO1.5** Classification of Soils	1.Determine Natural moisture content using Oven Drying method. 2. Determine Field Density using Core Cutter method and Sand replacement method. 3. Determination of Specific gravity of Soils. 4. Grain size distribution by Sieve and Hydrometer Analysis. 5. Determination of Liquid limit	**Unit-1.0** Introduction to soils, their plasticity characteristics and their classification. 1.1 Introduction to soil, types, deposition and formation of soils. 1.2 Two phase and three phase systems of soil representation. 1.3 Soil volume, weight, void ratio, moisture content. 1.4 Unit weight, percent air voids, saturation moisture content, specific gravity etc. 1.5 Relationship between different index properties of soils 1.6 Numerical based on properties of soils. 1.7 Index properties of soil and their determination. 1.8 Plasticity and Atterberg limits (liquid limit, plastic limit, shrinkage limit) of soil. 1.9 Determination of Atterberg	1. Properties of different types of soils. 2. Relationship between different Atterberg limits.

	of fine-grained soils. 6. Determination of Plastic limit and shrinkage limit of fine-grained soils. 7. Field identification of Fine-Grained soils	limits of soils. 1.10 Study of Different Indices (plasticity y index and shrinkage index). 1.11 Liquidity index, consistency index, toughness index etc. 1.12. Sensitivity. 1.13Particle size classification 1.14 Textural classification, unified soil classification. 1.15 IS soil classification. 1.16 Field identification of soils. 1.17 Toughness Index, thixotropy and sensitivity of soils	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Formation of soils. Different types of soils. Types of soils used in different parts of India. Types of soils used for various construction.

b. Mini Project:

I. A chart representing zonal distribution of soils in India.

c. Other Activities (Specify):

I. A flow chart representing studies conducted on soil and method of selecting suitable foundation for any construction

PCC CE 07.2: Evaluate the permeability of soil and also compute analytically the vertical stress in a semi-infinite soil mass.

Approximate Hours

Item	Approx. Hours
CI	**14**
LI	**04**
SW	**02**
SL	**01**
Total	**21**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO2.1 Permeability of Soil and its aspects. **SO2.2** Seepage Analysis, stream and potential functions. **SO2.3** Effective stress in soils **SO2.4** Stresses in soils. **SO2.5** Computation of displacements from elastic parameters.	1. Permeability test using Constant-head test method. 2.Permeability test using Falling-head method.	**Unit-2** Permeability, determination and seepage analysis. 2.1 Introduction to permeability, Darcy 's law, Coefficient of permeability. 2.2 Permeability aspects. 2.3 Methods of determination of permeability. 2.4 Permeability for stratified soils (in direction parallel and perpendicular to flow). 2.5 Comparison between permeability and transmissivity. 2.6 Seepage Analysis. stream and potential functions, flow nets. 2.7 Effective Stress Principle. 2.8 Fluctuations of effective stress, effective stress in soils saturated by capillary action. 2.9. Seepage pressure, quick sand condition. 2.10. Stresses in soils. 2.11 Stresses due to loads of various shapes.	i. Permeability of various soils i.e. fine grained and coarse grained. ii. Formation of stress isobars underneath the soil for various loadings.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Calculation of pressure at various depths using Bousinessq's and Westerguard's theory.

II. Determination of seepage through the body of a dam.

b. Mini Project:

I. Preparation of a constant head permeameter model and thus determining the permeability for a soil sample.

c. Other Activities (Specify):

I. Presentation of a poster depicting the stratified soils when flow take place in direction parallel and perpendicular to the direction of stratification.

PCC CE 07.3: Determine the compactive effort required to obtain necessary degree of compaction and also various consolidation parameters of soil.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**04**
SW	**02**
SL	**03**
Total	**20**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Compaction of soil. SO3.2 Factors affecting compaction of soil. SO3.3 Determination of Optimum moisture content and maximum dry density. SO3.4 Consolidation of soil. SO3.5 Computation of initial and final settlement of different soil deposits.	1. Compaction test: Standard Proctor test and Modified Proctor test. 2. Consolidation Test and Calculation of Relative density.	**Unit-3:** Compaction and consolidation of soil. 3.1 Introduction to Compaction of Soil. 3.2 Laboratory determination of optimum moisture content and maximum dry density. 3.3 Compaction in field. 3.4 Various methods of compaction in field. 3.5 Compaction specifications and field control 3.6 Consolidation of Soil. 3.7 Comparison between consolidation and compaction of soil. 3.8 Initial, primary & secondary consolidation. 3.9 Terzaghi ‘s theory of consolidation 3.10 Spring analogy for primary consolidation. 3.11 Computation of consolidation and final settlement of soil deposits.	i. Differences between compaction and consolidation ii. Assumptions and mechanisms involved in Terzaghi’s consolidation theory. iii. Compare the maximum dry density and optimum moisture content for different soils

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Comparison between compaction and consolidation.

ii. Initial, primary and secondary consolidation.

iii. Complete analysis by Terzaghi’s consolidation theory.

b. Mini Project:

I. Prepare a poster representing the behavior of fine grained soils on the dry and wet of optimum side in relation to various properties.

c. Other Activities (Specify):

I. Comparison chart showing the difference between maximum dry density and optimum moisture content for different soil types.

PCC CE 07.4: Understand the significance of shear strength parameters in various geotechnical analyses.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**08**
SW	**04**
SL	**02**
Total	**24**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Shear Strength and factors affecting it. **SO4.2** Mohr's theory and Mohr Coulomb Theory **SO4.3** Different types of Shear Strength Tests. **SO4.4** Define effective strength parameters and also their determination. **SO4.5** Triaxial shear test and Unconfined compression test	1. Triaxial Test (UU). 2. Vane shear test. 3. Direct Shear Test. 4. Unconfined Compression Strength Test.	**Unit-4** Shear Strength of soil. 4.1 Introduction to shear strength and factors affecting it. 4.2 Principal planes, major and minor principal stresses 4.3 Representation of stresses on any plane in a stressed element.. 4.4 Mohr's circle and Mohr-Coulomb theory. 4.5 Types of shear tests, pore-pressure measurement. 4.6 Computation of effective shear strength parameters 4.7 Direct Shear Test 4.8 Triaxial shear test. 4.9 Unconfined compression test. 4.10 Vane shear test	i. Preparation of process flow chart of the processes involved in the triaxial shear test. ii. Draw a typical lay out of unconfined shear test.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Draw the Mohr Circle for plane stress and plane strain conditions.
ii. Differentiate between the Direct Shear test and triaxial shear test.

b. Mini Project:

I. Collect a soil sample and determine its shear strength parameters by triaxial test.

c. Other Activities (Specify):

I. Power Point Presentation on the various advantages and disadvantages of direct shear test.

PCC CE 07.5: Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**0**
SW	**02**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Types of slopes and their failures**.** **SO5.2** Factor of safety and concept of stability number **SO5.3** Methods of soil exploration and soil investigation. **SO5.2** Factor of safety and concept of stability number **SO5.3** Methods of soil exploration and soil investigation.	1.Study different components of DC Motor and Three Phase Starter. 2. Study of different components of Induction Motor and Star	**Unit 5:** Stability of Slopes and soil exploration. 5.1 Types of slopes and their failure mechanisms 5.2 Factor of safety, finite and infinite slopes. 5.3 Wedge failure Swedish circle method, friction circle method 5.4 Stability numbers and charts. 5.5. Methods of soil exploration and soil investigation. 5.6 Methods of boring, soil samplers, sampling procedures. 5.7 Trail pits, borings, penetrometer tests, analysis of borehole logs. 5.8 Geophysical and advance soil exploration methods	1.Understand Taylors stability analysis for all the soil conditions. 2.Know the different types of soil samplers, their merits and demerits.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. List the different types of slopes and types of slope failure.

II. Understand all the types of factor of safety i.e. with respect to height, cohesion and angle of friction..

b. Mini Project:

I. Prepare a poster depicting all the methods of soil exploration and differences between each.

c. Other Activities (Specify):

I. Enlist all the methods of failure analysis of slopes.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 07.1: Understand the various index properties of soil, determine them experimentally and classify the soil accordingly.	17	4	2	1	34
PCC CE 07.2: Evaluate the permeability of soil and also compute analytically the vertical stress in a semi-infinite soil mass	14	4	2	1	21
PCC CE 07.3: Determine the compactive effort required to obtain necessary degree of compaction and also various consolidation parameters of soil.	11	4	2	3	20
PCC CE 07.4: Understand the significance of shear strength parameters in various geotechnical analyses.	10	8	4	2	24
PCC CE 07.5: Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground	8	0	2	1	11
Total Hours	60	30	12	08	110

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 07.1	Introduction to soils, their plasticity characteristics and their classification	03	01	01	05
PCC CE 07.2	Permeability, determination and seepage analysis	02	06	02	10
PCC CE 07.3	Compaction and consolidation of soil.	03	07	05	15
PCC CE 07.4	Shear Strength of soil	-	10	05	15
PCC CE 07.5	Stability of Slopes and soil exploration.	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to soil testing lab
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Soil Mechanics & Foundations	Punamia B.C	Firewall Media	2017 (16th edition)
2.	Modern Geotechnical Engineering	Alam Singh	CBS Publishers & Distributors	2012(3rd edition)
3.	Basic & Applied Soil Mechanics	Gopal Ranjan & ASR Rao	New Age International	2016 (3rd edition)
4.	Geotechnical Engineering.	S.K Garg	Khanna Publishers	2016 (10th edition)
5.	Lecture note provided by Dept. of Civil Engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 07
Course Title: Geo-Technical Engineering

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 07.1: Understand the various index properties of soil, determine them experimentally and classify the soil accordingly.	1	2	3	2	3	2	3	3	2	3	2	3	2	3	2	3

PCC CE 07.2: Evaluate the permeability of soil and also compute analytically the vertical stress in a semi-infinite soil mass	2	1	2	3	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 07.3: Determine the compactive effort required to obtain necessary degree of compaction and also various consolidation parameters of soil.	1	2	3	2	3	2	3	2	3	2	3	1	2	2	3	3
PCC CE 07.4: Understand the significance of shear strength parameters in various geotechnical analyses.	2	1	2	3	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 07.5: Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground	3	2	1	2	3	2	3	2	3	2	3	3	2	2	3	3

Legend:1–Low,2–Medium,3-High

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 07.1:** Understand the various index properties of soil, determine them experimentally and classify the soil accordingly.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 07.2:** Evaluate the permeability of soil and also compute analytically the vertical stress in a semi-infinite soil mass	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 07.3:** Determine the compactive effort required to obtain necessary degree of compaction and also various consolidation parameters of soil.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7,	**PCC CE 07.4**:	SO1.1	**1, 2, 3, 4**	**Unit-4:**	

8,9,10,11,12 PSO 1, 2	Understand the significance of shear strength parameters in various geotechnical analyses.	SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 07.5:** Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
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Semester-IV

Course Code: **PCC CE 13**
Course Title: **Fluid Mechanics-II**
Pre-requisite: Students are expected to know the fundamentals of engineering mechanics, resolving of forces, Statics, Dynamics and flow kinematics.
Rationale: This Subject provides students with an introduction to principal concepts and methods of fluid mechanics. Topics covered in the course include pressure, hydrostatics, and buoyancy; open systems and control volume analysis; mass conservation and momentum conservation for moving fluids; viscous fluid flows, flow through pipes; dimensional analysis; boundary layers, and lift and drag on objects.

Course Outcomes:

PCC CE 13.1: Understand the Uniform flow in open channels.

PCC CE 13.2: Acquired the knowledge of non-uniform flow in open channels.

PCC CE 13.3: Understand the Pipe flow problems.

PCC CE 13.4: Understanding of Turbines.

PCC CE 13.5: Understanding of Centrifugal pumps.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 13	Fluid Mechanics-II	3	0	2	2	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure
outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 13	Fluid Mechanics-II	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 13.1: Understand the Uniform flow in open channels.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the velocity distribution, energy in open channel flow **SO1.2** Understand the Critical flow and its computations **SO1.3** determination of normal depth and velocity		Unit-1 Uniform flow in open channels: 1.1Channel geometry and elements of channel section velocity distribution, energy in open channel flow 1.2 Specific energy, types of flow 1.3 Critical flow and its computations 1.4 uniform flow and its computations 1.5 Chazy's and Manning's formulae 1.6 determination of normal 1.7 depth and velocity 1.8 Normal and critical slopes 1.9 Economical sections	1. Laminar flow and turbulent flow.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Explain uniform flow and its computations.

ii. What are Economical sections

b. Mini Project:

I. Various properties of Laminar flow.

c. Other Activities (Specify):

I. Channel geometry and elements of channel section.

PCC CE 13.2: Acquired the knowledge of non-uniform flow in open channels.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To Understand the Basic assumptions and dynamic equations of gradually varied flow beams. **SO2.2** Forces on immersed bodies		**Unit-2** non-uniform flowing open channels 2.1. Basic assumptions and dynamic equations of gradually varied flow 2.2 characteristics analysis and computations of flow profiles 2.3 rapidly varied flow 2.4 hydraulic jump in rectangular channels and its basic characteristics 2.5 surges in open channels& channel flow routing 2.6 Forces on immersed bodies 2.7 drag on a sphere 2.8 A flat plate, a cylinder 2.9 Magnus effect.	1.Comparison of open channel flow and pipe flow 2. Flow in open channels types of channels

SW-2 Suggested Sessional Work (SW):

a. Assignments:
1. types of flow
2. geometric elements of channel section.

b. Mini Project:
I. uniform flow in channels, Chezy's equation.

c. Other Activities (Specify):
I. Condition for maximum discharge and maximum velocity through circular channels, computations for uniform flow.

PCC CE 13.3: Understand the Pipe flow problems.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand losses in pipe **SO3.2** concepts of equivalent length **SO3.3** Pipe Network		**Unit-3:** Pipe flow problems 3.1 Losses due to sudden expansion and contraction 3.2 losses in pipe fittings and valves 3.3 concepts of equivalent length 3.4 hydraulic and energy gradient lines siphon, pipes in series pipes in parallel, branching of pipes 3.5 Laminar and turbulent boundary layers and laminar sub-layer 3.6Boundary layer thickness, hydro-dynamically smooth and rough boundaries 3.7Resistance of smooth and artificially roughened pipes, 3.8commercial pipes, aging of pipes. 3.9 Pipe flow	1. Water Hammer 2. Pipe Network

SW-3 Suggested Sessional Work (SW):

a. Assignments:
i. Computation of critical flow
ii. Section factor for critical flow.

b. Mini Project:
I. Dynamic equation for gradually varied flow

c. Other Activities (Specify):
I. Approximation for a wide rectangular channel.

PCC CE 13.4: Understanding of Turbines.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**

SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 turbines **SO4.2** Similarity laws **SO4.3** Pelton Turbine. **SO4.4** action of jet torque. **SO4.5** runaway speed		**Unit-4:** Turbines 4.1Introduction & Definitions 4.2Classifications Similarity laws, specific speed and unit quantities 4.3Pelton turbine- their construction and settings 4.4Speed regulation, dimensions of various elements 4.5Action of jet Torque, 4.6 power and efficiency for ideal case construction & settings, 4.7 draft tube theory, 4.8 runaway speed simple theory of design 4.9 characteristic curves, cavitation.	1. Classification and comparison of velocity triangles for 2.Pelton wheel and reaction turbines (Francis and Kaplan)

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Classification and comparison of velocity triangles for Pelton wheel and reaction turbines (Francis and Kaplan).

b. Mini Project:

I. Different types of penstock and surge tanks.

d. Other Activities (Specify):

I. Types, cavitation in turbines in Load carrying capacity of piles.

PCC CE 13.5: Understanding of Centrifugal pumps.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understating the centrifugal pumps **SO5.2** Various types and their important components **SO5.3** Reciprocating pumps		Unit 5: Centrifugal pumps 5.1 Introduction of centrifugal pumps 5.2 Various types and their important components 5.3 manometric head, total head, net positive suction head 5.4 specific speed, shut off head, 5.5 energy losses, cavitation principle of working and characteristic curves. 5.6 Introduction of Reciprocating pumps 5.7 Principle of working Coefficient of discharge, slip, 5.8 single acting and double acting pump 5.9 Manometric head, Acceleration head.	1. Submersible Pump.

SW-5 Suggested Sessional Work (SW):
a. Assignments:

I. Working Principle of centrifugal pump
II. Types of centrifugal pump.

b. Mini Project:
I. Difference between single and multistage centrifugal pump.

c. Other Activities (Specify):
I. Relative direction of flow through impeller.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 13.1: Understand the Uniform flowing open channels.	9	2	2	13
PCC CE 13.2: Acquired the knowledge of non-uniform flow in open channels.	9	2	2	13

PCC CE 13.3: Pipe flow problems.	9	2	2	13
PCC CE 13.4: Understanding of Turbines.	9	2	2	13
PCC CE 13.5: Understanding of Centrifugal pumps.	9	2	2	13
Total Hours	45	10	10	65

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 13.1	Uniform flow in open channels	01	01	03	05
PCC CE 13.2	Non-uniform flow in open channels	02	05	08	15
PCC CE 13.3	Pipe flow problems	02	03	05	10
PCC CE 13.4	Turbines	02	05	08	15
PCC CE 13.5	Centrifugal pumps	02	-	03	05
	Total	09	14	27	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to barrages and weir
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Fluid Mechanics & Hydraulic Machines	S.S. Rattan	Khanna Book Publishing	2019
2.	Introduction to Fluid Mechanics, P	.J. Pritchard, A.T. McDonald and R.W. Fox	Wiley India	2012
3.	Fluid Mechanics	F.M. White	Tata McGraw Hill	2011
4.	"Introduction to Fluid Mechanics and Fluid Machines	S. K. Som, G. Biswas and S. Chakraborty	Tata McGraw Hill	2017
5.	Mechanics ofFluids	Shames	McGraw Hill	1988

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 13
Course Title: Fluid Mechanics-II

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 13.1: Understand the Uniform flowing open channels.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 13.2: Acquired the knowledge of non-uniform flow in open	1	2	3	2	3	2	3	2	3	2	2	3	2	3	2	3

channels.																
PCC CE 13.3: Pipe flow problems.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 13.4: Understanding of Turbines.	1	2	3	2	3	2	3	2	3	2	1	2	2	3	2	3
PCC CE 13.5: Understanding of Centrifugal pumps.	2	2	1	2	3	2	3	2	3	2	3	2	2	2	1	2

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**PCC CE 13.1**: Understand the Uniform flowing open channels.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**PCC CE 13.2**: Acquired the knowledge of non-uniform flow in open channels.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**PCC CE 13.3**: Pipe flow problems.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5.**	

PO1,2, 9,10,12	**PCC CE 13.4**: Understanding of Turbines.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**PCC CE 13.5:** Understanding of Centrifugal pumps.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

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Semester-IV

Course Code: **HSMC 05**
Course Title: **Project Management**
Pre-requisite: Student should have basic knowledge of Geometry, Geometrical Shapes, basic knowledge of Computer, Mouse and keyboard use, navigating menus and dialogs, managing files and directories, etc.
Rationale: The rationale of measurement and metrology lies in ensuring precision, accuracy, and reliability across various fields. It is crucial for quality control, scientific research, safety, innovation, and international standards. Measurement and metrology contribute to efficiency, standardization, and progress in technology and society.

Course Outcomes:

HSMC 05.1: Students will demonstrate an understanding of fundamental project management principles, including project lifecycle, stakeholders, constraints, and success criteria.

HSMC 05.2: Students will be able to apply various project management methodologies.

HSMC 05.3: Students will develop comprehensive project plans that include scope definition, scheduling, resource allocation, budgeting, risk management, and communication strategies.

HSMC 05.4: Students will gain hands-on experience with project management tools and software.

HSMC 05.5: Students will assess project performance using key performance indicators (KPIs), metrics, and benchmarks, and make data-driven decisions to optimize project outcomes.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and Science Course	HSMC 05	Project Management	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
HSMC	HSMC 05	Project Management	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 05.1: Student gain a comprehensive understanding of project management.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**02**
SL	**02**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO1.1 Define basic project management terms and concepts. **SO1.2.** Explain the purpose and importance of project management. **SO1.3.** Apply project management principles to analyze and solve basic project scenarios. **SO1.4**. Develop a project plan for a hypothetical project, integrating elements such as scope, schedule, budget, and risk management		**Unit 1:** Introduction to Project Management 1.1 Introduction 1.2 Concept of Project 1.3 Meaning, 1.4 Characteristics, 1.5 Classification of Projects, 1.6 Project Life Cycle and Phases 1.7 Project Selection criteria, 1.8 Project Management 1.9 Line Management 1.10 Project Manager: 1.11 Roles and Responsibilities, 1.12 Project Management as a Profession	1What are the Basic element of measurement system 2.What are the different techniques used for the measurement of displacement.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Explain the Project Life Cycle

ii. Explain characteristic of Project Manager

HSMC 05.2: student understood the fundamentals of Project Execution and Monitoring.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**03**
SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Recall the key activities involved in project execution and monitoring. **SO2.2** Explain the purpose and importance of project execution and monitoring in achieving project		**Unit-II:** Project Execution and Monitoring 1.1 Generating and Screening Ideas 1.2 Steps, Monitoring the Environment, 1.3 Scouting for Project Ideas, 1.4 Preliminarily Screening	1. Explain types of monitoring 2. Explain the objective of communication

objectives. **SO2.3.** Apply project management methodologies to execute project tasks effectively. **SO2.4.** Design a project communication plan to keep stakeholders informed about project progress and changes.		1.5 Project Rating Index. 1.6 Feasibility Studies 1.7 Technical, Financial Managerial 1.8 Economic Managerial 1.9 Social, Legal and Managerial. 1.10 Team formation and roles 1.11 Communication and leadership in project management 1.12 Resource allocation and management	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Explain the Project Rating Index.
2. Explain the function of Financial Managerial.
3. Write the principle of leadership in project management.

HSMC 05.3: Learn techniques and methodologies in Financial Estimates and Projections.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**03**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Recall the basic financial terms and concepts related to estimates and projections. SO3.2. Explain the purpose and importance of financial estimates and projections in project planning and decision making.		**Unit 3:** Financial Estimates and Projections 1.1 Project cost estimation & working capital requirements, 1.2 Sources of funds 1.3 Equity, debentures, term loans & their Cost of Capital. 1.4 Projected Cash Flow Statement & fund flow	1. Write the short note on term loans. 2. Write the steps to make balance sheet

SO3.3. Evaluate the financial viability of a project based on projected costs, revenues, and expected returns. **SO3.4**. Develop a comprehensive financial plan for a project, including cost estimates, revenue projections, and cash flow forecasts.		statement, 1.5 Projected Income statement and Balance sheet 1.6 Capital budgeting decisions 1.7 Payback Period, Accounting Rate of Return 1.8 NPV, Internal Rate of Return and BCR Method 1.9 project financing,	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. What are the sources of funds?
2. Explain the Capital budgeting decisions.

HSMC 05.4: Understood the different Project Appraisal and Risk Management techniques.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**02**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Memorize the types of risks commonly encountered in project management. **SO4.2**. Explain the purpose and importance of project appraisal in evaluating project feasibility and investment decisions. **SO4.3**. Utilize risk management tools and techniques, such as risk assessment matrices and probability impact grids, to		**Unit 4**: Project Appraisal and Risk Management techniques 1.1 Project Appraisal Techniques 1.2 Objectives 1.3 Types and Method 1.4 Environmental appraisal, 1.5 Market appraisal 1.6 market survey for forecasting future demand and sales	1.Explain the following a. Risk management b. Market appraisal

identify, assess, and prioritize project risks.			

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Explain the future demand and sales.
2. Write short note on risk management tools and techniques

HSMC 05.5: Student get the knowledge about Agile techniques in Project Management.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**02**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1. Explain the Agile approach to project management and its differences from traditional waterfall methodologies. **SO5.2.** Evaluate Agile project metrics and performance indicators to assess project progress and identify areas for improvement. **SO5.3.** Develop an Agile project plan that includes iteration planning, sprint goals, and release planning.		**Unit 5:** Agile techniques in Project Management 5.1 Introduction to Agile 5.2 principles, 5.3 Scrum, Kanban, 5.4 other Agile methodologies, 5.5 Agile project management tools 5.6 Traditional project management 5.7 Agile vs. Traditional project management	1. What do you mean by project planning? 2. Write the short note on agile projects.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Explain Agile project metrics and performance indicators.
2. Explain the Traditional project management.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 05.1: Student gain a comprehensive understanding of project management.	12	2	2	16
HSMC 05.2: student understood the fundamentals of Project Execution and Monitoring.	12	3	2	17
HSMC 05.3: : Learn techniques and methodologies in Financial Estimates and Projections.	9	2	3	14
HSMC 05.4: : Understood the different Project Appraisal and Risk Management techniques.	6	2	2	10
HSMC 05.5: : Student get the knowledge about Agile techniques in Project Management.	7	2	2	11
Total Hours	46	11	11	68

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 05.1	**HSMC 05.1**: Student gain a comprehensive understanding of project management.	03	01	01	05
HSMC 05.2	**HSMC 05.2**: student understood the fundamentals of Project Execution and Monitoring.	02	06	02	10
HSMC 05.3	**HSMC 05.3**: Learn techniques and methodologies in Financial Estimates and Projections.	03	07	05	15
HSMC 05.4	**HSMC 05.4**: Understood the different Project Appraisal and Risk Management techniques.	-	10	05	15
HSMC 05.5	**HSMC 05.5:** Student get the knowledge about Agile techniques in Project Management.	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Project Management	Choudhary	Tata Mc graw Hill	2017
2.	Project Management: The Managerial Process	Clifford F Gray	Vision ias	2023
3.	Project Management: Planning and Control Techniques	R. L. Srivastava	New Age International Publishers	2021
4.	Training Manual			
5.	Lecture note provided by Dept. of Mechanical Engineering, AKS University, Satna.			

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 05
Course Title: Project Management

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 05.1: Student gain a comprehensive understanding of project management.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 05.2: student understood the fundamentals of Project Execution and	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Monitoring.																
HSMC 05.3: Learn techniques and methodologies in Financial Estimates and Projections.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 05.4: Understood the different Project Appraisal and Risk Management techniques.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 05.5: Student get the knowledge about Agile techniques in Project Management.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**HSMC 05.1**: Student gain a comprehensive understanding of project management.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12	**HSMC 05.2**:	SO1.1		**Unit-**	

PSO2	student understood the fundamentals of Project Execution and Monitoring.	SO1.2 SO1.3 SO1.4 SO1.5		**2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**HSMC 05.3**: Learn techniques and methodologies in Financial Estimates and Projections.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**HSMC 05.4**: Understood the different Project Appraisal and Risk Management techniques.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**HSMC 05.5:** Student get the knowledge about Agile techniques in Project Management.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

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Semester-IV

Course Code: **HSMC 06**
Course Title: **Finance and Accounting**
Pre-requisite: The primary objective of studying accounting is to facilitate transparent and accurate financial reporting.
Rationale: Accounting provides a structured and standardized system for recording, summarizing, and analyzing financial transactions. This transparency is crucial for stake holders, including investors, creditors, and management, to make informed decisions. Accounting helps maintain the integrity and reliability of financial information, contributing to trust and accountability in business and financial management

Course Outcomes:

HSMC 06.1: Ability to understand and apply financial management principles in decision-making.

HSMC 06.2: Analyzing and determining optimal capital structures, assessing cost of capital.

HSMC 06.3: Proficiency in preparing financial statements and handling various aspects of company accounts.

HSMC 06.4: Competence in handling debenture-related transactions and accounting entries.

HSMC 06.5: Understanding and complying with accounting standards, including Ind AS, IFRS, and international reporting standards.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and Social Science Course	HSMC 06	Finance and Accounting	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
HSMC	HSMC 06	Finance and Accounting	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 06.1: Ability to understand and apply financial management principles in decision-making.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**00**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Financial Management: Ability to apply financial management principles for effective fund utilization. **SO1.2** Risk-Return Analysis: Proficiency in evaluating risks and returns to enhance firm value. **SO1.3** Skill in balancing profit maximization and wealth maximization as organizational objectives. **SO1.4** Competence in applying discounted and non-discounted cash flow methods for investment decisions.		**Unit I:** Nature and Scope of Financial Management: 1.1 Nature, Scope and Objectives of Financial Management 1.2 Risk-Return and Value of the Firm 1.3 Objectives of the firm 1.4 Profit Maximization vs. Wealth Maximization 1.5 Emerging roles of Finance Managers 1.6 Capital Budgeting: Compounding and Discounting techniques 1.7 Concepts of Annuity and Perpetuity 1.8 Capital Budgeting Process 1.9 Techniques of Capital Budgeting 1.10 Discounted and NonDiscounted 1.11 Cash Flow Methods 1.12 Capital Rationing 1.13 Risk Evaluation and Sensitivity Analysis.	1. Engage in online simulations or case studies to self-learn risk evaluation and sensitivity analysis in financial decision-making.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Calculate the Net Present Value (NPV) and Internal Rate of Return (IRR) for a given capital budgeting project using discounted cash flow methods.

b. Mini Project:

I. Develop a proposal for a capital budgeting project, including a brief description, estimated costs, and potential return.

c. Other Activities (Specify):

I. Compare and contrast Profit Maximization and Wealth Maximization as objectives of the firm. Discuss their implications on long-term sustainability.

HSMC 06.2: Analyzing and determining optimal capital structures, assessing cost of capital.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2. 1: Capability in determining optimal capital structure and analyzing its impact on risk and shareholder returns. **SO2.2** Skill in exploring diverse sources for raising long-term finance. **S02.3:** Cost of Capital Analysis: Proficiency in calculating and understanding the Weighted Average Cost of Capital (WACC). **SO2.4:** Competence in analyzing the effects of leverage on shareholders' return		**Unit 2:** Capital Structure 2.1 Introduction- Meaning and Significance 2.2 Optimal Capital Structure 2.3 Determinants of Capital Structure Theories of Capital Structure 2.4 EBIT – EPS Analysis 2.5 EBITDA Analysis; Risk and Leverage 2.6 Effects of Leverage on Shareholders' Returns. 2.7 Sources of raising long-term finance and Cost of Capital: 2.8 Sources, Meaning, Factors Affecting Cost of Capital;	1. Create a presentation outlining the capital budgeting process, incorporating concepts of annuity and perpetuity, discounted and non-discounted cash flow methods.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Calculate the Weighted Average Cost of Capital (WACC) for a given company. Discuss the implications of the WACC in the context of the company's capital structure and investment decisions.

b. Mini Project:

I. Assign a project where students assess the impact of the scope of supply on businesses in specific industries. This could involve considering how the definition affects pricing, tax liability, and compliance.

c. Other Activities (Specify):

I. Compare and contrast Profit Maximization and Wealth Maximization as objectives of the firm. Discuss their implications on long-term sustainability.

HSMC 06.3: Proficiency in preparing financial statements and handling various aspects of company accounts.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**02**
SL	**01**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Able to understand meaning and features of company. **SO3.2** Competence in handling share capital, bonus shares, rights shares, and related journal entries.		**Unit 3:** Introduction to Company Account 3.1 Introduction, Meaning of Company, 3.2 Salient Features of a Company, 3.3 Types of Companies, Books of Account, 3.4 Preparation of Financial Statements. 3.5 Introduction, Issue, Forfeiture and Reissue of Shares 3.6 Share Capital, Types of Shares. 3.7 Bonus share, Right share, Issue of Shares for Cash,	1. Formulate a buyback strategy for a real or hypothetical company.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Iinvestigate the company's share capital structure. Identify and explain the different types of shares issued by the company.

b. Mini Project:

I. Research and report if the company has issued bonus shares or rights shares in recent years.

c. Other Activities (Specify):

I. Discuss the impact of these actions on the company's equity structure.

HSMC 06.4: Competence in handling debenture-related transactions and accounting entries.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**00**
SW	**02**
SL	**01**
Total	**06**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Ability to identify and explain features and types of debentures, along with understanding the issuance process. **SO4.2** Able to differentiate between debentures and shares		**Unit 4:** Issue of Debentures 4.1 Introduction, Meaning, Features of Debentures 4.2 Distinction between Debentures and Shares 4.3 Types of Debentures, Issue of Debentures,	1. How to gain skill on accurately accounting for interest payments on debentures.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Identify the types of debentures issued and elaborate on their terms and conditions. Explain how these terms align with the company's financial goals.

b. Mini Project:

I. Analyze the impact of the debenture issuance on the company's financial statements.

c. Other Activities (Specify):

I. Choose a publicly traded company that has recently issued debentures. Obtain relevant financial reports and announcements.

HSMC 06.5: Understanding and complying with accounting standards, including Ind AS, IFRS, and international reporting standards.

Approximate Hours

Item	Approx. Hours

CI	**05**
LI	**00**
SW	**02**
SL	**01**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Ability to comprehend the meaning and significance of corporate reporting. **SO5.2** Proficiency in applying accounting standards, including Ind AS, IFRS, and understanding their applicability and scope. **SO5.3** Capability to ensure compliance with international accounting standards, including an overview of International Financial Reporting Standard **SO5.4** Skill in preparing comprehensive financial reports that adhere to the relevant accounting standards		**UNIT-5:** Corporate Reporting – 5.1 Meaning of Corporate Reporting; 5.2 Accounting Standards 5.3 Applicability, Scope and Compliance 5.4 Ind AS, IFRS 5.5 International Financial Reporting Standard Overview (National and International accounting Authorities)	1. Review case studies or examples of companies that effectively demonstrate compliance with accounting standards.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Analyze how the company's corporate reporting practices impact various stakeholders, including investors, creditors, and employees.

b. Mini Project:

I. Examine the company's compliance with relevant accounting standards and regulatory requirements. Highlight any instances of non-compliance or areas of improvement.

c. Other Activities (Specify):

I. Prepare a presentation om corporate reporting.

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Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 06.1: Importance of Civil Engineering in the infrastructural development of society.	13	2	1	16
HSMC 06.2: Analyzing and determining optimal capital structures, assessing cost of capital.	8	2	1	11
HSMC 06.3: Proficiency in preparing financial statements and handling various aspects of company accounts.	7	2	1	10
HSMC 06.4: Competence in handling debenture-related issues.	3	2	1	6
HSMC 06.5: Understanding and complying with accounting standards, including Ind AS, IFRS, and international reporting standards	5	2	1	8
Total Hours	45	10	05	60

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 06.1	Ability to understand and apply financial management principles in decision-making	01	01	03	05
HSMC 06.2	Analyzing and determining optimal capital structures, assessing cost of capital.	01	01	03	05
HSMC 06.3	Proficiency in preparing financial statements and handling various aspects of company accounts	-	03	10	13
HSMC 06.4	Competence in handling debenture-related transactions and accounting entries.	-	03	10	13
HSMC 06.5	Understanding and complying with accounting standards, including Ind AS, IFRS, and international reporting standards	01	03	10	14
	Total	3	11	36	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to accounting office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)

8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Principles of Corporate Finance" by Richard A. Brealey.	Singhania Vinod K. and Monica Singhania	Published by McGraw-Hill Education	
2.	"Fundamentals of Financial Management"	Eugene F. Brigham and Joel F. Housto	Cengage Learning)	
3.	"Financial Management: Theory & Practice"	Eugene F. Brigham and Michael C. Ehrhardt	Published by Cengage Learning)	
4.	Principles and Application.	Sheridan Titman, Arthur J. Keown, and John D. Martin	Published by Pearson	
5.	Lecture note provided by Dept. of Commerce AKS University, Satna			

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 06
Course Title: Finance and Accounting

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 06.1: Importance of Civil Engineering in the infrastructural development of society.	2	2	1	2	3	2	3	2	3	2	3	2	2	3	2	3
HSMC 06.2: Analyzing and	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

determining optimal capital structures, assessing cost of capital.																
HSMC 06.3: Proficiency in preparing financial statements and handling various aspects of company accounts.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
HSMC 06.4: Competence in handling debenture-related issues.	1	2	3	2	3	2	3	2	3	2	3	3	2	3	2	3
HSMC 06.5: Understanding and complying with accounting standards, including Ind AS, IFRS, and international reporting standards	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12	**HSMC 06.1**:	SO1.1		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned**

PSO1,2	Importance of Civil Engineering in the infrastructural development of society.	SO1.2 SO1.3 SO1.4 SO1.5			**above**
PO1,2, 9,10,12 PSO2	**HSMC 06.2**: Analyzing and determining optimal capital structures, assessing cost of capital.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**HSMC 06.3**: Proficiency in preparing financial statements and handling various aspects of company accounts.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**HSMC 06.4**: Competence in handling debenture-related issues.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**HSMC 06.5:** Understanding and complying with accounting standards,	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

	including Ind AS, IFRS, and international reporting standards				

Curriculum Development Team

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Semester-V

Course Code: **PCC CE 12**
Course Title: **Design of Concrete Structure**
Pre-requisite: Student should have basic knowledge of building materials and Concrete structure elements Beam, Column, Slab, footing and other concrete elements.
Rationale: The students studying Design of Concrete Structural Design should possess foundational understanding about Concrete structures, members and buildings materials employed in construction. The rationale behind "Design of Concrete Structural " lies in the need to develop and implement more sophisticated and efficient design approaches for concrete structures. This field of study and practice is driven by several key factors and considerations: Safety, Sustainability, Innovation and technology, Economic efficiency.

Course Outcomes:

PCC CE 12 .1: Understand the Basic Principles of Structural Design & Beam Section.

PCC CE 12 .2: Acquired the knowledge of Design of Beams.

PCC CE 12 .3: Understanding of the Design of slab.

PCC CE 12 .4: Familiarize with Classification of Columns and Footings.

PCC CE 12 .5: Understanding Staircases.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 12	Design of Concrete Structure	3	0	2	2	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 12	Design of Concrete Structure	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 12 .1: Understand the Basic Principles of Structural Design & Beam Section.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the RCC structures. **SO1.2** Understand the properties of building materials. **SO1.3** Types of sections based on amount of steel. **SO1.4** Concrete mix design. **SO1.5** Hybrid systems.		**Unit-1 Basic principles of structural design and beam section.** 1.1 Introduction to Reinforcement concrete 1.2 structure. Various properties of concrete and reinforcing steel. 1.3 characteristic strength, partial safety factors. 1.4 Balanced, under-reinforced and over-reinforced sections 1.5 Depth of neutral axis, Deflection limits. 1.6 systems, and hybrid systems. Permissible stresses in concrete. 1.7 Concrete mix proportioning. 1.8 1.8 Workability of concrete. 1 1.9 Water cement ratio, grade of concrete, durability of concrete.	1. Transporting, placing, compacting and curing 2. Formwork, methods of proportioning concrete mixes.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

a. Explain Transporting, placing, compacting and curing of concrete.

b. What is Formwork and methods of proportioning concrete mixes.

b. Mini Project:

Various properties of concrete and reinforcing steel.

c. Other Activities (Specify):

Assumptions on RCC structures.

PCC CE 12 .2: Acquired the knowledge of Design of Beams.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To Understand the design of singly and doubly reinforcement rectangular beams. **SO2.2** Design procedure of cantilever and continuous beam. **SO2.**3 Design and detailing of shear stirrups. SO2.4 Moment of resistance **SO2.**5 Design and detailing of RCC beams.		Unit-2 Design of Beams 2.1. Design of singly reinforced rectangular Beam. 2.2 Design of Doubly reinforced rectangular Beam. 2.3 Cantilever Beam. 2.4 Continuous Beam. 2.5 Neutral axis of beam section. 2.6 Modular ratio 2.7 Shear stress in R.C. beams 2.8 Types of shear stirrups. 2.9 Design of T beam.	1.Regions of cracks in beams. ii. Read IS: 456-2000

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Design of cantilever and continuous beam.
2. Design of singly and doubly reinforcement Beam

b. Mini Project:

I. Complete report on steel beam theory

c. Other Activities (Specify):

I. Types of problems in doubly reinforcement beam.

PCC CE 12 .3: Understanding of the Design of slab.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**

SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand Design of one way and two-way slabs. **SO3.2** Discuss of flat slab SO3.3 Design of continuous slab **SO3.4** Design of cantilever chajja **SO3.5** Opening in flat slab		**Unit-3: Design of slabs** 3.1 Basic knowledge of design of slabs. 3.2 Types of slabs. 3.3 Design of one-way slabs. 3.4 Design of cantilever chajja. 3.5 Design of Continuous slabs. 3.6 Design of two-way slabs. 3.7 Cases of slabs. 3.8 Introduction of flat slabs. 3.9 Components of flat slab construction.	1.Circular Slabs 2 Design steps of circular slabs, Shear in flat slab

SW-3 Suggested Sessional Work (SW):

a. Assignments:
. Specification of design of slabs.
ii. Design procedure of two-way slabs.

b. Mini Project:
Design and analysis of flat slab.

c. Other Activities (Specify):
Design of hollow tile roof.

PCC CE 12 .4: Familiarize with Classification of Columns and Footings.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Classification of Columns and footings. **SO4.2** Design of short columns. **SO4.3** Design of isolated column. **SO4.4** Design of isolated footing. **SO4.5** Design procedure of combined footing		**Unit-4: Columns and footing** 4.1 Basic knowledge of types of columns and footings. 4.2 Effective length of columns 4.3 Design of axially loaded short column 4.4 Design Parameters: 4.5 Design of Isolated column footing subjected to axial loads. 4.6 Load carrying capacity of short columns 4.7 Design of continuous footing 4.8 Isolated footing 4.9 introduction of combined footing	1. Isolated sloped footing. 2. Combine d rectangular footing

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1.Write design steps of combined rectangular footing.

2. Describe briefly Design procedure of isolated footing.

b. Mini Project:

1. Comprehensive study between strap and raft footing.

d. Other Activities (Specify):

I. Explain Load carrying capacity of piles.

PCC CE 12 .5: Understanding Staircases.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO5.1 Understating the Effective span of stairs **SO5.2** Types of stair cases. **SO5.3** Design of dog-legged stair. **SO5.4** Live & dead load on stairs **SO5.5** Design procedure of staircases		**Unit 5: Staircase** 5.1 General notes on design of stairs 5.2 Design of stairs spanning horizontally 5.3 Design of dog- legged stairs 5.4 Design of stair with quarters pace landing 5.5 Slab less tread-riser staircase 5.6 Staircases with waist slab having equal and unequal flights with different support conditions. 5.7 Distribution of loading on the stairs. 5.8 Estimation of dead load 5.9 Effective span of stairs	1. Live load on stairs. 2. Types of stairs.

SW-5 Suggested Sessional Work (SW):
a. Assignments:

1.General notes on design of stairs
2.Estimation of load on stairs.

b. Mini Project:
I. Design dog-legged stairs

c. Other Activities (Specify):
I. Explain single flight, quarter term stair case and geometrical stair cases

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 12 .1: Understand the Basic Principles of Structural Design & Beam Section.	9	2	2	13
PCC CE 12 .2 Acquired the knowledge of Design of Beams.	9	2	2	13
PCC CE 12 .3: Understanding of the Design of slab.	9	2	2	13
PCC CE 12 .4: Familiarize with Classification of Columns and Footings.	9	2	2	13
PCC CE 12 .5: Understanding Staircases.	9	2	2	13
Total Hours	45	10	10	65

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 12 .1	Basic Principles of Structural Design & Beam Section	01	01	03	05
PCC CE 12 .2	Design of Beams	02	05	08	15
PCC CE 12 .3	Design of Slabs	02	03	05	10
PCC CE 12 .4	Columns & Footings	02	05	08	15
PCC CE 12 .5	Staircases	02	-	03	05
	Total	09	14	27	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to construction sites
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Reinforced Concrete Structures	Dr. A.K. Jain		2005
2.	"Limit State Design of Reinforced Concrete"	P. C. Varghese	Laxmi Publication Pvt. Ltd.	2012
3.	Design of Reinforced Concrete Structures	N. Subramanian		2017

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 12
Course Title: Design of Concrete Structure

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 12 .1: Understand the Basic Principles of Structural Design & Beam Section.	3	2	3	2	2	1	2	3	2	2	2	3	2	3	2	3
PCC CE 12 .2 Acquired the knowledge of Design	2	1	2	3	3	3	2	3	2	2	3	1	2	3	2	3

of Beams.																
PCC CE 12 .3: Understanding of the Design of slab.	3	3	2	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 12 .4: Familiarize with Classification of Columns and Footings.	1	2	3	2	2	2	3	2	3	2	3	1	2	3	2	2
PCC CE 12 .5: Understanding Staircases.	2	1	2	3	3	3	2	3	3	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning(SL)**
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 12 .1**: Understand the Basic Principles of Structural Design & Beam Section.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. Basic principles of structural design and beam section 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9**	**As mentioned above**
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 12 .2** Acquired the knowledge of Design of Beams.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- Design of Beams 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9**	
PO1,2,3,4,5,6	**PCC CE 12 .3**:	SO1.1		**Unit-3: Design of slabs**	

7,8,9,10,11,12 PSO1,3,3,4	Understanding of the Design of slab.	SO1.2 SO1.3 SO1.4 SO1.5		**3.1, 3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 12 .4**: Familiarize with Classification of Columns and Footings.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **Unit-4: Basic knowledge of types of columns and footings.** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 12 .5:** Understanding Staircases.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit 5: General notes on design of stairs** **5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9**	

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Semester-V

Course Code: **PCC CE 09**
Course Title: **Construction Materials**
Pre-requisite: Building material is material used for construction. Many naturally occurring substances, such as clay, rocks, sand, wood, and even twigs and leaves, have been used to construct buildings.
Rationale: The building material affects the vision of a structure, as it deals with the appearance-related qualities of the structure. It also impacts the durability of the structure. Hence, the character of the architecture is determined by the quality–quantity relationship of the building material used.

Course Outcomes:

PCC CE 09.1: To understand elements of building construction with respect to substructure and superstructure.

PCC CE 09.2: To gain in depth knowledge and understanding of different building materials used for construction.

PCC CE 09.3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.

PCC CE 09.4: Identify the factors to be considered in planning and construction of buildings.

PCC CE 09.5: Understand the practices and techniques for Temporary/Special construction Works.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 09	Construction Materials	3	1	1	1	6	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 09	Construction Materials	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 09	Construction Materials	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 09.1: To understand elements of building construction with respect to substructure and superstructure

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**03**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1. Classification of stone and properties of stone. **SO1.2** To understand classification of bricks and properties of bricks. **SO1.3** Define the various types of cement. **SO1.4** Learn about setting of cement and test of cement. **SO1.5**. To understand mortar and preparation of mortar	Testing on Bricks (i) Water absorption. (ii) Dimensional Tolerance. (iii) Compressive strength	**Unit-1.:** Introduction 1. Classification of Materials, economics of Building Materials. 1.2- Building stones – Characteristics, Testing, Preservation. 1.3-Common Building stones. 1.4-Bricks – Conventional and Fly ash Bricks, Testing, Efflorescence. 1.5 Cement – Physical properties, composition, manufacture. 1.6-setting of cement, types of cement. 1.7- field and laboratory tests, uses 1.8- Mortar – Bulking of sand, Tests for sand 1.9- properties of good mortar 1.10-preparation of mortar, uses of mortar	1. Write the detail note on types of cement.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
I. Prepare notes on classification of bricks.

b. Mini Project:
I. draw a neat diagram of manufacturing process of cement.

b. Other Activities (Specify):
I. Quiz

PCC CE 09.2: To gain in depth knowledge and understanding of different building materials used for construction.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**03**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To understand classification of timber. **SO2.2.** To understand the different types timber defects. **SO2.3** To understand the seasoning of timber. **SO2.4.** To learn about preservation of timber. **SO2.5** To know about factors affecting strength of timber.	Testing on Fine Aggregates (i) Sieve analysis of sand. (ii) Bulking of sand. iii) Revision	**Unit-2** Timber 2.1 Classification of timber 2.2 Engineering properties of timber. 2.3 Defects in timber 2.4 Factors affecting strength of timber 2.5 seasoning of timber. 2.6 preservation of timber 2.7 Wood based eco-friendly timber products. 2.8 Revision	1) what is seasoning? Write all the types of seasoning of timber

SW-2 Suggested Sessional Work (SW):

a. Assignments:
I. what is defect in timber and explain all types of defects in timber?

b. Other Activities (Specify):
I. Quiz.

PCC CE 09.3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To understand the importance of paint, varnishes and distempers**.** **SO3.2** To know about the different types of paint, varnishes and distempers. **SO3.3** To learn about plastering and pointing. **SO3.4** To know about reinforcing steel physical and magnetic properties.	Testing on Coarse Aggregates (i) Crushing value of aggregates. (ii) Impact value of aggregates. (iii) Water absorption of aggregates. (iv) Sieve analysis of Aggregates. (v) Grading of aggregates	**Unit-3 Paints, varnishes and distempers** 3.1- Paints, varnishes and distempers Common constituents. 3.2- types and desirable properties, 3.3-Cement paints. Ferrous metals. 3.4- Characteristics of reinforcing steel. 3.5- Principles of cold working. 3.6-Reinforcing steel – physical and magnetic properties 3.7 chemical composition, uses. 3.8- Brief discussion on properties of aluminum 3.9 uses of Aluminum and lead.	i). Comparison between varnish and paint. ii). Define gypsum and properties of gypsum

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Write about the types of paints and varnishes.

b. Mini Project:

I. Brief discussion on properties and uses of Aluminum and lead.

c. Other Activities (Specify):
I. Class test

PCC CE 09.4: Identify the factors to be considered in planning and construction of buildings.

Approximate Hours

Item	Approx. Hours
CI	**11**
LI	**03**
SW	**02**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 To understand the types of Asphalt, Bitumen and Tar **SO4.2** To learn about gypsum and properties of gypsum. **SO4.3** To understand the importance of pozzolana cement in construction. **SO4.4** To learn about all the types of materials used in construction work. **SO4.5** To understand the Repairs techniques for fire protection and thermal insulation.	Testing on Coarse Aggregates (i) Sieve analysis of Aggregates. (ii) Grading of aggregates. (iii) Testing on Cement Normal Consistency of cement.	**Unit-4:** Asphalt, Bitumen and Tar 4.1 Introduction of Asphalt, Bitumen and Tar. 4.2 Terminology, specifications and uses 4.3 Gypsum – Properties 4.4 Building Products and their uses 4.5 Pozzolana – Fly ash and Surkhi (Properties and uses). 4.6 Use of material lIKS101e glass 4.7 rubber, tar, emulsion, bitumen, glass wool, Use of J bolts U hooks 4.8 content &origin Asphalt, 4.9 tar, bitumen - their specific uses. 4.10 Electrification, Fire protection, thermal insulation. 4.11 Air Conditioning, Acoustics & Sound insulation	i. Write short notes on glass. ii. Explain the manufacturing process of rubber.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
I. Write the importance of Electrification, fire protection and thermal insulation in building construction.

b. Mini Project:

I. Write the comparison between asphalt, bitumen and tar.

PCC CE 09.5: Understand the practices and techniques for Temporary/Special construction Works.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**03**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To understand the manufacturing process of plastic. **SO5.2** To learn about classification of chemistry of plastic. **SO5.3** To know about the advantages and disadvantages of plastic. **SO5.4** To know about the Mechanical properties and their uses of plastic. **SO5.5** To understand the Thermal and sound insulating materials	Testing on Cement (i) Initial & final setting time of cement. (ii) Compressive strength of cement. (iii) Fineness of cement by Le-chatalier's apparatus.	**Unit 5:** Chemistry of Plastics 5.1-manufacturing process of plastic 5.2 classification of chemistry of plastic. 5.3 advantages of plastics, Mechanical properties and their uses. 5.4 Glass – Ingredients, properties 5.5 types and uses in construction 5.6 Insulating Materials 5.7 Thermal and sound insulating materials 5.8 desirable properties and types.	i. Write the Mechanical properties and their uses of plastic.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain all the types of Glass – Ingredients, properties and uses in construction.

II. Write the short notes on Insulating Material

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 09.1: To understand elements of building construction with respect to substructure and superstructure.	10	3	2	1	16
PCC CE 09.2: To gain in depth knowledge and understanding of different building materials used for construction.	8	3	2	1	14
PCC CE 09.3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.	8	4	2	1	15
PCC CE 09.4: Identify the factors to be considered in planning and construction of buildings.	11	3	2	2	18
PCC CE 09.5: Understand the practices and techniques for Temporary/Special construction Works.	8	3	2	1	14
Total Hours	45	16	10	06	77

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 09.1	Introduction of Building stones	03	01	01	05
PCC CE 09.2	Timber	02	06	02	10
PCC CE 09.3	Paints, varnishes and distempers	03	07	05	15
PCC CE 09.4	Asphalt, Bitumen and Tar	-	10	05	15
PCC CE 09.5	Chemistry of Plastics	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play

5. Visit to batching plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Building materials,.	S K Duggal	Nagaraju naga	3rd edition
2.	Engineering Materials, 43rd edition 2019	S.C. Rangwala,	Charotar. Publishing	43rd edition 2019
3.	Building Materials & Construction	Saurabh K..Soni	S.K. Kataria & Son	1st edition Revised 2022
4.	Concrete Technology. 2019	M S Shetty	S. Chand Technical.	4th edition

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: PCC CE 09

Course Title: Construction Materials

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 09.1: To understand elements of building construction with respect to substructure and superstructure.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 09.2: To gain in depth knowledge and	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

understanding of different building materials used for construction.																
PCC CE 09.3: Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 09.4: Identify the factors to be considered in planning and construction of buildings.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 09.5: Understand the practices and techniques for Temporary/Special construction Works.	2	3	2	3	2	2	2	1	2	3	2	3	2	1	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12	**PCC CE 09.1:** To understand	SO1.1 SO1.2	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

PSO 1, 2	elements of building construction with respect to substructure and superstructure.	SO1.3 SO1.4 SO1.5			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 09.2:** To gain in depth knowledge and understanding of different building materials used for construction.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2:** **2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 09.3:** Ability to use necessary skills, techniques and modern engineering tools for civil engineering practice.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 09.4**: Identify the factors to be considered in planning and construction of buildings.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4:** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 09.5:** Understand the practices and	SO1.1 SO1.2 SO1.3	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

	techniques for Temporary/Special construction Works.	SO1.4			

Curriculum Development Team

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2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
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Semester-V

Course Code: **PCC CE 10**
Course Title: **Strength of Materials**
Pre-requisite: Students must have knowledge of Calculus, linear algebra, physics (classical mechanics), differential equations, materials science basics, and mechanics of materials concepts.
Rationale: The study of Mechanics of Deformable Bodies is crucial for understanding structural behavior, enabling design, analysis, and optimization in engineering applications.

Course Outcomes:

PCC CE 10.1: Apply elasticity principles to analyze and design structures, understanding stress-strain relationships, deformations, and temperature effects for practical engineering solutions."

PCC CE 10.2: Analyze plane stresses using principal stresses, Mohr's circle, and transformations. Understand plain strain, principal strains, and combined loading in structures and pressure vessels.

PCC CE 10.3: Develop shear force and bending moment diagrams for beams, understanding loading rate relationships and identifying maximum moments and contra flexure points.

PCC CE 10.4: Derive flexural and shear formulas, analyze stress distribution, calculate slope and deflection using double integration method for standard cases.

PCC CE 10.5: Analyze strain energy in axial loads, bending, torsion, determine torsion stresses, and study buckling of columns using Euler's and Rankine's formulas.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 10	Strength of Materials	3	2	1	1	8	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
PCC	PCC CE 10	Strength of Materials	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:
This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 10.1: Apply elasticity principles to analyze and design structures, understanding stress-strain relationships, deformations, and temperature effects for practical engineering solutions.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Define stress, strain, elastic constants, and material behavior principles. **SO1.2** Interpret stress-strain diagrams for ductile and brittle materials, ensuring safety factors. **SO1.3** Evaluate stresses and strains in determinate, indeterminate, homogeneous, and composite bars. **SO1.4** Analyze temperature-induced stresses in simple structural members. **SO1.5** Understand and apply interrelations between various elastic constants.		1.1 Introduction 1.2 Stresses and strain, Hooke's law 1.3 Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity 1.4 Modulus of Rigidity, Bulk Modulus. Interrelation between elastic constants, 1.5 Stress-strain diagram for ductile and brittle materials, factor of safety 1.6 Stresses and strains in determinate and indeterminate bars under self-weight 1.7 Stresses and strains in determinate and indeterminate under concentrated loads. 1.8 Stresses and strains in homogeneous and composite bars under self-weight. 1.9 Stresses and strains in homogeneous and composite bars under concentrated loads. 1.10 Temperature stresses in simple members.	1. Stresses and strains determinate and indeterminate unde concentrated loads.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

Stresses and strains in determinate and indeterminate bars under self-weight

PCC CE 10.2: Analyze plane stresses using principal stresses, Mohr's circle, and transformations. Understand plain strain, principal strains, and combined loading in structures and pressure vessels.

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**02**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Apply Mohr's circle to analyze principal stresses and maximum shear stresses. **SO2.2** Understand Mohr's circle for plain strain, principal strains, and maximum shear strain. **SO2.3** Evaluate components under bending, torsion, and axial loads. **SO2.4** Analyze stresses in thin-walled pressure vessels. **SO2.5** Integrate knowledge to solve complex stress and strain scenarios.		2.1 Principal stresses and strain 2.2 Transformation of plane stresses, Principal stresses 2.3 Maximum shear stresses, 2.4 Numerical solving 2.5 Mohr's circle for plane stresses 2.6 Numerical solving 2.7 Plain strain and its Mohr's circle representation 2.8 Principal strains, 2.9 Maximum shear strain. 2.10 Combined Loading: Components subjected to bending, torsion & axial loads. 2.11 Analysis of thin pressure vessels. 2.12 Numerical solving	1. Maximum shear strain

SW-2 Suggested Sessional Work (SW):

a. Assignments:
Plain strain and its Mohr's circle representation

PCC CE 10.3: Develop shear force and bending moment diagrams for beams, understanding loading rate relationships and identifying maximum moments and contra flexure points.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**01**
SL	**01**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Construct shear force and bending moment		3.1 Types of Beams 3.2 Shear force and bending	1. Shear force and bending moment

diagrams for various loads. SO3.2 Understand the connection between loading rates, shear force, and bending moments. SO3.3 Identify and calculate maximum bending moments in statically determinate beams. SO3.4 Determine positions of points of contraflexure in beam structures.		moment 3.3 Shear force and bending moment diagrams for statically determinate beam due to concentrated load 3.4 Shear force and bending moment diagrams for statically determinate beam due to uniformly distributed load 3.5 Shear force and bending moment diagrams for statically determinate beam due to uniformly varying load 3.6 Shear force and bending moment diagrams for statically determinate beam due to couple 3.7 Relationship between rate of loading, shear force and bending moment. 3.8 Maximum bending moment and position of points of contra flexure	diagrams for statically determinate beam due to uniformly varying load

SW-3 Suggested Sessional Work (SW):

a. Assignments:
Shear force and bending moment diagrams for statically determinate beam due to uniformly varying load

PCC CE 10.4: Derive flexural and shear formulas, analyze stress distribution, calculate slope and deflection using double integration method for standard cases.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**02**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Derive flexural formula, stress distribution, moment of resistance.		4.1 Theory of simple bending, assumptions 4.2 Derivation of flexural	1. Flexure and shear formula 2. Slope and

SO4.2 Derive distribution formula, analyze common sections. **SO4.3** Relate bending moment, analyze determinate beams using integration. **SO4.4** Calculate second moment for various cross sections, stress diagrams. **SO4.5** Explore shear stresses, connections between flange and web.		formula, Second moment of area of common cross sections (rectangular, I, T, C) with respect to centroidal and parallel axes, 4.3 bending stress distribution diagrams, moment of resistance and section modulus. 4.4 Shear stresses: Concept, derivation of shear stress distribution formula, shear 4.5 stress distribution diagrams for common symmetrical sections, 4.6 maximum and average shears stresses, shear connection between flange and web. 4.7Slope and deflection of beams: Relation between bending moment and slope, slope and deflection of 4.8determinate beams, double integration method (Macaulay's method), derivation of formula for slope and deflection for standard cases. 4.9 Uses & Various types of Cement Test 4.10 Concrete Uses & Properties	deflection

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Flexure and shear formula
2. slope and deflection

PCC CE 10.5: Analyze strain energy in axial loads, bending, torsion, determine torsion stresses, and study buckling of columns using Euler's and Rankine's formulas.

Approximate Hours

Item	Approx. Hours

CI	**15**
LI	**00**
SW	**01**
SL	**01**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Analyze gradual, sudden, and impact scenarios. **SO5.2** Examine stresses, strains, and deformations in determinate shafts. **SO5.3** Derive Euler's formula, evaluate safe loads, consider end conditions. **SO5.4** Investigate torsion, bending, and axial force interactions. **SO5.5** Understand energy aspects in bending, torsion.		5.1 Strain energy: Strain energy due to gradual load 5.2 Strain energy due to sudden load 5.3 Strain energy due to impact load, 5.4 Strain energy due to bending and torsion. 5.5 Torsion: Stresses, strain and deformations in determinate shafts of solid and hollow, 5.6 homogeneous and composite circular cross section subjected to twisting moment, derivation of torsion equation, stresses due to combined torsion, bending and axial force on shafts. 5.7 Buckling of columns: Concept of buckling of columns, derivation of Euler's formula for buckling 5.8 loads for column with hinged ends, concept of equivalent length for various end conditions, limitations of 5.9 Euler's formula, Rankine's formula, safe load on columns. 4.10 stress distribution diagrams for common symmetrical sections, 4.11 maximum and average shears stresses, shear connection between flange and web. 4.12 Slope and deflection of beams: Relation between	Strain energy

		bending moment and slope, slope and deflection of 4.13 determinate beams, double integration method (Macaulay's method), derivation of formula for slope and deflection for standard cases. 4.14 Uses & Various types of Cement Test 4.15Concrete Uses & Properties	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Strain energy method
2. Buckling of column

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 10.1: Apply elasticity principles to analyze and design structures, understanding stress-strain relationships, deformations, and temperature effects for practical engineering solutions."	9	2	1	12
PCC CE 10.2: Analyze plane stresses using principal stresses, Mohr's circle, and transformations. Understand plain strain, principal strains, and combined loading in structures and pressure vessels.	14	1	2	17
PCC CE 10.3: Develop shear force and bending moment diagrams for beams, understanding loading rate relationships and identifying maximum moments and contra flexure points.	12	2	1	15
PCC CE 10.4: Derive flexural and shear formulas, analyze stress distribution, calculate slope and deflection using double integration method for standard cases.	10	2	2	14
PCC CE 10.5: Analyze strain energy in axial loads, bending, and torsion, determine torsion stresses, and study buckling of columns using Euler's and Rankine's formulas.	15	1	1	17
Total Hours	60	8	7	75

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 10.1	Simple stresses and strains	03	01	01	05
PCC CE 10.2	Principal stresses and strains	02	06	02	10
PCC CE 10.3	Shear Force and Bending Moment Diagrams	03	07	05	15
PCC CE 10.4	Stresses in Machine Elements, Slope and deflection of beams	-	10	05	15
PCC CE 10.5	train energy and Buckling of columns	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to cement plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Strength of Materials	Gere &Timoshenko	CBS Publication	Third Edition 2013
2.	Strength of Materials	Ramamurtham	Dhanpat Rai Publication.	

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 10
Course Title: Strength of Materials

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning				
PCC CE 10.1: Apply elasticity principles to analyze and design structures, understanding stress-strain relationships, deformations, and temperature effects for practical engineering solutions."	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

PCC CE 10.2: Analyze plane stresses using principal stresses, Mohr's circle, and transformations. Understand plain strain, principal strains, and combined loading in structures and pressure vessels.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 10.3: Develop shear force and bending moment diagrams for beams, understanding loading rate relationships and identifying maximum moments and contra flexure points.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 10.4: Derive flexural and shear formulas, analyze stress distribution, calculate slope and deflection using double integration method for standard cases.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 10.5: Analyze strain energy in axial loads,	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

bending, and torsion, determine torsion stresses, and study buckling of columns using Euler's and Rankine's formulas.																

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2,3,4	**PCC CE 10.1**: Apply elasticity principles to analyze and design structures, understanding stress-strain relationships, deformations, and temperature effects for practical engineering solutions."	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1.** Apply elasticity principles to analyze and design structures **1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2,3,4	**PCC CE 10.2**: Analyze plane stresses using principal stresses, Mohr’s circle,	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-** Analyze plane stresses using principal stresses, Mohr’s circle, and transformations. **2.1,2.2,2.3,2.4,2.5.**	

	and transformations. Understand plain strain, principal strains, and combined loading in structures and pressure vessels.				
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2,3,4	**PCC CE 10.3**: Develop shear force and bending moment diagrams for beams, understanding loading rate relationships and identifying maximum moments and contra flexure points.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** Develop shear force and bending moment diagrams for beams **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2,3,4	**PCC CE 10.4**: Derive flexural and shear formulas, analyze stress distribution, calculate slope and deflection using double	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** Derive flexural and shear formulas, analyze stress distribution **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	

	integration method for standard cases.				
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,2,3,4	**PCC CE 10.5:** Analyze strain energy in axial loads, bending, and torsion, determine torsion stresses, and study buckling of columns using Euler's and Rankine's formulas.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit 5.0** Analyze strain energy in axial loads, bending, and torsion, determine torsion stresses **.1,5.2,5.3,5.4,5.5**	

Curriculum Development Team

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AKS University

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Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Semester-I

Course Code: **PCC CE 11**

Course Title: **Building Materials Lab**

Pre-requisite: India has one of the fastest growing economies, and the construction industry plays an important role. Every country, state, or city we visit is evaluated based on its infrastructure. As a result, having a Building Material Testing Lab becomes equally important. The construction industry is the nation's second largest contributor to GDP. Construction activities include building roads, towers, and complexes, among other things.

Rationale: Building materials are materials used in the construction industry and form essential constituents of any structure. Many naturally occurring substances, such as clay, rocks, sand, and wood, have been used to construct buildings. Apart from naturally occurring materials, many manufactured products are also used, some more and some less synthetic. Building materials should necessarily be strong and withstand the adverse forces of construction, weather, and Live and Dead loads imposed on the structure. In this elaborate article, we have thrown light on the classification of building materials used in building construction.

Course Outcomes:

PCC CE 11.1: Students are able to understand the behavior of material under different loading.

PCC CE 11.2: Student are able to understand and calculate the different type of stress simple stress, shear stress, direct stress and bending stress in the material.

PCC CE 11.3: Students are students are able to understand and calculate the shear force and bending moment for beam of different loading.

PCC CE 11.4: Students are able to calculate the deflection of beam for different loading.

PCC CE 11.5: Students are able to understand the property, use, advantage and disadvantage of different material used in construction.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core Course	PCC CE 11	Building Materials Lab	0	2	0	0	2	1

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 11	Building Materials Lab	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 11.1: Students are able to understand the behavior of material under different loading.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**03**

SW	**00**
SL	**00**
Total	**03**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 The fineness of cement has an important bearing on the rate of hydration and hence on the rate of gain of strength and also on the rate of evolution of heat. **SO1.2** The significance of fineness modulus (FM) is in specifying the proportions of fine and coarse aggregates. **SO1.3** The grain size analysis test is performed to determine the percentage of each size of grain that is contained within a soil sample	1. To determination of fineness of cement. 2. To determination of fineness modulus of sand (Fine aggregate). 3. To determination of gran size distribution of coarse aggregate.		

PCC CE 11.2: Student are able to understand and calculate the different type of stress simple stress, shear stress, direct stress and bending stress in the material.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**03**
SW	**00**
SL	**00**
Total	**03**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 The normal consistency test determines the water content required to achieve a cement paste of standard consistency **SO2.2** The setting time of	1. To determination of normal consistency of cement. 2. To		

cement is an important characteristic that determines its performance and application. **SO2.3** Silt content test describe below is field test to find out volumetric percentage of silt in fine aggregates. More detail and accurate test are described in IS 2386	determination of initial and final setting time of cement. 3. To determination of field method to determination fine silt in aggregate.		

PCC CE 11.3: Students are students are able to understand and calculate the shear force and bending moment for beam of different loading.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**03**
SW	**00**
SL	**00**
Total	**03**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1. The two methods generally used to find the grain size distribution are: Sieve analysis which is used for particle sizes larger than 0.075 mm in diameter and. 1. To determination the shape and size the supplied brick. **SO3.2**. 12% to 20 % for first class brick, second class brick and third-class brick. **SO3.3** First, the aggregate sample sieve through 12.5mm sieve and collect it which is retained in 10mm sieve. Now, the sample should be dried through the oven up to 4 hours at 100	1. To determination the shape and size the supplied brick. 2. To determination water absorption of bricks. 3. To determination of aggregate impact value test.		

deg to 110 deg. Then, the aggregate sample should be filled in the metal cup by 3 layers.			

PCC CE 11.4: Students are able to calculate the deflection of beam for different loading.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**03**
SW	**00**
SL	**00**
Total	**03**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 the percentage by weight of the crushed (or finer) material obtained when the test aggregates are subjected to a specified load under standardized conditions, The Flakiness Index of aggregates **SO4.2** is the percentage by weight of particles whose least dimension (thickness) is less than 0.6 times their mean dimension. **SO4.3.** -Silt content test describe below is field test to find out volumetric percentage of silt in fine aggregates	1. Aggregate crushing value test. 2. To determination of flakiness index and elongation index of coarse aggregate. 3. To determination of field method fine silt in aggregate.		

PCC CE 11.5: Students are able to understand the property, use, advantage and disadvantage of different material used in construction.

Approximate Hours

Item	Approx. Hours
CI	**00**
LI	**03**
SW	**00**

SL	**00**
Total	**03**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 The slump test consists of filling with fresh concrete and compacting an inverted steel cone in three layers. **SO5.2** Compaction Factor Test of Concrete is the workability test for concrete conducted in the laboratory. **SO5.3** Soundness means the ability to resist volume expansion.	1.Workability test on fresh concrete. 2. Compaction factor test 3. Soundness test		

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 11.1: Students are able to understand the behavior of material under different loading.	0	3	0	0	3
PCC CE 11.2: Student are able to understand and calculate the different type of stress simple stress, shear stress, direct stress and bending stress in the material	0	3	0	0	3
PCC CE 11.3: Students are students are able to understand and calculate the shear force and bending moment for beam of different loading.	0	3	0	0	3
PCC CE 11.4: Students are able to calculate the deflection of beam for different loading.	0	3	0	0	3
PCC CE 11.5: Students are able to understand the property, use, advantage and disadvantage of different material used in construction.	0	3	0	0	3
Total Hours	00	30	00	00	30

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 11.1	Introduction	03	01	01	05
PCC CE 11.2	Rate analyses	02	06	02	10
PCC CE 11.3	Detailed Estimate	03	07	05	15
PCC CE 11.4	Cost of Work	-	10	05	15
PCC CE 11.5	Valuation	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to material testing lab
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Building Materials, New Age International	S.K. Duggal :	New Age Publishers; Fifth edition	(1 January 2019)
2.	Engineering Materials (Material Science	Rangwala :	Charotar Publishing House Pvt. Ltd., Charotar Publiction	2019

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 11
Course Title: Building Material Lab

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 11.1: Students are able to understand the behavior of material under different loading.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 11.2: Student are able to	1	2	3	2	3	2	3	2	3	2	1	2	3	2	3	3

understand and calculate the different type of stress simple stress, shear stress, direct stress and bending stress in the material																
PCC CE 11.3: Students are students are able to understand and calculate the shear force and bending moment for beam of different loading.	2	2	1	2	3	2	3	2	3	2	3	3	2	3	2	1
PCC CE 11.4: Students are able to calculate the deflection of beam for different loading.	2	3	2	2	3	2	3	2	3	2	2	3	2	3	2	3
PCC CE 11.5: Students are able to understand the property, use, advantage and disadvantage of different material used in construction.	3	2	3	2	2	2	2	1	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs	Laboratory	Classroom	Self Learning(SL)

		No.	Instruction (LI)	Instruction (CI)	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 11.1:** Students are able to understand the behavior of material under different loading.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 11.2:** Student are able to understand and calculate the different type of stress simple stress, shear stress, direct stress and bending stress in the material	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 11.3:** Students are students are able to understand and calculate the shear force and bending moment for beam of different loading.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 11.4**: Students are able to calculate the deflection of	SO1.1 SO1.2 SO1.3 SO1.4	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	beam for different loading.	SO1.5 SO1.6			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 11.5:** Students are able to understand the property, use, advantage and disadvantage of different material used in construction.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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Semester-V

Course Code: **HSMC 03**
Course Title: **Industrial Psychology**
Pre-requisite: Student should have basic knowledge General Psychology, Research Methods and Statistics, Human Resource Management (HRM) etc.
Rationale: Workplaces worldwide are rapidly evolving to meet the increasing expectations of their employees and cultural changes that prioritize well-being and retention as much as productivity. Industrial organizational psychology is a field that equips companies with the tools to adapt to this ever-changing environment. The aim of this course is to develop an awareness of the major perspectives underlying industrial psychology and to understand the potential that it holds for society and organizations in the present and future

Course Outcomes:

HSMC 03.1: Understand key concepts, theoretical perspectives, and trends in industrial psychology.

HSMC 03.2: Create a better work environment for better performance.

HSMC 03.3: Understand customer behavior.

HSMC 03.4: Apply different work methods to improve industrial efficiency.

HSMC 03.5: Understand Criteria's in evaluation of job-related factor.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Humanities and Social Science	HSMC 03	Industrial Psychology	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
HSMC	HSMC 03	Industrial Psychology	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

HSMC 03.1: Understand key concepts, theoretical perspectives, and trends in industrial psychology.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**01**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 role of the psychologist in industry SO1.2 Study behavior in work situation SO1.3 applications of psychological principles to problems of Placement, counselling and training		Unit-1: Introduction: 1.1 The role of the psychologist in industry, 1.2 the field of occupational Psychology 1.3 Study of behavior in work situation 1.4 applications of psychological principles to problems of selection 1.5 applications of psychological principles to problems of Placement, 1.6 applications of psychological principles to problems of Counselling 1.7 applications of psychological principles to problems of training	1. General Psychology.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Definitions, Historical Development, and Characteristics of OR.

b. Mini Project:

I. Make a chart on role of the psychologist in industry.

HSMC 03.2: Create a better work environment for better performance.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**01**
SL	**01**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Student will		**Unit- 2:** Design of Work	1. Human Engineering

understand physical environment techniques. **SO2.2** Students will understand Group dynamics in Industry.		Environments: 2.1 Human engineering and physical environment techniques of job analysis**.** 2.2 Social environment: Group dynamics in Industry 2.3 Personal psychology, Selection, training 2.4 placement, promotion, counselling 2.5 job motivations, 2.6 Job satisfaction. 2.7 Special study of problem of fatigue 2.8 boredom and accidents	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Analyze role of physical environment in industrial efficiency.
II. Effect of social environment.

HSMC 03.3: Understand customer behavior.

Approximate Hours

Item	Approx. Hours
CI	**05**
LI	**00**
SW	**01**
SL	**01**
Total	**07**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Student will understand Customer behavior **SO3.2** Student will understand the role of engineering psychology		**Unit- 3:** Understanding Consumer Behavior: 3.1 Consumer behavior 3.2 study of consumer preference 3.3 effects of advertising 3.4 Industrial morale: The nature and scope of engineering psychology	1. customer Behavior

		3.5 application of engineering psychology to industry	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Study of Customer Behavior.

ii. Significance of engineering psychology in industry.

HSMC 03.4: Apply different work methods to improve industrial efficiency.

Approximate Hours

Item	Approx. Hours
CI	**13**
LI	**00**
SW	**01**
SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Student will be able to understand the efficiency at work. **SO4.2** Student will be able to understand work curve and its characteristic. **SO4.3** analyze personal factors the affects efficiency **SO4.4** Student will understand the effect of working environment		**Unit- 4:** Work Methods: 4.1 Efficiency at work, 4.2 the concept of efficiency, 4.3 the work curve and its characteristics 4.4 The work methods; hours of work. 4.5 Nature of work, fatigue and boredom. 4.6 Rest pauses. 4.7 The personal factors; age abilities 4.8 interest, job satisfaction, 4.9 the working environment, noise, illumination. 4.10 Atmospheric conditions. 4.11 Increasing efficiency at work; improving the work methods. 4.12 Time and motion study, its contribution and failure resistance to time 4.13 motion studies.	1. Work efficiency and its parameters.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
i. Factors that affect work efficiency
ii. Effect of environmental factors.

HSMC 03.5: Understand Criteria in evaluation of job-related factor.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**01**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Student will understand evaluation of job-related factor **SO5.2** Student will be able understand different processes involve in work and equipment design. **SO5.3** Student will understand different factors involve in industrial accidents.		**Unit 5:** Work and Equipment Design: 5.1 Criteria in evaluation of job-related factor, 5.2 job design, human factors, Engineering information, 5.3 input processes, mediation, processes, action processes, 5.4 methods design, work space and its arrangement, 5.5 Human factors in job design. Accident and Safety 5.6 The human and economic costs of accidents 5.7 Accident record and statistics 5.8 the causes of accidents 5.9 Situational and individual factors related to accident reduction.	1. Industrial accidents and their cause.

SW-5 Suggested Sessional Work (SW):
a. Assignments:

I. Study of Criteria in evaluation of job-related factor.

II. Situational and individual factors related to accident reduction.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
HSMC 03.1: Understand key concepts, theoretical perspectives, and trends in industrial psychology.	7	1	1	9
HSMC 03.2: Create a better work environment for better performance.	8	1	1	10
HSMC 03.3: Understand customer behavior.	5	1	1	07
HSMC 03.4: Apply different work methods to improve industrial efficiency.	13	1	1	15
HSMC 03.5: Understand Criteria in evaluation of job-related factor.	9	1	1	11
Total Hours	42	5	5	52

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
HSMC 03.1	Introduction	02	04	04	10
HSMC 03.2	Design of Work Environments	-	05	05	10
HSMC 03.3	Understanding Consumer Behavior	03	03	04	10
HSMC 03.4	Work Methods	-	05	05	10
HSMC 03.5	Work and Equipment Design	03	04	03	10
	Total	8	21	21	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to arbitrators office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Industrial Psychology	Tiffin and McCormick	Prentice Hall	6th Edition. 1975
2.	Human Factors Engineering and Design	McCormick	McGraw Hill	4th Edn.,1976
3.	Principles of Human relations	N.R.F Mair,		
4.	Personnel and Industrial Psychology	Ghiselli &Brown		

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: HSMC 03
Course Title: Industrial Psychology

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
HSMC 03.1: Understand key concepts, theoretical perspectives, and trends in industrial psychology.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
HSMC 03.2: Create a better work	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

environment for better performance.																
HSMC 03.3: Understand customer behavior.	2	2	1	2	3	2	3	2	3	2	3	2	3	3	2	3
HSMC 03.4: Apply different work methods to improve industrial efficiency.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
HSMC 03.5: Understand Criteria in evaluation of job-related factor.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO1,2, 9,10,12 PSO1,2	**HSMC 03.1**: Understand key concepts, theoretical perspectives, and trends in industrial psychology.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**HSMC 03.2**: Create a better work	SO1.1 SO1.2 SO1.3		**Unit-2.1,2.2,2.3,2.4,2.5.**	

	environment for better performance.	SO1.4 SO1.5			
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**HSMC 03.3**: Understand customer behavior.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**HSMC 03.4**: Apply different work methods to improve industrial efficiency.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**HSMC 03.5:** Understand Criteria in evaluation of job-related factor.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

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Semester-V

Course Code: **OEC CE 01**
Course Title: **Geology and Remote Sensing**
Pre-requisite: Student should have basic knowledge of Geology and Chemistry
Rationale: Engineering geology is the application of geologic information to aid in characterization of construction sites for the design of suitable foundations, and support thereof, which can reasonably be expected to withstand all of the probable loads on the structure

Course Outcomes:

OEC CE 01.1: Acquire the basic knowledge of Mineralogy, Petrology and Stratigraphy for better understanding the nature and distribution of geological resources and construction materials.

OEC CE 01.2: Understand the deformation and attitude of rocks due to geo-dynamic earth processes.

OEC CE 01.3: Understanding of the various activities of Geological & Geophysical prospecting, Remote Sensing and Site investigations.

OEC CE 01.4: Familiarize with the engineering properties of rocks masses and soils.

OEC CE 01.5: Geological Constraints of major Engineering Structures (Dam, Tunnel, Bridge &Highways).

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective Course	OEC CE 01	Geology and Remote Sensing	2	2	1	1	8	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
OEC	OEC CE 01	Geology and Remote Sensing	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
OEC	OEC CE 01	Geology and Remote Sensing	35	10	5	50	50	100

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Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

OEC CE 01.1: Acquire the basic knowledge of Mineralogy, Petrology and Stratigraphy for better understanding the nature and distribution of geological resources and construction materials.

Approximate Hours

Item	Approx. Hours
CI	**14**
LI	**05**
SW	**03**
SL	**02**
Total	**24**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1Understand the application of engineering geology. SO1.2 Understand the internal structure of Earth and its dynamic process. SO1.3 To learn about the minerals and their identical physical properties. SO1.4 Understand the origin and classification of Igneous, Sedimentary, Metamorphic rocks. SO1.5Tounderstandthe source of construction materials: Building &Dimension stone, SO1.6 To understand the source of construction materials: Crushed stone & Aggregates SO1.7 To understand the source of construction	1. Physical identification of common rock forming Minerals, 2. Physical identification of Igneous rock. 3. Physical identification of Sedimentary rocks. 4. Physical identification of Metamorphic rocks. 5. Prepare a list of available natural local construction materials and their properties	**Unit–1:** Mineralogy, Petrology Stratigraphy and Scope of Engineering Geology, 1.1 Geology and its main branches Scope of Engineering Geology and role of an engineering geologist in a project 1.2 Mineralogy: Minerals, Physical & chemical properties 1.3 Classification of Minerals 1.4 Petrology: Rock Cycle, 1.5 Genesis &Classification of Igneous, 1.6 Origin & Classification of Sedimentary 1.7 Genesis &Classification of Metamorphic Rocks 1.8 Stratigraphy: Standard Geological Time Scale, 1.9 Geological Materials Used in Construction 1.10 Building or Dimension	1. Dynamic forces of Earth. 2. Rock deformation.

materials: Gravel& Cement.		Stone, Roofing and Facing Materials 1.11 Crushed Rock: Concrete 1.12 Aggregate, Road aggregate 1.13 Gravels, Sands, 1.14 Lime, Cement and Plaster	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Internal structure and composition of the Earth, Plate tectonics and formation in rocks.

b. Mini Project:

I. Structure of rocks: Folds, Faults, Joints and Unconformity

.

OEC CE 01.2: Understand the deformation and attitude of rocks due to geodynamic earth processes**.**

Approximate Hours

Item	**Approx. Hours**
CI	**10**
LI	**02**
SW	**03**
SL	**02**
Total	**17**

Session Outcomes (SOs)	**Laboratory Instructions (LI)**	**Classroom Instructions (CI)**	**Self Learning (SL)**
SO2.1 Understand the concept of deformation in rock due to tectonic stress**.** **SO2.2** Nature and Classification of folding in rocks. **SO2.3** Nature and classification of faulting of rocks **SO2.4** Classify the joints in different rocks. **SO2.4** Genesis and types of unconformity	1. Use of Clino compass for measuring attitude of rocks 2. Use of Brunton compass for measuring attitude of rocks.	**Unit 2**: Structural Geology & Dynamic Earth 2.1 Plate Tectonics: Concept of Continental Drifting, Plate Margins &Boundaries 2.2 Structural Geology: Deformation and Stress& Strain 2.3 Attitude of Rocks 2.4 Origin and terminology of Folds 2.5 Classification of Folds 2.6 Origin and Terminology of Fault. 2.7 Classification of Faults,	i. Minerals Genesis in sedimentary environment ii. Formation of Bauxite and Gypsum

		2.8 Origin and Classification of Faults, 2.9 Origin and Classification of Joints 2.10 Origin and Classification of Unconformity.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:
a. Plate Tectonics
b. Identification of fault and folds
c. Identification of folded strata.

b. Mini Project:
a. Structure of rocks: Folds, Faults, Joints and Unconformity.

c. Other Activities (Specify):
a. Geological Materials Used in Construction

OEC CE 01.3: Understanding of the various activities of Geological & Geophysical prospecting, Remote Sensing and Site investigations.

Approximate Hours

Item	Approx. Hours
CI	**15**
LI	**06**
SW	**03**
SL	**02**
Total	**26**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand the different phase of prospecting and exploration. **SO3.2** Acquainted with the various activities such as geological sampling& mapping of prospecting and exploration. **SO3.3** Understand the	1. Study of topography using toposheet 2. Study of Geological Map 3. Draw the cross- sectional map using geological map of horizontal	**Unit–3**: Geological Exploration & Site Investigation 1. Geological Prospecting & Exploration 2. Fieldwork Planning for Prospecting, Use of toposheet/map sand field equipment's, 3. Geological Mapping and its	i. Study of Topography& Toposheet. ii. Use of tools in geological field work.

reserve estimation and evaluation of exploration data. **SO3.4** Site Investigation: using Aerial photography and remote sensing **SO3.5** Geophysical investigations	strata 4. Draw the cross- sectional map using geological map of inclined strata 5. Draw the cross- sectional map using geological map of folded strata 6. Draw the cross- sectional map using geological map of faulted strata	components 4. Geological Sampling Methods, 5. Borehole Sampling & Core-logging 6. Trenching & Pitting 7.Phases of Geological Prospecting& Exploration 8. Methods of Reserve Estimation 9. UNFC Codes & Classification of Deposits. 10. Resource & Reserve Categories of Deposit 11. Site Investigation: Different stages of site investigation 12. Aerial Photography Interpretation and Remote Sensing 13. Applications of remote sensing 14. Geophysical Exploration: Gravity Survey& Magnetic Survey 15. Resistivity Survey & Seismic Survey	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Geological Prospecting & Exploration
ii. Methods of Reserve Estimation
iii. UNFC Codes & specification of Deposits.
iv. Phases of Geological Prospecting &Exploration.

b. Mini Project

i. Trenching & Pitting, Sampling Methods and Bore hole sampling.

OEC CE 01.4 Familiarize with the engineering properties of rocks masses and soils.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**02**
SW	**02**

SL	**02**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1Understand the Rock and soil as engineering materials, **SO4**.2 Understanding Soil Classification and its properties **SO4**.3UnderstandingSoil Classification and its properties **SO4**.4Understand the Properties of Rocks and sediments **SO4**.5Influence of Weathering on Rock Mass Properties	1. Prepare a chat on different soil parameters 2. Prepare chaton mechanical parameters of rocks.	**Unit-4: Rock and soil as engineering materials,** 4.1 Rock and soil as engineering materials, 4.2 Soil Classification: Coarse Soils, Silt sand Loess, Clay Deposits 4.3 Grain size classification for engineering soils/ Sediments, Strength scale for sediment sand rocks. 4.4 Description and properties of Rock sand sediments. 4.5 Geological Masses or Mass Fabric. 4.6 Discontinuities & Persistence (Continuity) 4.7 Orientation& Spacing 4.8 Influence of Weathering on Rock Mass Properties 4.9 Weathering Description and Zonation 4.10 Ground Mass Description: Core	1. Mechanical properties of rocks ii. Mechanical behavior of soils

SW-4 Suggested Sessional Work (SW):

a. Assignments:

a. Description and properties of Rocks and sediments.

b. Geological Masses or Mass Fabric.

b. Mini Project:

I. RQD and RMR.

OEC CE 01.5: Geological Constraints of major Engineering Structures (Dam, Tunnel, Bridge &Highways).

Approximate Hours

Item	Approx. Hours

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CI	**17**
LI	**00**
SW	**03**
SL	**02**
Total	**22**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Types and Geological consideration of Dam **SO5.2** Types and Geological consideration of Tunnel **SO5.3** Types and Geological consideration of bridge. **SO5.4** Types and Geological consideration of road. **SO5.5** Understand the general terminology of various engineering structures	5.1 Determination of Friction Factor 'f' for G.I pipes. 5.2 Study of Boundary Layer theory	**Unit 5**: Geological Constraints of major Engineering Structures 5.1 Dam: Terminology and basic aspects of dam construction 5.2 Types of dams and their functions Geological constrains of a dam 5.3 Stresses Along Faults at Different Dispositions 5.4 Treatment of a Fault by Plug and Its Depth Calculation 5.5 Tunnel: Components and types of tunnels 5.6 Excavation methods of rock tunnelling 5.7 Tunnelling through rock: 5.8 Effects of Rocks Bedding, Fault, Fold and Rock Pressure 5.9 Tunnelling through Soft Ground: Imposed load &Stability 5.10 Geological hazards in tunnelling. 5.11 Types of Tunnel Supports Including Rock Bolting 5.12 Bridge: Functions and Types of bridges 5.13 Abutments & Piers, Well Foundation for Bridges 5.14 Geological investigation of a bridge site 5.15 Construction materials for a bridge 5.16 Road & Highways: Different types of pavements and materials used.	1. Reservoir & associated Geological issues. 2.Ground water and aquifers.

		5.17 Seepage Problem in Pavement and Corrective Measures	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

a. Types of dams and their functions

b. Tunnelling.

b. Mini Project:

a. Functions and Types of bridges.

c. Other Activities (Specify):

a. Problem in Pavement and Corrective Measures

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
OEC CE 01.1: Acquire the basic knowledge of Mineralogy, Petrology and Stratigraphy for better understanding the nature and distribution of geological resources and construction materials.	14	5	3	2	24
OEC CE 01.2: Understand the deformation and attitude of rocks due to geodynamic earth processes.	10	2	3	2	17
OEC CE 01.3: Understanding of the various activities of Geological & Geophysical prospecting, Remote Sensing and Site investigations.	15	6	3	2	26
OEC CE 01.4: Familiarize with the engineering propertied rocks masses and soils.	10	2	2	2	16
OEC CE 01.5: Geological Constraints of major Engineering Structures (Dam, Tunnel, Bridge & Highways).	17	0	3	2	22
Total Hours	66	15	14	10	105

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
OEC CE 01.1	Mineralogy, Petrology Stratigraphy and Scope of Engineering Geology	03	01	03	07
OEC CE 01.2	Structural Geology & Dynamic Earth	02	02	03	07
OEC CE 01.3	Geological Exploration & Site Investigation	02	02	06	10
OEC CE 01.4	Rock and soil as engineering materials	03	04	06	13
OEC CE 01.5	Geological Constraints of major Engineering Structures	03	04	06	13
	Total	13	13	24	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to stone quarry site.
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Engineering Geology	Subinoy Gangopadhyay	Oxford University Press	2013
2.	Foundations of Engineering Geology	Tony Waltham	Taylor & Francis	2009
3.	Basic Environmental and Engineering Geology	F. G.Bell	Whittles Publishing, CRC Press LLC, Taylor and Francis Group	2007
4.	A Geology for Engineers -	F.G.H. Blyth	Elsevier Butterworth-	2005

			Heinemann Seventh Edition	
5.	Practical Engineering Geology	Steve Hencher	Spon Press	2012
6.	Engineering Geology Principles and Practice	David George Price	Springer-Verlag Berlin Heidelberg	2009

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: OEC CE 01
Course Title: Geology and Remote Sensing

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
OEC CE 01.1: Acquire the basic knowledge of Mineralogy, Petrology and Stratigraphy for better understanding the nature and distribution of	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

geological resources and construction materials.																
OEC CE 01.2: Understand the deformation and attitude of rocks due to geodynamic earth processes.	1	2	3	2	3	2	3	2	3	2	3	1	2	1	2	3
OEC CE 01.3: Understanding of the various activities of Geological & Geophysical prospecting, Remote Sensing and Site investigations.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 01.4: Familiarize with the engineering propertied rocks masses and soils.	2	2	1	2	3	2	3	3	2	3	2	3	2	2	3	2
OEC CE 01.5: Geological Constraints of major Engineering Structures (Dam, Tunnel, Bridge & Highways).	1	2	3	2	3	1	2	3	2	3	2	3	2	3	1	2

Legend:1–Low,2–Medium,3-High

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Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**OEC CE 01.1:** Acquire the basic knowledge of Mineralogy, Petrology and Stratigraphy for better understanding the nature and distribution of geological resources and construction materials.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**OEC CE 01.2:** Understand the deformation and attitude of rocks due to geodynamic earth processes.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**OEC CE 01.3:** Understanding of the various activities of Geological & Geophysical prospecting,	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	

	Remote Sensing and Site investigations.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**OEC CE 01.4**: Familiarize with the engineering propertied rocks masses and soils.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**OEC CE 01.5:** Geological Constraints of major Engineering Structures (Dam, Tunnel, Bridge & Highways).	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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Semester-V

Course Code: **PCC CE 14**
Course Title: **Environmental Engineering-I**
Pre-requisite: 1.study of the engineering design principles dealing with the quantity, quality and treatment of water. 2. Basic knowledge of environmental. science and mathematics 3. A determination of the design capacity 4. A laboratory course that acquaints students with experimental techniques and approaches used to study major processes in water treatment.
Rationale: The main importance of water supply is to provide water to people for their uses. The importance of water supply for economic development and human well-being, the environmental and economic problems. Economic development is one of the main reasons for increasing demand for water.

Course Outcomes:

PCC CE 14.1: Impart Knowledge on the structure of drinking water supply systems, including water transport, treatment and quantity of water.

PCC CE 14.2: The Major objective of operation and maintenance of water supply system is to provide sustainable, equitable, consistent, economic safe and adequate water.

PCC CE 14.3: Understand the water quality criteria and standards, and their relation to public health.

PCC CE 14.4: Understand the water quality criteria and standards, and their relation to public health.

PCC CE 14.5: Analyze the distribution network for pipe loops.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 14	Environmental Engineering-I	3	1	2	1	7	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
PCC	PCC CE 14	Environmental Engineering-I	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
PCC	PCC CE 14	Environmental Engineering-I	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 14.1: Introduction & Quantity of Water.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 What do you mean by assessment of a groundwater source for water supply? **SO1.2** Explain Basic terms and importance of Sources of water. **SO1.3** Define water quality standards for surface waters. **SO1.4** Define Climatic conditions & Size of community, Living standard of the people & Industrial and commercial activities **SO1.5** What do you mean by population forecasting?	Determination of Acidity in a water samples. Pressure in the distribution system	**Unit-1. Introduction** 1.1- Estimation of ground water resources. 1.2- Estimation of surface water resources 1.3 Quality of water from different sources 1.4- Water demand 1.5 Quantity of water 1.6- Fire demand 1.7 Water requirement for various uses 1.8- Fluctuations in demand 1.9 Forecast of population	Sketch the natural hydrologic al cycle. 2. Elaborate the role of a Public Health Engineer.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Compute the 'fire demand' for a city of 2 lakh population by any two formulae (including that of the National Board of Fire Underwriters).

b. Mini Project:

1. Sketch the natural hydrological cycle of water & Why protected water supply is necessary for a city?

c. Other Activities (Specify):

1. Quiz

PCC CE 14.2: Rural Sanitation.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1. Understand water quality concepts and their effect on treatment process selection. **SO2.2** what is System of sanitation. **SO2.3** What do you mean by Cost of water. **SO2.4** What do you mean by collecting and transporting waste water through drain pipes, by gravity, to join either a public sewer or a domestic septic tank, is termed house drainage or building drainage. **SO2.5** What are the objectives of National rural drinking water Program?	Determination of Alkalinity in a water samples.	**Unit-2** Rural Sanitation 2.1 Sanitary sewage, Sullage Storm Water, Refuse, Soil Pipe. \ 2.2 Rural water supply schemes. 2.3 Financing of water supply project. 2.4 management of water supply project. 2.5 water pollution control act 2.6 conservancy & water carriage system 2.7 sanitary appliance 2.8 sanitary operation. 2.9 building drainage system of plumbing	i. Discuss the suitability of sources of drinking in the rural areas. ii.Give a brief account of causes which prevent water supply and sewage systems in rural areas

SW-2 Suggested Sessional Work (SW):

a. Assignments:

Compare the conservancy and water carriage systems giving at least two points.

b. Mini Project:

a) Sate at least 6 points suitable for adoption of separate system of sewerage.

c. Other Activities (Specify):

1. Group Discussion.

PCC CE 14.3: Quality Of Water.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**04**
SW	**02**
SL	**02**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Biological contaminants such as bacteria, protozoa, viruses, and parasites may lead to fatal waterborne diseases and health disorders. **SO3.2** The minute organisms present in water lead to diseases such as typhoid fever, dysentery, and many other health problems. **SO3.3** State the impurities in water according to their types. **SO3.4** Various types of pipes used in water supply works and Criteria for their selection. **SO3.5** What is the criteria of selecting a particular type of pump for given situations.	1. Measurement of turbidity 2. Determination of hardness of the given sample.	**Unit-3:** Quality Of Water 3.1- Impurities of water and their significance 3.2- water-borne diseases 3.3- Physical analysis of water, 3.4-Chemical analysis of water, 3.5-Bacteriological analysis of water 3.6- water standards for different uses 3.7- Intake structure 3.8- conveyance of water, 3.9 - pipe materials 3.10 pumps - operation & pumping stations.	i. What is the criteria of selecting a particular type of pump for given situations? ii. List the diseases which are caused by bacteria or list the water borne diseases.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. List the accepted standards of water used for domestic purposes on the points discussed.

b. Mini Project

a) Sketch a Collar joint for Concrete and Asbestos cement pipe jointing.

c. Other Activities (Specify):

1. Class test

PCC CE 14.4 Water Treatment Process.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**02**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Water treatment is a process in volving different types of operations (physical, chemical, and biological), the aim of which is to eliminate and/or reduce contamination or non-desirable characteristics of water. **SO4.2.** Water purification can remove all the unnecessary bacteria and viruses from the water that is hazardous for our health. Water purification may also improve the flavor and appearance of water **SO4.3** Coagulation is often the first step in water treatment. During coagulation, chemicals with a positive charge are	1. To determine the coagulant dose required to treat the given turbid water sample	**Unit-4:** Water Treatment Process 4.1 Water Treatment Methods 4.2 Theory and design of sedimentation 4.3 Coagulation 4.4 Filtration 4.5 Disinfection 4.6 Aeration & water softening 4.7 Modern trends in sedimentation & filtration 4.8 Miscellaneous methods of treatment. 4.9 Problem solving	i. Show by a flow diagram of Water Treatment Plant. ii. Enlist the various methods of disinfection of water.

added to the water. The positive charge neutralizes the negative charge of dirt and other dissolved particles in the water. **SO4.4** Water filtration is the process of removing or reducing the concentration of particulate matter, including suspended particles, parasites, bacteria, algae, viruses, and fungi, as well as other undesirable chemical and biological contaminants from contaminated water to produce safe and clean water for a specific purpose. **SO4.5** The goal of disinfection of public water supplies is the elimination of the pathogens that are responsible for waterborne diseases			

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i) Explain for test procedure for determining the dose of alum required for given water sample

b. Mini Project:

i) Visit to a Water Treatment Plant & writing a report.

c. Other Activities (Specify):

1. poster making on WTP.

PCC CE 14.5: Master boundary layer theory, friction factors, and separation control, plus dimensional analysis methods and model laws in fluid dynamics.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**

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SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 A water distribution systems is one in which the drinking water is transported from the centralized treatment plant or well supplies to the service connection or consumers´ taps. These systems aim to preserve the quality and quantity of water, as well as maintain sufficient pressures in the distribution of water. **SO5.2** The ultimate goal of any piping design projects is to open the. way for the construction team to materialize the plans of creating an engineering piping system by developing construction drawings. **SO5.3** One of the most important reasons for carrying out water leak detection isto ensure a reliable water supply. **SO5. 4** The storage capacity of a reservoir is determined by a contour map. The contour line indicating the full reservoir level (F.R.L) is drawn on the contour map. **SO5.5** determining the flow in pipe network systems where the inputs and outputs are known, but the flow inside the network is unknown.	1. Determination of Dissolved Oxygen (DO) in the water sample. 2. To determine the conc. of chlorides in a given water samples.	**Unit 5:** Distribution System 5.1-1 Layout and hydraulics of different distribution systems. 5.2- Pipe fittings 5.3 Valves and appurtenances 5.4- Analysis of distribution system 5.5 Hardy cross method 5.6- Leak detection 5.7- Maintenance of distribution systems 5.8 Service reservoir capacity 5.9- Height of reservoir	i. State the requirements of a good distribution system. ii. State the functions of a service reservoir.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i) List the components of a distribution system of a town or a city.

b. Mini Project:

ii. State the function of Sluice valve & Reflux Valve.

c. Other Activities (Specify):

1. Sketch an elevated R.C.C. overhead Reservoir or R.C.C. Tank.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 14.1: Impart Knowledge on the structure of drinking water supply systems, including water transport, treatment and quantity of water.	9	2	2	1	14
PCC CE 14.2: The Major objective of operation and maintenance of water supply system is to provide sustainable, equitable, consistent, economic safe and adequate water.	9	2	2	1	14
PCC CE 14.3: Understand the water quality criteria and standards, and their relation to public health.	10	4	2	2	18
PCC CE 14.4: Impart knowledge in various unit operations and processes in water treatment.	9	2	2	2	15
PCC CE 14.5: Analyze the distribution network for pipe loops.	9	4	2	2	17
Total Hours	46	14	10	8	78

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 14.1	Introduction & Quantity Of Water	03	01	01	05
PCC CE 14.2	Rural Sanitation	02	02	06	10
PCC CE 14.3	Quality Of Water	02	03	10	15
PCC CE 14.4	Water Treatment Process	-	05	10	15
PCC CE 14.5	Distribution System	03	02	-	05
	Total	10	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to water treatment plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Environmental Engineering –I in Civil Engineering	Garg, S.K.	Khanna Publishers New Delhi,	2010
2.	A Text Book of Water Supply Engineering.	Modi, P.N	Vol.I Standard Book House New Delhi	2010
3.	Water Supply Engineering.	Punmia, B.C.,Ashok Jain and Arun Jain	Laxmi Publications (P) Ltd., New Delhi	2014
4.	Environmental Engineering ., G	Peavy, H.s, Rowe, D.R, Tchobanoglous	Mc-Graw– Hill International Editions, New York	

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 14
Course Title: Environmental Engineering-I

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 14.1: Impart Knowledge on the structure of drinking water supply systems, including water transport, treatment and quantity of water.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 14.2: The	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3

Major objective of operation and maintenance of water supply system is to provide sustainable, equitable, consistent, economic safe and adequate water.																
PCC CE 14.3: Understand the water quality criteria and standards, and their relation to public health.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 14.4: Impart knowledge in various unit operations and processes in water treatment.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PCC CE 14.5: Analyze the distribution network for pipe loops.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 14.1:** Impart Knowledge on the	SO1.1 SO1.2 SO1.3	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

	structure of drinking water supply systems, including water transport, treatment and quantity of water.	SO1.4 SO1.5			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 14.2:** The Major objective of operation and maintenance of water supply system is to provide sustainable, equitable, consistent, economic safe and adequate water.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2:** **2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 14.3:** Understand the water quality criteria and standards, and their relation to public health.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 :** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 14.4**: Impart knowledge in various unit operations and processes in water	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4**	**Unit-4:** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	treatment.	SO1.6			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 14.5:** Analyze the distribution network for pipe loops.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
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Semester-VI

Course Code: **PCC CE 08**
Course Title: **Transportation engineering-II**
Pre-requisite: 1. Familiarity with various modes of transportation such as roads, railways, airports, and waterways, including their design, operations, and management. 2. Knowledge of transportation systems, traffic flow theory, and transportation planning provides the context for designing and managing highways. 3. Awareness of environmental impact assessment, sustainability principles, and regulations helps in designing highways that minimize adverse effects on the environment and communities. 4. Knowledge of traffic flow theory, traffic control devices, traffic safety, and capacity analysis is essential for designing efficient transportation networks. 5. Understanding urban development, land use patterns, and transportation planning principles helps in designing transportation systems that integrate with the built environment effectively.
Rationale: Highway engineers aim to create infrastructure that meets the current and future needs of society while minimizing negative impacts on the environment and communities

Course Outcomes:

PCC CE 08.1: Formulating strategies for highway project prioritization, funding, and implementation & Performing laboratory tests and field inspections to assess the quality and suitability of highway materials.

PCC CE 08.2: Applying geometric design elements, including horizontal and vertical alignments, cross-sections, and sight distances, to create safe and efficient highway layouts.

PCC CE 08.3: Analyzing the characteristics of different traffic control devices and their impact on traffic flow and safety, such as traffic signals, signs, and markings.

PCC CE 08.4: Understanding the principles of pavement design methods, including empirical, mechanistic-empirical, and performance-based approaches, to develop durable and cost-effective pavement structures suitable for varying traffic and environmental conditions.

PCC CE 08.5: Demonstrating the ability to plan, execute, and supervise highway construction standards, safety regulations, and environmental requirements to ensure the timely completed infrastructure.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core Course	PCC CE 08	Transportation engineering-II	3	1	2	1	7	4

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Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 08	Transportation engineering-II	15	20	5	5	5	50	50	100

Scheme of Assessment:

Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)

			(CA)					
PCC	PCC CE 08	Transportation engineering-II	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 08.1: Introduction and Highway Material.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Learning techniques for evaluating and selecting optimal highway alignments and interchanges. **SO1.2** Exploring methods for integrating sustainable and environmentally friendly practices into highway development projects. **SO1.3** Understanding the properties and characteristics of various materials used in highway construction, such as asphalt, concrete, and	1. Performance of Aggregate Crushing Value Test. 2. Determination of aggregate impact value	**Unit-1.** Introduction and Highway Material 1.1 Historical Development. 1.2 Road patterns, Master plans 1.3 Road development plans, PMGSY 1.4- Engineering surveys, Highway projects 1.5 Highway Materials and Testing: Subgrade soil, Sub base and base 1.6- Course materials, Bituminous materials 1.7 Testing of soil 1.8- Testing of stone 1.9 Testing of bitumen	1. Highway projects is learning about environmental impact assessments and strategies for minimizing ecological disruption during construction and operation. 2. highway material and testing is understanding different types of pavement materials and their performance under various conditions, including

aggregates. **SO1.4** Familiarizing oneself with the specifications and standards set by regulatory agencies for highway materials, such as the American Association of State Highway and Transportation Officials (AASHTO) and ASTM International. **SO1.5** Gaining knowledge of quality control and quality assurance processes for ensuring the reliability and longevity of highway infrastructure.			factors like durability, skid resistance, and load-bearing capacity.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Write a brief essay discussing the importance of highways in transportation infrastructure.

b. Mini Project:

1. Analysis of Aggregate Properties for Highway Construction.

c. Other Activities (Specify):

1. Quiz

PCC CE 08.2: Highway Geometric Design.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understanding the various elements of highway geometry, such as	1. California Bearing Ratio values	**Unit-2** Highway Geometric Design 2.1 Cross section elements –	1. Researching Design Guidelines: Delve into the design guidelines

horizontal and vertical alignment, cross-sectional design, and sight distance considerations. **SO2.2** Ability to analyze and optimize highway geometric design to enhance safety, reduce congestion, and minimize environmental impact. **SO2.3** Knowledge of the factors influencing geometric design decisions, such as terrain characteristics, traffic volumes, and design speed requirements. **SO2.4** Familiarity with computer-aided design (CAD) software and other tools used for geometric design, and proficiency in using these tools to create detailed design plans and simulations. **SO2.5.** Competence in conducting geometric design evaluations and assessments to identify areas for improvement and ensure compliance with regulatory standards and project objectives.		Pavement Characteristics & Related Problems 2.2 Cross section elements Camber & its types with related problems. 2.3 Cross section elements – Shoulder & Kerb and divider 2.4 Cross Section Of Road. 2.5 S.S.D. with Problems 2.6 I.S.D. with Problems. 2.7 O.S.D. with Problems. 2.8 Horizontal Alignment with Problems. 2.9 Vertical Alignment with Problems.	provided by organizations like the American Association of State Highway and Transportation Officials (AASHTO) or the Federal Highway Administration (FHWA). Understanding these guidelines can provide insights into the principles and standards used in geometric design. 2. Studying Case Studies Analyze case studies of past highway projects, focusing on their geometric design elements. Investigate how different design decisions were made and their impact on factors such as safety, traffic flow, and environmental considerations. Case studies can provide valuable real-world examples to deepen understanding and inspire innovative design solutions..

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Analyze a hypothetical highway corridor and develop a geometric design plan incorporating horizontal and vertical alignment element.

b. Mini Project:

1. Optimization of Horizontal Alignment Design for Highway Curves.

c. Other Activities (Specify):

1. Group Discussion.

PCC CE 08.3: Traffic Engineering.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Mastery of traffic flow theory, including fundamental principles such as traffic volume, density, and speed, and their interrelationships. **SO3.2.** Proficiency in traffic data collection methods and analysis techniques, such as traffic counts, speed studies, and travel time surveys, to assess current conditions and identify potential problems. **SO3.3** Understanding of traffic control devices and their application, including traffic signals, signs, pavement markings, and roadway lighting, to optimize safety and efficiency. **SO3.4** Knowledge of traffic calming measures and strategies for managing speed, reducing congestion, and improving pedestrian and cyclist safety in skill urban areas.	1. Determination of penetration value of Bitumen 2. Determination of Viscosity of Bituminous Material. 3. Determination of softening point of bituminous material 4. Determination of ductility of the bitumen	**Unit-3:** Traffic Engineering 3.1- Traffic characteristics 3.2 -Road user 3.3 -Vehicular characteristics, 3.4 -Traffic studies 3.5Accident studies 3.6- Traffic operations, 3.7 - Traffic control devices, 3.8- Intelligent transport systems, 3.9- Pollution due to traffic.	1. Online Courses and Tutorials: Seek out online courses, tutorials, or educational resources on platforms like Coursera, edX, or YouTube. These resources can cover a wide range of topics in traffic engineering, from basic principles to advanced concepts, allowing for self-paced learning and skill development. 2.Professional Journals and Publications. Explore academic Journals, industry magazines, and research publications related to traffic engineering. Reading articles and papers on topics of interest can provide insights into the latest.

SO3.5 Familiarity with traffic simulation software and modeling techniques, allowing for the prediction and optimization of traffic behavior in complex urban or highway networks.			

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Conduct a thorough analysis of the intersection's traffic flow patterns, including peak traffic hours, vehicle volumes, pedestrian movements, and turning movements.

b. Mini Project

1. Traffic Flow Analysis and Optimization of a Road Network.

c. Other Activities (Specify):

1. Poster Presentation.

PCC CE 08.4 Design of Highway Pavements.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**02**
SW	**02**
SL	**02**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1. Competence in conducting pavement condition assessments and performance evaluations, using techniques like pavement distress surveys and deflection testing, to inform rehabilitation and maintenance strategies. **SO4.2** Familiarity with environmental considerations and	1. Determination of flash point and fire point of bituminous material 2. Determination of Bitumen content by centrifuge extractor	Unit-4: Design of Highway Pavements 4.1 Flexible pavements 4.2 Design, 4.3 review of old methods, 4.4 CBR method, 4.5 IRC:37-2001, 4.6 Equivalent single wheel load factor, 4.7 Rigid pavements, 4.8 Stress in rigid pavement, 4.9 IRC design method	1. Understanding Pavement Design Methods: Mastery of various pavement design methods, such as the American Association of State Highway and Transportation Officials (AASHTO) design guide, the Mechanistic Empirical

sustainability principles in pavement design, including the use of recycled materials, energy efficient construction techniques, and life cycle cost analysis. **SO4.3.** Proficiency in communicating and presenting pavement design concepts, analyses, and recommendations to stakeholders, including transportation agencies, engineers, contractors, and the public, to facilitate informed decision making and project success. **SO4.4** Mastery of various pavement design methods, including empirical, mechanistic empirical, and performance-based approaches, to effectively design pavements that meet performance requirements and durability expectations. **SO4.5** Understanding of material properties and behavior, such as asphalt mix characteristics, subgrade soil properties, and pavement layer interactions, to optimize pavement performance and longevity.		(IRC:58- 2002).	Pavement Design Guide (MEPDG), or the Asphalt Institute's Thickness Design Manual. This understanding includes knowledge of the inputs required for each method, such as traffic loads, material properties, and environmental factors. 2. Application of Design Software: Proficiency in using pavement design software tools like the AASHTOW are Pavement ME Design software or commercial programs like Street Pave or Civil 3D. This proficiency includes the ability to input design parameters, analyze pavement structures, and interpret results to produce cost effective and durable pavement designs that meet performance requirements and regulatory standards.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i) Evaluate the proposed pavement design in terms of structural adequacy, durability, and cost effectiveness.

b. Mini Project:

i) Comparative Analysis of Flexible and Rigid Pavement Designs for a Highway Section.

c. Other Activities (Specify):

1. Quiz.

PCC CE 08.5: Highway Construction and Maintenance.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**04**
SW	**02**
SL	**02**
Total	**17**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1. Mastery of construction techniques and practices, including earthwork, grading, paving, and drainage, to ensure the safe, efficient, and high-quality construction of highways and associated infrastructure. **SO5.2** Proficiency in material selection, testing, and quality control procedures, including asphalt mix design, concrete testing, and soil compaction testing, to meet project specifications and performance requirements. **SO5.3** Understanding of equipment operation and maintenance, including heavy machinery such as excavators, graders, pavers, rollers, and maintenance vehicles, to ensure safe and effective use throughout construction and maintenance activities. **SO5.4.** Competence in safety protocols and procedures, including	1. Determination of stripping value of road aggregate 2.Determination of Marshall stability value for Bituminous mix 3.Determination of shape tests on aggregate.	**Unit 5:** Highway Construction and Maintenance 5.1 Highway Construction: Construction of various layers, 5.2 Earthwork, 5.3 WBM, 5.4 GSB, 5.5 WMM, 5.6 Various types of bituminous layers 5.7 Joints in rigid pavements 5.8 Highway Maintenance: Various type of failures, 5.9 Evaluation and remedial measures.	1. Explore online resources, such as websites, forums, and educational platforms, where you can find articles, videos, tutorials, and courses related to highway construction and maintenance. These resources cover various topics, including construction techniques, materials, equipment, safety practices, and maintenance strategies, allowing for self-paced learning and skill development. 2. Take advantage of opportunities to observe highway construction and maintenance activities firsthand. Whether through site visits, job shadowing, internships, or volunteering with construction crews or

hazard identification, personal protective equipment (PPE) usage, traffic control measures, and emergency response planning, to minimize risks and ensure the well-being of workers and the public. **SO5.5**. Familiarity with maintenance strategies and techniques for preserving and extending the service life of highways, including routine maintenance tasks such as crack sealing, pothole repair, pavement marking, and vegetation management, as well as long-term preservation treatments and rehabilitation methods			maintenance teams, gaining practical experience in the field provides valuable insights into processes, challenges, and best practices, complementing theoretical knowledge acquired through self-study.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i) Your task is to develop a comprehensive plan for the construction and maintenance of a new highway segment, ensuring its long-term durability, safety, and sustainability.

b. Mini Project:

ii. Pavement Condition Assessment and Maintenance Prioritization.

c. Other Activities (Specify):

1. Site visit.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 08.1: Formulating strategies for highway project prioritization, funding, and implementation & Performing laboratory tests and field inspections to assess the quality and	9	2	2	1	14

suitability of highway materials.					
PCC CE 08.2: Applying geometric design elements, including horizontal and vertical alignments, cross-sections, and sight distances, to create safe and efficient highway layouts.	9	2	2	1	14
PCC CE 08.3: Analyzing the characteristics of different traffic control devices and their impact on traffic flow and safety, such as traffic signals, signs, and markings.	9	4	2	2	17
PCC CE 08.4: Understanding the principles of pavement design methods, including empirical, mechanistic-empirical, and performance-based approaches, to develop durable and cost-effective pavement structures suitable for varying traffic and environmental conditions.	9	2	2	2	15
PCC CE 08.5: Demonstrating the ability to plan, execute, and supervise highway construction standards, safety regulations, and environmental requirements to ensure the timely completed infrastructures.	9	4	2	2	17
Total Hours	45	14	10	8	77

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 08.1	Introduction and Highway Material	03	01	01	05
PCC CE 08.2	Highway Geometric Design	02	02	06	10
PCC CE 08.3	Traffic Engineering	02	03	10	15
PCC CE 08.4	Design of Highway Pavements	-	05	10	15
PCC CE 08.5	Highway Construction and Maintenance	03	02	-	05
	Total	10	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play

5. Visit to highway material testing lab
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Highway Engineering Revised	S.K. Khanna and C.E.G. Justo	Nem Chand & Bros	10th Edition - 2017
2.	Highway Engineering"	Martin Rogers	Wiley	2nd Edition 2012
3.	"Principles of Highway Engineering and Traffic Analysis"	Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski	Wiley	5thEdition 2012
4.	Highway Engineering Handbook"	Roger L. Brockenbrough, Kenneth J. Boedecker	McGraw-Hill Education	2nd Edition 2009
5.	"Highway Engineering: Planning, Design, and Operations"	Daniel J. Findley	CRC Press	1st Edition 2018

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Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 08
Course Title: Transportation engineering-II

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 08.1: Formulating strategies for highway project prioritization, funding, and implementation & Performing laboratory tests and field inspections to assess	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

the quality and suitability of highway materials.																
PCC CE 08.2: Applying geometric design elements, including horizontal and vertical alignments, cross-sections, and sight distances, to create safe and efficient highway layouts.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 08.3: Analyzing the characteristics of different traffic control devices and their impact on traffic flow and safety, such as traffic signals, signs, and markings.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 08.4: Understanding the principles of pavement design methods, including empirical, mechanistic-empirical, and performance-based approaches, to develop durable and cost-effective	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

pavement structures suitable for varying traffic and environmental conditions.																
PCC CE 08.5: Demonstrating the ability to plan, execute, and supervise highway construction standards, safety regulations, and environmental requirements to ensure the timely completed infrastructures.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning(SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 08.1:** Formulating strategies for highway project prioritization, funding, and implementation & Performing laboratory tests and field	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

	inspections to assess the quality and suitability of highway materials.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 08.2:** Applying geometric design elements, including horizontal and vertical alignments, cross-sections, and sight distances, to create safe and efficient highway layouts.	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 08.3:** Analyzing the characteristics of different traffic control devices and their impact on traffic flow and safety, such as traffic signals, signs, and markings.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 08.4**: Understanding the principles of	SO1.1 SO1.2 SO1.3	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	

	pavement design methods, including empirical, mechanistic-empirical, and performance-based approaches, to develop durable and cost-effective pavement structures suitable for varying traffic and environmental conditions.	SO1.4 SO1.5 SO1.6			
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 08.5:** Demonstrating the ability to plan, execute, and supervise highway construction standards, safety regulations, and environmental requirements to ensure the timely completed infrastructures.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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Semester-VI

Course Code: **PCC CE 15**

Course Title: **Environmental Engineering-II**

Pre-requisite: To provide a coherent development to the students for the courses in sector of engineering like Waste Water treatment, solid Waste Management, house drainage etc. To analyze the Waste water sources and waste water characteristics. To develop various waste water treatment process. To give an experience in the implementation of engineering concepts which are applied in field of waste Water treatment process.

Rationale: The goal of environmental engineering is to ensure that societal development and the use of water, land and air resources are sustainable. This goal is achieved by managing these resources so that environmental pollution and degradation is minimized. Environmental engineers study water, soil and air pollution problems, and develop technical solutions needed to solve, attenuate or control these problems in a manner that is compatible with legislative, economic, social and political concerns. Civil engineers are particularly involved in such activities as water supply and sewerage, management of surface water and groundwater quality, remediation of contaminated sites and solid waste management.

Course Outcomes:

PCC CE 15.1: Ability to estimate sewage generation and design sewer system including Sewage pumping stations.

PCC CE 15.2: Understand the sewage characteristics, treatment and disposal according to national and international standards.

PCC CE 15.3: Ability to perform basic design o ft he unit operations and processes that are used in sewage treatment.

PCC CE 15.4: Understand the biological treatment and sludge disposal.

PCC CE 15.5: To know about Advanced waste water treatment techniques.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 15	Environmental Engineering-II	3	0	4	2	9	3

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Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure
outcome of Learning.

Scheme of Assessment:

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 15	Environmental Engineering-II	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 15.1: Sewerage system and plumbing.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**04**
SL	**01**
Total	**14**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 The entire infrastructure, which includes the appurtenances, devices, and equipment for the collection, transportation, and disposal of sewage **SO1.2** The entire infrastructure, which Includes the appurtenances, devices, and equipment for the collection, transportation, and disposal of sewage **SO1.3** to protect the physical operation of downstream treatment works. **SO1.4** A plumber's responsibility for a drainage system on private property ends at the property line. **SO1.5** Ability to estimate sewage generation and design sewer system including Sewage pumping stations		**Unit-1.0** SEWERAGE SYSTEM AND PLUMBING 1.1 Sewerage schemes and their importance, 1.2 collection & conveyance of sewage 1.3 storm water quantity, 1.4 fluctuation in sewage flow, 1.5 flow through sewer, 1.6 design of sewer, 1.7 construction & maintenance of sewer 1.8 sewer appurtenances 1.9 pumps & pumping stations.	1. Explain the sewage and sewage sources.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Explain the classification of sewage.

b. Mini Project:
I. To determine the alkalinity in water sample
II. To determine the acidity in water sample.

c. Other Activities (Specify):
I. Industrial visit in water purification plant.

PCC CE 15.2: Characterization of sewage.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**04**
SL	**02**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 introduce the students to the area of water and wastewater treatment **SO2.2.** will cover water chemistry; characteristics of water & wastewater; primary, secondary & tertiary treatment processes **SO2.3** Students will know about physical, chemical, and biological parameters of wastewater. **SO2.4** Students learn the natural process of waste disposal. **SO2.5** required understanding of the characteristics and composition of sewage, self Purification of streams		**Unit 2.0** CHARACTERIZATION OF SEWAGE 2.1 Characteristics and analysis of waste water 2.2 cycles of decomposition, 2.3 physical, chemical & biological parameters. 2.4 Oxygen demand i.e. BOD & COD, TOC, TOD, Th OD, 2.5 Relative Stability, 2.6 population equivalent, 2.7 instrumentation involved in analysis 2.8 natural methods of waste water disposal i.e. by land treatment & by dilution 2.9 self-purification capacity of stream 2.10 Oxygen sag analysis	i. Write the parameters of waste water. ii. Explain all types of oxygen demand.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Explain the natural methods of waste disposal.

b. Mini Project:

I. Determination of dissolved oxygen in the water and waste water sample, biological oxygen demand of a waste water sample and chemical oxygen demand of a waste water sample.

c. Other Activities (Specify):

I. Quiz

PCC CE 15.3: treatment of sewage.

Approximate Hours

Item	Approx. Hours
CI	**07**
LI	**00**
SW	**04**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
Briefly explain all type of unit operation for waste water treatment		**Unit 3.0** TREATMENT OF SEWAGE 3.1 Unit operations for waste water treatment 3.2 preliminary treatment 3.3 screens and grit chamber, 3.4 Floatation tank and sedimentation 3.5 chemical clarification, 3.6 role of micro-organism in biological treatment, 3.7 Sewage filtration- theory & design.	i. Explain all steps of primary treatment of wastewater ii. Write the type of microorganism.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Briefly explain all type of unit operation for waste water treatment.

b. Mini Project:

I. Determination of bacterial number by membrane filter Technique

c. Other Activities (Specify):

I. PPT.

PCC CE 15.4: Sewage treatment units design and treated effluent disposal.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**04**
SL	**02**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Students will learn the biological treatment of sewage **SO4.2** students will able to describe sludge generation and treatment. **SO4.3** to know about difference between septic tank and imhoff tank **SO4.4** students learn about activated sludge process		**Unit 4.0** SEWAGE TREATMENT UNITS DESIGN AND TREATED EFFLUENT DISPOSAL 4.1 Methods of Biological Treatment (Theory & Design) 4.2 Activated Sludge process, 4.3 Oxidation ditch 4.4 stabilization ponds 4.5 aerated lagoon and anaerobic lagoons, 4.6 septic tank & imhoff tank, 4.7 sources & treatment of sludge 4.8 sludge thickening and digestion 4.9 sludge drying beds 4.10 sludge disposal	i. Write the short note on water purification. ii. Explain the water pollution with treatment.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Explain the method of biological treatment.

b. Mini Project:

I. Determination of bacterial colonies by standard plat count method.

d. Other Activities (Specify):

I. Power Point Presentation on Waste water Treatment.

PCC CE 15.5: Advanced waste water treatment.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**04**
SL	**02**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Students learn about advance techniques of wastewater treatment. **SO5.2** Learn about solid waste disposal **SO5.3** Will know about the process of rural sanitation. **SO5.4** Students Learn about act carbon sludge process		**UNIT-5** ADVANCED WASTE WATER TREATMENT 5.1 Advanced Waste Water treatment 5.2 Diatomaceous earth filters 5.3 ultra filtration 5.4Adsorption by activated carbon 5.5Phosphorus removal, Nitrogen removal, 5.6Physicochemical waste water treatment, 5.7Solid waste disposal - classification, composition, collection, & disposal methods. 5.8Rural sanitation - collection & disposal of refuse, 5.9sullage & night soil.	1.. Explain activated sludge process 2.Write about solid waste disposal.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain the Procedure Of AWWT.

b. Mini Project:

I. Visit to a Waste water Treatment plant and writing a report.

c. Other Activities (Specify):

I. List of the 5-waste water treatment plant near by your area.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 15.1: Ability to estimate sewage generation and design sewer system including Sewage.	9	4	1	14
PCC CE 15.2: Understand the sewage characteristics, treatment and disposal according to national and international standard.	10	4	2	16
PCC CE 15.3: Ability to perform basic design of the unit operations and processes that are used in sewage treatment.	7	4	2	13
PCC CE 15.4: Understand the biological treatment and sludge disposal1.	10	4	2	16
PCC CE 15.5: To know about Advanced waste water treatment techniques.	9	4	2	15
Total Hours	45	20	09	74

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 15.1	Sewarage system and plumbing	03	01	01	05
PCC CE 15.2	Characterization of sewage	02	06	02	10
PCC CE 15.3	Treatment of sewage	03	07	05	15
PCC CE 15.4	Sewage treatment units design and treated effluent disposal	-	10	05	15
PCC CE 15.5	Advanced waste water treatment	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to waste water traetment plant
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Water Supply & Sanitary Engg -	G.S. Birdie	Dhanpat Rai Publishing Company	2016
2.	Waste Water Engg -	B.C. Punmia	Laxmi Publication (P) Ltd. New Delhi	2018
3.	Environmental Engg	M.L.Davis & D.A. Cornwell	Mc Graw Hill Company	2012
4.	Chemistry for Environmental Engg	Sawyer & Mc Carty	Mc Graw Hill Book Company	2017
5.	Water & Waste Water Technology -	Mark J Hammer	Prentice -Hall of India, New Delhi	2011
6.	Waste Water Engineering	Metcalf & Eddy		2017

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 15
Course Title: Environmental Engineering-II

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 15.1: Ability to estimate sewage generation and design sewer system including Sewage.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 15.2: Understand the sewage characteristics,	2	1	2	3	2	3	2	3	2	3	2	3	2	1	2	3

treatment and disposal according to national and international standard.																
PCC CE 15.3: Ability to perform basic design of the unit operations and processes that are used in sewage treatment.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 15.4: Understand the biological treatment and sludge disposal1.	1	2	3	2	3	2	3	2	3	2	3	3	2	3	2	3
PCC CE 15.5: To know about Advanced waste water treatment techniques.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2, 9,10,12 PSO1,2	**PCC CE 15.1**: Ability to estimate sewage generation and design sewer system including	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**

	Sewage.				
PO1,2, 9,10,12 PSO2	**PCC CE 15.2**: Understand the sewage characteristics, treatment and disposal according to national and international standard.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2** **2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3	**PCC CE 15.3**: Ability to perform basic design of the unit operations and processes that are used in sewage treatment.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5.**	
PO1,2, 9,10,12	**PCC CE 15.4**: Understand the biological treatment and sludge disposal1.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**PCC CE 15.5:** To know about Advanced waste water treatment techniques.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

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Semester-VI

Course Code: **PCC CE 16**
Course Title: **Advanced Surveying**
Pre-requisite: Student should have basic knowledge of Cement, Concrete, Roads and Infrastructure.
Rationale: The department of civil engineering has been constantly contributing high-quality technical manpower needed by the industry. The broad objective of the department is to achieve recognition for excellence in research and teaching in the country. The Department is well suited to meet the ever-changing requirements of engineers with courses that combine the study of management, business skills and computers with engineering. The Department also encourages its students to engage in extra-curricular and co-curricular activities, essential for development of team spirit and organizational skills.

Course Outcomes:

PCC CE 16.1: Identify and handle various conventional surveying instruments.

PCC CE 16.2: To analyses different surveying methods for suitability for different conditions.

PCC CE 16.3: Undertake surveying of land using total station & Setting out Curves.

PCC CE 16.4: Measure and layout out elevations and relative heights between points BY trigonometrically leveling.

PCC CE 16.5: Explain the fundamentals of Photogrammetric and its applications.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 16	**Advanced Surveying**	3	1	1	1	5	4

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 16	Advanced Surveying	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
PCC	PCC CE 16-L	Advanced Surveying	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 16.1: Identify and handle various conventional surveying instruments.

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**06**
SW	**02**
SL	**02**
Total	**20**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Explain the working and components of electronic theodolite **SO1.2** Explain the working principle and components of Total station. **SO1.3** Describe traversing using total station	1. Surveying of an area by chain and compass survey (closed traverse) & plotting 2. Determine of distance between two inaccessible points with compass 3. Radiation method, intersection methods by plane table survey.	**Unit 1.0 Adjustment and Theory of Errors** 1.1 Geode meter. 1.2 Tellerometer. 1.3 Distomats. 1.4 Digital levels and theodolites 1.5 Electronic Distance measurement (EDM) 1.6 Total Station 1.7 Waves 1.8 Microwaves 1.9 Visible Light waves 1.10 Infrared waves	1. Advantages of EDM 2. Application of Total Station

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Difference between plain surveying and geodetic surveying

II. What if triangulation. Explain principle of triangulation.

b. Mini Project:
I. Application of Total Station.

C. Other Activities (Specify):
Note on Different types of Instruments.

PCC CE 16.2: To analyze different surveying methods for suitability for different conditions.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**06**
SW	**02**
SL	**02**
Total	**18**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Describe data gathering and processing using application software **SO2.2** To learns about Law of Accidental. **SO2.3** To Learn About Different types of Error.	1. Levelling – Longitudinal and cross-section and plotting. 2. Measurement of Horizontal and vertical angle by theodolite. 3. Trigonometric leveling using theodolite	**Unit2.0 - Errors** **2**.1 Introduction 2.2 Definitions. 2.3 law of accidental error 2.4 determination of probable errors. 2.5 determination of most probable errors. 2.6 Natural Error 2.7 Personal Error 2.8 Instrumental Error	I. Define Probable Error ii. Probability Curve

SW-2 Suggested Sessional Work (SW):

a. Assignments:
I. Write short note on: type of error.
ii. Prepare Detail project on Construction Life Cycle.

b. Mini Project:
I. Interdisciplinary nature of civil engineering projects.

c. Other Activities (Specify):
Challenges of Indian Infrastructure

PCC CE 16.3: Undertake surveying of land using total station & Setting out Curves.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Types of Curves Used in India **SO3.2** Component and use of Curves **SO3.3** Analyze various types of Simple Circular Curve and Its parts. **SO4.4** To what extent you are able to Analyze various types of GPS.	1. Levelling – Longitudinal and cross-section and plotting. 2. Measurement of Horizontal and vertical angle by theodolite. 3. Trigonometric leveling using theodolite	**Unit 3.0**- Errors 2.1 Introduction 2.2 Definitions. 2.3 law of accidental error 2.4 determination of probable errors. 2.5 determination of most probable errors. 2.6 Natural Error 2.7 Personal Error 2.8 Instrumental Error 2.9 Tutorial.	I. Define Probable Error ii. Probability Curve

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. Write short note on: type of error.
ii. Prepare Detail project on Construction Life Cycle.

b. Mini Project:
Interdisciplinary nature of civil engineering projects.

c. Other Activities (Specify):
Challenges of Indian Infrastructure

PCC CE 16.4: Measure and layout out elevations and relative heights between points BY trigonometrically leveling.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Outline principles and applications of remote sensing SO4. Describe traversing using total station SO4.3Understanding the Trigonometrically leveling. transformer.	1. Traversing using total station for drawing contour map 2. Stake out using total station 3. Setting out Curve using total station	**Unit-4** Trigonometrically leveling 4.1 Introduction: 4.2 base of object accessible. 4.3 base of object inaccessible 4.4 determination of height of elevated object 4.5 It's base & top are visible but not accessible. 4.6 Remote Sensing 4.7 Principle. 4.8 components 4.9 classification	Remote sensing - Introduction and applications in Civil Engineering i. Principles of trigonometrical y leveling.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Trigonometric leveling using theodolite Determination of height,

II. remote elevation, distance between inaccessible points using total station

b. Mini Project:

I. Draw phasor diagram of transformer at different loads.

Mini Project:

Determination of Area using total station and drawing map

Other Activities (Specify):

Stake out using total station.

PCC CE 16.5: Explain the fundamentals of Photogrammetric and its applications.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**06**
SW	**02**
SL	**02**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Outline principles of Photogrammetric and its applications SO5.2 Understand the concept of advanced techniques and operation of modern equipment SO5.3 Understand the Principle of Error of Closure		Unit 5: Traverse surveying: 1.1 Introduction. 1.2 methods of computing area 5.3 balancing angle 5.4 latitudes and departures 5.5, errors of closure, 5.6 methods of closure errors 5.7 Photogrammetric 5.8 Principle 5.9 definitions and classifications of terrestrial	1.1 List out the methods of Traversing. 1.2. Define traversing method in plane table surveying.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

Explain the Bowditch's rule in balancing the traverse Define Photogrammetric.

b. Mini Project:

Prepare Project Report on Aerial Camera.

c. Other Activities (Specify):

Advantages of Latitudes & Departure.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 16.1: Identify and handle various conventional surveying instruments.	10	06	2	2	20
PCC CE 16.2: To analyze different surveying methods for suitability for	08	06	2	2	18

different conditions					
PCC CE 16.3: Undertake surveying of land using total station and setting of curves	09	06	2	2	19
PCC CE 16.4: Measure and layout out elevations and relative heights between points BY trigonometrically leveling.	09	06	2	2	19
PCC CE 16.5: Explain the fundamentals of Photogrammetry and its applications.	09	06	2	2	19
Total Hours	45	30	10	10	95

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 16.1	Survey Adjustment and Theory of Errors	03	01	01	05
PCC CE 16.2	Errors	02	03	02	07
PCC CE 16.3	Types Of Roads Used in Construction	02	04	04	10
PCC CE 16.4	Building Materials	03	07	05	15
PCC CE 16.5	Traverse surveying	01	06	06	13
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to mines and open survey fieldss
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Surveying and Leveling-Part-I & II	T.P. Kanetkar and S.V. Kulkarni	Pune Vidyarthi Girah Prakashan,	Fifth

			Pune	
2.	Surveying: Problems Solving with theory and objective type questions	A.M. Chandra,	New Age International Publishers N. Delhi.	2016 - Second
3.	Advance Surveying	A.M. Chandra	New Age International Publishers N. Delhi.	2009
4.	Surveying Vol. II	S.K. Duggal	Tata McGraw Hill Publishing Company Ltd. New	Third
5.	Lecture note provided by Dept. of Civil engineering, AKS University, Satna.			

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PCC CE 16
Course Title: Advanced Surveying

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 16.1: Identify and handle various conventional surveying instruments.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 16.2: To analyze different surveying methods for suitability for different	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

conditions																
PCC CE 16.3: Undertake surveying of land using total station and setting of curves	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 16.4: Measure and layout out elevations and relative heights between points BY trigonometrically leveling.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PCC CE 16.5: Explain the fundamentals of Photogrammetry and its applications.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 16.1:** Identify and handle various conventional surveying instruments.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 16.2:** To analyze different surveying methods for suitability for different conditions	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 16.3:** Undertake surveying of land using total station and setting of curves	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 16.4**: Measure and layout out elevations and relative heights between points BY trigonometrically leveling.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4:4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PCC CE 16.5:** Explain the fundamentals of Photogrammetry and its applications.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
4. Mr. Devendra Singh, Assistant Professor, Dept. of Civil Engineering
5. Mrs. Shraddha Panday, Teaching Associate, Dept. of Civil Engineering
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Semester-VI

Course Code: **PCC CE 17**
Course Title: **Design of Advanced Concrete Structure**
Pre-requisite: Student should have basic knowledge of Concrete structure design- Beam, Column, Slab, footing and other concrete elements.
Rationale: The students studying Advanced Concrete Structural Design should possess foundational understanding about concrete structures, members and buildings materials employed in construction. The rationale behind "Advanced Concrete Structural Design" lies in the need to develop and implement more sophisticated and efficient design approaches for concrete structures. This field of study and practice is driven by several key factors and considerations: Safety, Sustainability, Innovation and technology, Economic efficiency.

Course Outcomes:

PCC CE 17 .1: Understand the Design of Multistory Buildings - Sway and non-sway buildings, Shear walls and other bracing elements.

PCC CE 17 .2: Acquired the knowledge of Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.

PCC CE 17 .3: Understanding of the Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

PCC CE 17 .4: Familiarize with classification of bridges, T-beam & Slab bridges- for highway loading (IRC Loads).

PCC CE 17 .5: Understanding Prestressing concepts materials, systems of prestressing &losses Introduction to working & limit.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Core Course	PCC CE 17	Design of Advanced Concrete Structure	3	0	2	2	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PCC	PCC CE 17	Design of Advanced Concrete Structure	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PCC CE 17 .1: Understand the Design of Multistory Buildings - Sway and non-sway buildings, Shear walls and other bracing elements.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the Multistory Buildings. **SO1.2** Understand the Design of Multistory Buildings. **SO1.3** Sway and non-sway buildings. **SO1.4** Shear walls and its types. **SO1.5** bracing elements and types of bracing system.		**Unit-1.0 Design of Multistory Buildings Sway and non-sway buildings, Shear walls and other bracing elements.** 1.1. Introduction to Multistorey Buildings: 1.2.0Sway and Non- Sway Buildings: 1.3. Define the terms "sway" and Structural Systems: 1.4. Present the various structural systems commonly used in multistorey buildings. moment-resisting frames, braced frames, shear wall systems, and hybrid systems. 1.5. Explain the advantages and disadvantages of each system and when to use them. 1.6. Shear Walls and Bracing Elements: 1.7. Focus on shear walls and their role in providing lateral stability to buildings. 1.8. Discuss the types of shear walls, their design principles, and their placement in the building. 1.9. Safety and Building Codes:	1. structural elements that provide lateral resistance against wind and seismic loads in buildings. 2. The portion of a building structure that provides stability for the framing

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1.What is Sway and non-sway Structures, and also explain Difference Between Sway and Non-Sway Frames?

2. Explain Shear wall and that's type?

b. Mini Project:

Diagram of different types of bracing systems.

c. Other Activities (Specify):

Research on most suitable bracing systems and shear wall in Highrise structures.

PCC CE 17 .2: Acquired the knowledge of Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To Understand the Earth Retaining Structures. **SO2.2** Design procedure of cantilever retaining wall. **SO2.3** Design and detailing of cantilever retaining wall. **SO2.4** Design procedure of counterfort retaining wall **SO2.5** Design and detailing of counterfort retaining wall		Unit-2 Cantilever and counterfort types retaining walls. 2.1. Introduction to Earth Retaining Structures. 2.2 Overview of Cantilever Retaining Walls. 2.3 Design Principles for Cantilever Retaining Walls 2.4 Overview of Counter fort Retaining Walls 2.5 Design Principles for Counterfort Retaining Walls 2.6 Materials and Construction Methods 2.7 Safety and Environmental 2.8Considerations. Student Projects and Exercises 2.9Back Anchoring of retaining wall	1.Design of cantilever earth retaining wall. 2.Design of counterfort retaining wall.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Design of cantilever earth retaining wall.
2.Design of counterfort retaining wall.

b. Mini Project:

I. Design a suitable earth retaining wall for resist high soil pressure.

c. Other Activities (Specify):

I. Types of retailing wall availability in India

PCC CE 17 .3: Understanding of the Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Understand water tank and Types of water tanks. **SO3.2** Discuss of ground and underground water tanks. **SO3.3** Design of square and rectangular water tank resting on ground. **SO3.4** Design of circular water tank resting on ground. **SO3.5** Design of circular overhead water tanks.		**Unit-3: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.** 3.1 Lesson Plan: Understanding of Water Tanks. 3.2 Ground water tanks 3.3 Underground water tanks 3.4 Square and Rectangular Tanks 3.5 Overhead water tank 3.6 Circular water tanks 3.7 Structural Considerations Sizing and	i. Specification of water tanks. ii. Design steps of underground water tanks.

		Capacity 3.8 Circular tank with flexible 3.9 joint between floor and wall	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Specification of water tanks. WSM Method.
2. Design procedure of overhead water tank.

b. Mini Project:

Design and Analysis of a Water Tank.

c. Other Activities (Specify):

Availability and properties of water tanks in current time.

PCC CE 17 .4: Familiarize with Classification of bridges, T-beam & Slab bridges- for highway loading (IRC Loads).

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Classification of bridges. **SO4.2** Understanding the design of T-Beam **SO4.3** Understanding the design of slab bridges. **SO4.4** (IRC Loadings) for design of highway bridges. **SO4.5** Design of bridges decks, load classification.		**Unit-4: Classification of bridges T-beam & Slab bridges- for highway loading (IRC Loads).** 4.1 Type of Bridge Structure 4.2 Span Length: 4.3 Load Classification: 4.4 Design Parameters: 4.5 Aqueducts and 4.6 Syphon aqueducts 4.7 Box culvert	I. Study of bridge members. ii. IRC loading for bridges.

		4.8 Design of box culvert 4.9 Live loads and Impact effects	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Write design steps of T-Beam bridges.

ii. Describe briefly Design procedure of slab bridges.

b. Mini Project:

1. Comprehensive study between different shapes of bridge piers.

d. Other Activities (Specify):

I. Comprehensive study between different shapes of bridge piers.

PCC CE 17 .5: Understanding Prestressing concepts materials, systems of prestressing &losses Introduction to working & limit.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Understating the Pre- stressed concrete and pre-stressing system. SO5.2 Types of the losses in pre-stress. SO5.3 Design of simple span girders, Design of end block. SO5.4 Materials for prestress concrete members. SO5.5 Durability, Fire Resistance & Cover Requirements For P.S.C		**Unit 5: Prestressing concepts materials, systems of prestressing & losses Introduction to working &limit** 5.1 Terminology. Materials for prestress concrete 5.2 Durability, Fire Resistance& Cover. 5.3 Necessity of high grade of concrete. 5.4 Advantage of Prestressed Concrete. 5.5 Anchoring the tendons.	1.Guideline for Design of prestress concrete Member 2. Describe Tendons

Members.		5.6 Losses of prestresses 5.7 Shrinkage of concrete 5.8 Effect of Shrinkage 5.9 and Creep in Beam	

SW-5 Suggested Sessional Work (SW):
a. Assignments:

I Materials for prestress concrete members.
II Durability, Fire Resistance & Cover Requirements For P.S.C Members

b. Mini Project:
I. Project Title: Design and Build a Prestressed Concrete Beam

c. Other Activities (Specify):
I. List of instruments used in prestressed concrete members.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PCC CE 17 .1: Understand the Design of Multistory Buildings - Sway and no sway buildings, Shear walls and other bracing elements.	9	2	2	13
PCC CE 17 .2 Acquired the knowledge of Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.	9	2	2	13
PCC CE 17 .3: Understanding of the Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & Nitze tanks.	9	2	2	13
PCC CE 17 .4: Familiarize with classification of bridges, T-beam & Slab bridges- for highway loading (IRC Loads).	9	2	2	13
PCC CE 17 .5: Understanding Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit.	9	2	2	13
Total Hours	45	10	10	65

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PCC CE 17 .1	Design of Multistory Buildings Sway and non-sway buildings, Shear walls and other	01	01	03	05

	bracing elements.				
PCC CE 17 .2	Cantilever and counter fort types retaining walls.	02	05	08	15
PCC CE 17 .3	Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.	02	03	05	10
PCC CE 17 .4	Classification of bridges T-beam & Slab bridges- for highway loading (IRC Loads).	02	05	08	15
PCC CE 17 .5	Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit	02	-	03	05
	Total	09	14	27	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to construction sites.
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	**Title**	**Author**	**Publisher**	**Edition &Year**
1.	Reinforced Concrete Structures	Dr. A.K. Jain		2005
2.	"Limit State Design of Reinforced Concrete"	P. C. Varghese	Laxmi Publication Pvt. Ltd.	2012
3.	Design of Reinforced Concrete Structures	N. Subramanian		2017

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: PCC CE 17

Course Title: Design of Advanced Concrete Structure

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PCC CE 17 .1: Understand the Design of Multistory Buildings - Sway and no sway buildings, Shear walls and other bracing elements.	3	2	3	2	2	1	2	3	2	2	2	3	2	3	2	3
PCC CE 17 .2	3	2	3	2	2	2	3	2	3	2	3	3	2	3	2	3

Acquired the knowledge of Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.																
PCC CE 17 .3: Understanding of the Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & Nitze tanks.	2	3	2	2	1	2	3	2	2	2	3	2	3	2	2	3
PCC CE 17 .4: Familiarize with classification of bridges, T-beam & Slab bridges- for highway loading (IRC Loads).	3	2	3	2	3	2	2	1	2	3	2	2	2	3	2	3
PCC CE 17 .5: Understanding Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit.	2	3	2	2	1	2	3	2	2	2	3	2	2	1	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning(SL)
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 17 .1**: Understand the Design of Multistory Buildings - Sway and no sway buildings, Shear walls and other bracing elements.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1 Design of Multi-story Buildings 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9**	**As mentioned above**
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 17 .2** Acquired the knowledge of Design of Earth Retaining Structures: Cantilever and counter fort types retaining walls.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-2 Cantilever and counter fort types retaining wall 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 17 .3**: Understanding of the Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks:	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-3: Tanks on ground and underground tanks: 3.1, 3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9**	

	square, rectangular, circular & Nitze tanks.				
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 17 .4**: Familiarize with classification of bridges, T-beam & Slab bridges- for highway loading (IRC Loads).	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-4: Classification of bridges T-beam & Slab bridges 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,**	
PO1,2,3,4,5,6 7,8,9,10,11,12 PSO1,3,3,4	**PCC CE 17 .5:** Understanding Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit 5 Prestressing concepts materials, system of prestressing & Losses5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9**	

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Semester-VI

Course Code: **OEC CE 02**
Course Title: **Artificial Intelligence**
Pre-requisite: To study this Course, a student must have basic knowledge of computers
Rationale: AI can automate routine tasks, analyze data, and improve decision-making

Course Outcomes:

OEC CE 02.1: Understand the basic concepts and techniques of Artificial Intelligence.

OEC CE 02.2: Apply AI algorithms for solving practical problems

OEC CE 02.3: Describe human intelligence and AI

OEC CE 02.4: Explain how intelligent system works.

OEC CE 02.5: Apply basics of Fuzzy logic and neural networks

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Engineering Science Course	OEC CE 02	Artificial Intelligence	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

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Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
OEC	OEC CE 02	Artificial Intelligence	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

OEC CE 02.1: Understand the basic concepts and techniques of Artificial Intelligence.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**0**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understand the Artificial Intelligence and its applications **SO1.2** Explain Level of		Unit-1 Introduction 1.1Artificial Intelligence and its applications 1.2 Artificial Intelligence	1. Artificial Intelligence Techniques 2. Intelligent Agents,

models, criteria of success **SO1.3** Discuss advantages, and limitations of AI **SO1.4** Definition Impact and Examples of AI **SO1.5** Explain Advice for a career in AI		Techniques 1.3 Level of models, criteria of success 1.4 Intelligent Agents, Nature of Agents 1.5 Learning Agents. AI Techniques 1.6 advantages, and limitations of AI 1.7 Impact and Examples of AI, Application domains of AI 1.8 The AI Ladder - The Journey for Adopting AI Successfully	Nature of Agents

SW-1 Suggested Sessional Work (SW):

a. Assignments:

a. Intelligent Agents, Nature of Agents
b. Impact and Examples of AI, Application domains of AI
c. The AI Ladder - The Journey for Adopting AI Successfully

b. Mini Project:

I. Seminar

OEC CE 02.2: Apply AI algorithms for solving practical problems.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To Understand the Problem-solving techniques **SO2.2** To learn heuristic search **SO2.3** To lean about Hill climbing, best first search **SO2.4** Explain Max		Unit2: Problem solving techniques 2.1 State space search, control strategies 2.2 heuristic search, problem characteristics 2.3 production system	1. State space search, control strategies 2. production system characteristics

Search, Alpha Beta Pruning **SO2.5** Explain Additional refinements.		characteristics, Generate and test 2.4 Hill climbing, best first search, A* search 2.5Constraint satisfaction problem, Mean-end analysis 2.6 Min-Max Search, Alpha-Beta Pruning 2.7Additional refinements, Iterative Deepening 2.8 Advice for a career in AI	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

a. Heuristic search, problem characteristics
b. Min-Max Search, Alpha-Beta Pruning
c. Additional refinements

Major - Paper I:

OEC CE 02.3: Describe human intelligence and AI

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 To Understand Logic **SO3.2** To learn predicate logic **SO3.3** To understand the Resolution in proportional logic **SO3.4** Explain unification algorithm **SO3.5** learn about unification algorithm		**Unit3: Logic** 3.1 Propositional logic 3.2 predicate logic, Resolution 3.3 Resolution in proportional logic and predicate logic 3.4 unification algorithm 3.5 unification algorithm 3.6 Hotbeds of AI Innovation 3.7 non-monotonic reasoning, Default reasoning	1. predicate logic, Resolution 2. Resolution in proportional logic and predicate logic

		3.8 statistical reasoning, fuzzy logic Weak and Strong filler structures 3.9 semantic nets, frame 3.10 conceptual dependency, scripts	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

a. Resolution in proportional logic and predicate logic
b. Clause form
c. predicate logic, Resolution.

OEC CE 02.4: Explain how intelligent system works

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Evaluation of Mapping between facts and representations **SO4.2** Understanding the Approaches to knowledge representation **SO4.3** To learn Matching, conflict resolution **SO4.4** To lean about statistical reasoning, fuzzy logic Weak and Strong **SO4.5** Discuss conceptual dependency, scripts		**Unit-4 Knowledge Representation schemes and reasoning**: - 4.1 Mapping between facts and representations 4.2 Approaches to knowledge representation 4.3 procedural vs declarative knowledge 4.5 Forward vs. Backward reasoning 4.6 Matching, conflict resolution 4.7 non-monotonic reasoning, Default reasoning 4.8 statistical reasoning, fuzzy logic Weak and Strong filler structures 4.9 semantic nets, frame	1. procedural vs declarative knowledge 2. procedural vs declarative knowledge

		4.10 conceptual dependency, scripts	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

Ia. Approaches to knowledge representation

b. statistical reasoning, fuzzy logic Weak and Strong filler structures

c. Conceptual dependency, scripts

OEC CE 02.5: Apply basics of Fuzzy logic and neural networks

Approximate Hours

Item	Approx. Hours
CI	**10**
LI	**00**
SW	**02**
SL	**01**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 To Understand Logic the Planning problem **SO5.2** Explain planning graphs **SO5.3** learn this Analysis of planning approaches **SO5.4** To understand conditional planning **SO5.5** Explain Continuous and Multi Agent planning		Unit 5: Planning: 5.1 The Planning problem 5.2 planning with state space search 5.3 partial order planning 5.4 planning graphs 5.4 planning with propositional logic 5.5 Analysis of planning approaches 5.6 Hierarchical planning 5.7 conditional planning 5.8 Continuous and Multi Agent planning 5.9 Hotbeds of AI Innovation 5.10 Hotbeds of AI Innovation	1. planning with state space search 2. Analysis of planning approaches

SW-5 Suggested Sessional Work (SW):

a. Assignments:

a. Continuous and Multi Agent planning

b. planning with state space search
c. Hierarchical planning

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
OEC CE 02.1: Understand the basic concepts and techniques of Artificial Intelligence.	8	2	1	11
OEC CE 02.2: Apply AI algorithms for solving practical problems.	8	2	1	11
OEC CE 02.3: Describe human intelligence and AI	10	2	1	13
OEC CE 02.4: Explain how intelligent system works	10	2	1	13
OEC CE 02.5: Apply basics of Fuzzy logic and neural networks	10	2	1	13
Total Hours	46	10	05	61

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
OEC CE 02.1	Introduction Artificial Intelligence	03	02	03	08
OEC CE 02.2	Problem solving techniques	03	01	05	9
OEC CE 02.3	Logic	03	07	02	12
OEC CE 02.4	Knowledge Representation schemes and reasoning	03	05	05	13
OEC CE 02.5	Planning	03	02	3	08
	Total	15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to satna smart city office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	A Classical Approach to Artificial Intelligence	M.C. Trivedi	Khanna Book Publishing	2019
2.	Artificial Intelligence	A modern approach by Stuart Russel	Pearson Education	2010
3.	Artificial Intelligence	Rich and Knight	The McGraw Hill	2017

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: OEC CE 02
Course Title: Artificial Intelligence

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
OEC CE 02.1: Understand the basic concepts and techniques of Artificial Intelligence.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 02.2: Apply AI algorithms for solving practical	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

problems.																
OEC CE 02.3: Describe human intelligence and AI	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 02.4: Explain how intelligent system works	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 02.5: Apply basics of Fuzzy logic and neural networks	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2, 9,10,12 PSO1,2,3,4	**OEC CE 02.1**: Understand the basic concepts and techniques of Artificial Intelligence.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.**	**As mentioned above**
PO1,2, 9,10,12 PSO2	**OEC CE 02.2**: Apply AI algorithms for solving practical problems.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit2: 2.1,2.2,2.3,2.4,2.5.**	
PO1,2,3,4,5,6 7,8,9,10,11,12	**OEC CE 02.3**: Describe human	SO1.1 SO1.2		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5.**	

PSO1,3	intelligence and AI	SO1.3 SO1.4			
PO1,2, 9,10,12	**OEC CE 02.4**: Explain how intelligent system works	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11**	
PO1,2, 9,10,12	**OEC CE 02.5:** Apply basics of Fuzzy logic and neural networks	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **India (NHAI) 5.1,5.2,5.3,5.4,5.5,5.6,5.7**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra , Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi , Assistant Professor , Dept. of Civil Engineering
4. Mr. Devendra Singh, Assistant Professor , Dept. of Civil Engineering
5. Mrs. Shraddha Panday, Teaching Associate, Dept. of Civil Engineering
6. Mrs. Garima Panday, Teaching Associate, Dept. of Civil Engineering
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Semester-VI

Course Code: **PROJ CE 01**
Course Title: **Engineering Project-I**
Pre-requisite: In depth technical knowledge of various subjects of Civil engineering.
Rationale: Projects provide the chance to put the knowledge gained throughout the course of the degreases. For successful completion of this course, anthesis must be submitted, a seminar presentation must be made, and the whole work must be shown in public. The projects undertaken span a diverse range of topics, including theoretical, simulation and experimental studies.

Course Outcomes:

PROJ CE 01.1: Demonstrate a sound technical knowledge of their selected project topic.

PROJ CE 01.2: Analyze, design and implement solution methodologies

PROJ CE 01.3: Identify problem and formulate a solution for it.

PROJ CE 01.4: utilize system approach to provide engineering solutions.

PROJ CE 01.5: Demonstrate the knowledge, skills and attitudes of a professional engineer.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
PROJ	PROJ CE 01	Project work-I	0	04	0	03	07	2

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA + ESA)
PROJ	PROJCE 01	Engineering Project-I	10	10	10	15	5	50	50	100

Evaluation Method:

The student will give a seminar based on his/her training report, before an expert committee constituted by the Department of Civil Engineering. The evaluation will be based on the following criteria: Quality of content presented. Proper planning for presentation. Effectiveness of presentation. Depth of knowledge and skills. Attendance record, daily diary, departmental reports shall also be analyzed a long with the Internship Report. Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in student.

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Curriculum of B.Tech.(Civil Engineering) Program

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PROJ CE 01
Course Title: Engineering Project-I

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
CO1: Demonstrate a sound technical knowledge of their selected project topic.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO2: Analyze, design and implement solution	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

methodologies																
CO3: identify problem and formulate s solution for it.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO4: utilize system approach to provide Engineering solution s.	1	2	1	2	2	2	1	3	1	2	3	2	1	3	4	2
CO5: Demonstrate the knowledge, skills and Attitudes of a professional engineer	2	3	1	2	1	2	1	2	2	1	2	2	2	2	2	1

Curriculum Development Team

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Revised as on 01 August 2023

Semester-VII

Course Code: **PEC CE 01**
Course Title: **Quantity, Surveying and Costing**
Pre-requisite: A civil engineer can become a quantity surveyor by gaining experience and education in construction project management, cost estimating, and contract administration. This can be achieved through a combination of on-the-job training, continuing education courses, and professional development programs.
Rationale: Quantity surveying refers to the estimation of materials as well as the final cost estimation for any project. Cost estimating is one of the most important steps in project management. Cost estimation establishes the base line of the predicted project cost at different stages of development of the project.

Course Outcomes:

PEC CE 01.1: Introduction of estimation and measurement of different items in building.

PEC CE 01.2: Rate analysis for different types of works.

PEC CE 01.3: Types of estimates and method of estimates Make specifications and prepare tender documents.

PEC CE 01.4: Estimate the material quantities, prepare a bill of quantities, Prepare value estimates.

PEC CE 01.5: valuation of building and rent analysis.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Elective Course	PEC CE 01	Quantity, Surveying and Costing	3	0	2	1	6	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PEC	PEC CE 01	Quantity, Surveying and Costing	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:
This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PEC CE 01.1: Introduction To Quantity Surveying and Casting

Approximate Hours

Item	Approx. Hours
CI	**13**

LI	**00**
SW	**02**
SL	**01**
Total	**16**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Explain Basic terms and importance of estimation. **SO1.2** Define the various components of the building. **SO1.3,** Apply the skills to differentiate the components in the buildings. **SO1.4** Learn about preliminary estimate and methods **SO1.5.** calculate quantity of items		**Unit-1. Introduction** 1.1- Purpose and importance of estimator 1.2- Principal of estimate, 1.3 Types of estimators 1.4-Methods of taking out quantity of items of work 1.5-unit of measurement for different item, 1.6mode of measurement 1.7-measurement sheet 1.8 Abstract sheet, 1.9 bill of quantity 1.10-preliminary estimate 1.11 plinth area method & cubical content rate 1.12-riginal Estimate &Revised Estimate 1.13 supplementary estimate for different projects.	1. Write the role of estimating in civil engineering. 2. Preparing bill 1 of quantity for building estimate

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Prepare measurement sheet and abstract sheet.

b. Mini Project:

I. Take measurement of plinth area of one room single story building.

PEC CE 01.2: Rate analyses

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 To find out actual cost per unit of the item: **SO2.2.** To determine the current rate of an item per unit at the locality **SO2.3** To examine the viability of rates **SO2.4** To calculate labor and equipment quantity required for Project Planning. **SO2.5** To fix up labor contract rates	.	**Unit-2 Rate analyses** 2.1 Task for average artisan, 2.1 various factors involved in the rate of an item, 2.3 material measurement 2.4 Laboure measurements for various trader 2.5 preparation for rate of important items of civil work 2.6 Estimation of rate for excavation, concreting, flooring, masonry, Plastering, painting, 2.7 Estimation of rate for RCC, 2.8 current schedule of rates.	1.Prepare rate list of items in building. ii. Estimate of rate foe excavation

SW-2 Suggested Sessional Work (SW):

a. Assignments:
I. write the factors affecting rate of an item of civil work

b. Mini Project:
I. Prepare rate list of items in civil work according to the market rate.

c. Other Activities (Specify): Quiz

PEC CE 01.3: Detailed Estimate

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO3.1 Reading of Plans, Sections and detailed Drawings Related to buildings; preparation of Quantities and Units **SO3.2** Estimations and Quantity Surveying: Reading of Plans, Sections and detailed Drawings Related to irrigation structures; preparation of Quantities and Units. **SO3.3** Estimations and Quantity Surveying: Reading of Plans, Sections and detailed Drawings Related to Roads structures; preparation of Quantities and Units **SO3.4** Estimations and Quantity Surveying: Reading of Plans, Sections and detailed Drawings Related to Building services preparation of Quantities and Units **SO3.5** Preparing estimate by long wall and as short wall, and Centre line method.		**Unit-3: Detailed Estimate** 3.1-Preparing detailed estimates of various types of buildings, 3.2- Centre line method 3.3 long wall/short wall method, 3.4-preparing detailed estimate for earth work of road, 3.5- Estimate of canals, 3.6- Estimate of culvert, 3.7- Estimate of bridges 3.8-Estimate of water tanks, 3.9 Estimate for services of building for sanitary, electrification and water supply	I. Estimate of one room single story building. ii. Estimate of excavation of road.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Write about long wall and short wall and Centre line method

b- Mini Project: Prepare estimate of two room (4m*5 m) single story building with wall thickness 30cm.

c- Other Activities (Specify): Class test

PEC CE 01.4: Cost of Work

Approximate Hours

Item	Approx. Hours
CI	**07**

LI	**00**
SW	**02**
SL	**02**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 cost of work mainly deals with the estimation, control and planning of the cost of a construction project **SO4.2** It is the process of finding and reducing the expenses of a business in order to attain more profits **SO4.3** Conduct cost analysis for maintenance and repair work. **SO4.4** Find, analyses and find solutions for possible commercial risks. **SO4.5** Developing and maintaining documents that keep track of project costs.		**Unit-4: Cost of work** 4.1 Factors affecting cost of project, 4.2 overhead charges, contingencies and work charge establishment, 4.3 charges for different services in building 4.4 indirect cost, 4.5 cost analyses of projects 4.6 preparation of detailed project report (DPR). 4.7 Detailed specification for item of civil work.	I. Explain different type of cost. ii. Prepare the table of DPR with all work units.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Write the factors affecting rate of items of civil work.

b. Mini Project:

I. Prepare BOQ foe existing building with new rate schedule as per CPWD.

c. Other Activities (Specify):

I. Report making on DPR

PEC CE 01.5: Valuation

Approximate Hours

Item	Approx. Hours
CI	**12**
LI	**00**
SW	**02**

SL	**01**
Total	**15**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 When buying or selling a property, its valuation is required. **SO5.2** To assess the tax of a property, its valuation is required. **SO5.3** In order to determine the rent of a property SO5.4 required for Insurance, Betterment charges, speculations, **SO5.5** determine the amount of compensation		**Unit 5: Valuation** 5.1-Purpose of valuation, 5.2-Depreciation and Sinking fund 5.3-Scrap value and Yearly purchase, 5.4-Type of values, 5.5-Gross income and Net income, 5.6-Fixation of value to a building 5.7-dual rate interest and - method of valuation, 5.8-Rent fixation of building. 5.9 depreciation 5.10 types of depreciation 5.11 types of incomes 5.12 numerical	I. Fixation of rate of single storey two room building. ii. Write method of valuation.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Explain all types of value

b. Mini Project:

I. Find out the scrap value of residential building.

c. Other Activities (Specify):

Visit to a multi-story building which has to break down and then calculate scrap value.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (Ll)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PEC CE 01.1: Introduction of estimation and measurement of different items in building	13	2	2	1	18
PEC CE 01.2: Rate analysis for different types of works	8	2	2	1	13
PEC CE 01.3: Types of estimates and method of estimates Make specifications and prepare tender	9	4	2	2	17

documents.					
PEC CE 01.4: Estimate the material quantities, prepare a bill of quantities, Prepare value estimates.	7	2	2	2	13
PEC CE 01.5: Cost of building and rent valuation analysis.	8	2	2	2	14
Total Hours	45	12	10	08	75

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PEC CE 01.1	Introduction To Quantity Surveying and Casting	03	01	01	05
PEC CE 01.2	Rate analyses	02	03	02	07
PEC CE 01.3	Detailed Estimate	02	04	04	10
PEC CE 01.4	Cost of Work	03	07	05	15
PEC CE 01.5	Valuation	01	06	06	13
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to project manager office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Quantity, Surveying and Costing	Fitzrald and Higgonbothom	Tata McGraw-Hill	Fifth
2.	Theory and Problems of Quantity, Surveying and Costing	D.P. Kothari and I. J. Nagrath	Prentice Hall India Learning Private Limited	2016 - Second
3.	Quantity, Surveying and Costing	D. C. Kulshreshtha	McGraw Hill	2009
4.	Lecture note provided by Dept. of Civil engineering, AKS University, Satna.			

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PEC CE 01
Course Title: Quantity, Surveying and Costing

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PEC CE 01.1: Introduction of estimation and measurement of different items in building	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PEC CE 01.2: Rate analysis for different	2	1	2	3	2	3	2	3	2	3	2	2	1	2	3	2

types of works																
PEC CE 01.3: Types of estimates and method of estimates Make specifications and prepare tender documents.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PEC CE 01.4: Estimate the material quantities, prepare a bill of quantities, Prepare value estimates.	3	3	2	2	1	2	3	2	3	2	3	2	2	3	2	3
PEC CE 01.5: Cost of building and rent valuation analysis.	3	2	3	3	2	2	1	2	3	2	3	2	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 01.1:** Introduction of estimation and measurement of different items in building	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1: Introduction 1.1, 1.2, 1.3, 1.4, 1.5, 1.6,1.7,1.8,1.9,1.10,1.11,1.12,1.13**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 01.2:** Rate analysis for different types of works	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-2: Rate analyses 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8,**	

PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 01.3:** Types of estimates and method of estimates Make specifications and prepare tender documents.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-3: Detailed Estimate 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9,**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 01.4**: Estimate the material quantities, prepare a bill of quantities, Prepare value estimates.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6		**Unit-4: Cost of Work4.1, 4.2,4.3,4.4,4.5,4.6,4.7**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 01.5:** Cost of building and rent valuation analysis.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit 5: Valuation 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8,**	

Curriculum Development Team

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Semester-VI

Course Code: **PEC CE 02**
Course Title: **Water Resource Engineering**
Pre-requisite: To understand the fundamental principles and concepts of planning and Irrigation. To study about different Types of canal Network. To learn the development and floor controls covered.
Rationale: Construction of artificial reservoirs. Groundwater recharge. Drip irrigation systems. Desalination plants. Flood Control Systems.

Course Outcomes:

PEC CE 02.1: Compute mean precipitation, infiltration rate and runoff from a catchment area and work out yield from a well.

PEC CE 02.2: Construct unit hydrograph and S-hydrograph, and compute peak flood flow and design flood for hydraulic structures.

PEC CE 02.3: Workout reservoir capacity using a mass curve, develop idea about reservoir sedimentation and its control.

PEC CE 02.4: Calculate irrigation water requirement for the given cropping pattern in canal command and design of lined canals.

PEC CE 02.5: Suggest measures of water conservation in drought prone areas.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Elective Course	PEC CE 02	Water Resource Engineering	3	0	2	2	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PEC	PEC CE 02	Water Resource Engineering	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PEC CE 02.1: Irrigation water requirement and Soil-Water-Crop relationship

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 What do you mean by Irrigation and their application? **SO1.2** Explain Basic terms and importance of survey operation. **SO1.3** What do you mean by Duty and Delta **SO1.4** What do you mean by Duty and Delta **SO1.5** What do you mean Crop rotation		**Unit –II Ground Water and Well irrigation** 1.1 Irrigation 1.2 definition, necessity, advantages and disadvantages 1.3 types and methods. Irrigation development. 1.4 Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity 1.5 Water logging-causes, effects and its prevention 1.6 Salt efflorescence causes and effects. Reclamation of water logged and salt affected lands 1.7- Types of wells, well construction, 1.8- specific capacity and specific yield 1.9- advantages and disadvantages of well	1.definition and 2. necessity Irrigation Elaborate the Calculation of area 3. types and method of Irrigation.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Write the basic various method of Irrigation.

b. Mini Project:

I. Sketch the plotting an area of project site

c. Other Activities (Specify):

I. Quiz

PEC CE 02.2: Ground Water and Well irrigation**.**

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**

SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Understand the Confined and Un confined aquifer **SO2.2** how to increase the ground water recharge **SO2.3** Which type of well **SO2.4** how to manage water logging in heavy rainfall area		**Unit –II Ground Water and Well irrigation** 2.1 Confined and unconfined aquifers 2.2 aquifer properties 2.3 hydraulics of wells under steady flow Conditions 2.4 Ground water recharge-necessity and methods of improving ground water storage 2.5 Water logging-causes, effects and its prevention 2.6 Salt efflorescence causes and effects. Reclamation of water logged and salt affected Lands 2.7- Types of wells, well construction, 2.8- specific capacity and specific yield 2.9- advantages and disadvantages of well irrigation.	I. Discuss the various type of aquifer ii. Give a brief description of ground water recharge method

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. compare Confined and un confined aquafer

b. Mini Project:

I. Calculate the ground water recharge

c. Other Activities (Specify):

I. Group Discussion

PEC CE 02.3: Hydrology

Approximate Hours

Item	Approx. Hours

CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Apply the knowledge of precipitation and its measurement SO2. How to estimating missing rainfall data, rain gauge SO3.3 Uses of counter plan for rain fall data collection		Unit-3 Hydrology 3.1: Hydrological cycle, 3.2- precipitation and its measurement 3.3- recording and non-recording rain gauges 3.4- estimating missing rainfall data, rain gauge networks, 3.5- mean depth of precipitation over a drainage area, mass rainfall curves 3.6 intensity-duration curves, depth- area duration curves, Infiltration and infiltration indices 3.7- evaporation stream gauging 3.8- run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, 3.9- synthetic unit hydrograph.	I. Prepare the contour maps of the given area in your locality ii. Prepare a run off and its estimation

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. How to work - recording and non-recording

II. Rain gauges

b. Mini Project:

I. Sketch a Graphical Representation of rain fall data.

c. Other Activities (Specify):

I. Class test

PEC CE 02.4: Canals and Structures

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Introductions to Hydraulic Structures **SO4.2.** a knowledge of different type of canal **SO4.3** setting out. Of different type of canal regulation structure		Unit-4: Canals and Structure 4.1 Types of canals 4.2 alignment, design of unlined and lined canals, 4.3 Kennedy's and Lacey's silt theories 4.4 typical canal sections, 4.5canal losses. 4.6 lining-objectives, 4.7 materials used 4.8 Introductions to Hydraulic Structures viz. Dams, Spillways, Weirs 4.9 Canal Regulation Structures.	I. Describe in detail different types of canals ii. Detailed study report on canal loses iii. Write a short note and graphical representation of DAM

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Explain and write the detailed classification Canal structure

b. Mini Project:

I. prepare the detailed note and experiment of different type of canal regulating structure.

c. Other Activities (Specify):

I. poster making in WTP.

PEC CE 02.5: Floods

Approximate Hours

Item	Approx. Hours
CI	**09**

LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Prepare a report on any one of the following. Arial survey, photogrammetric survey, hydrographic survey, military survey and my survey. For flood design **SO5.2** with the help of photographic survey find out flood estimation **SO5.3** Analyze the various types of flood effect in crop		Unit 5: Floods: 5.1-1 Types of floods 5.2- floods and their estimation by different methods. 5.3 floods and their estimation by different methods 5.4- probability and frequency Analysis 5.5- flood routing through reservoirs and channels, 5.6- flood control measures 5.7- economics of flood control. 5.8- Types of floods 5.9 – flood effect in crop	1. Write various types of floods 2. write various types of floods control

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. List the various types of flood control method

b. Mini Project:

I. basic knowledge of flood control measures

c. Other Activities (Specify):

I. quiz

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PEC CE 02.1 Develop understanding about different components of the hydrological cycle and enable the students to estimate runoff, infiltration, evaporation, ground water flow and peak floods.	09	2	2	13
PEC CE 02.2 Develop understanding for reservoir capacity and design principles of embankment dams and gravity dams.	9	2	2	13

PEC CE 02.3- Estimation of irrigation water requirement and understanding of diversion head works and different canal structures.	09	2	2	1.3
PEC CE 02.4: Understand concepts of drought management of canal system	09	2	2	13
PEC CE 02.5: Able to control the accumulation of flood control	09	2	2	13
Total Hours	45	10	10	65

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PEC CE 02.1	Irrigation water requirement and Soil- Water-Crop relationship	03	01	01	05
PEC CE 02.2	Ground Water and Well irrigation	02	06	02	10
PEC CE 02.3	Hydrology	03	07	05	15
PEC CE 02.4	Canals and Structures:	-	10	05	15
PEC CE 02.5	Floods	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to dam site
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Irrigation & Water Power Eng	Punima & Pandey B.B. Lal	TMH	2010

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Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PEC CE 02
Course Title: Water Resource Engineering

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PEC CE 02.1 Develop understanding about different components of the hydrological cycle and enable the students to estimate runoff, infiltration,	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

evaporation, ground water flow and peak floods.																
PEC CE 02.2 Develop understanding for reservoir capacity and design principles of embankment dams and gravity dams.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PEC CE 02.3- Estimation of irrigation water requirement and understanding of diversion head works and different canal structures.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PEC CE 02.4: Understand concepts of drought management of canal system	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
PEC CE 02.5: Able to control the accumulation of flood control	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO1,2,3,4,5,6,7,8,9,10,12 PSO 1,2,3,4	**PEC CE 02.1** Develop understanding about different components of the hydrological cycle and enable the students to estimate runoff, infiltration, evaporation, ground water flow and peak floods.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9**	**As mentioned above**
PO1,2,3,4,5,6,7,8,9,10,12 PSO 1,2,3,4	**PEC CE 02.2** Develop understanding for reservoir capacity and design principles of embankment dams and gravity dams.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2.1. 2.2, 2.3, 2.4, 2.5,2.6,2.7,2.8,2.9,2.10,2.11,2.12,2.12,2.13**	
PO1,2,3,4,5,6,7,8,9,10,12 PSO 1,2,3,4	**PEC CE 02.3-** Estimation of irrigation water requirement and understanding of diversion head	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5,3.6,3.7,3.8,3.9,3.10,3.11**	

	works and different canal structures.				
PO1,2,3,4,5,6,7,8,9,10,12 PSO 1,2,3,4	**PEC CE 02.4**: Understand concepts of drought management of canal system	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,**	
PO1,2,3,4,5,6,7,8,9,10,12 PSO 1,2,3,4	**PEC CE 02.5:** Able to control the accumulation of flood control	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 India (NHAI) 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8**	

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Revised as on 01 August 2023

Semester-VII

Course Code: **PEC CE 03**
Course Title: **CAD Lab**
Pre-requisite: 1. Basic computer knowledge 2. Knowledge of Engineering Graphics 3. Introduction to IT systems
Rationale: Impart the knowledge of CAD commands for drawing 2D building Drawings required for various civil engineering applications

Course Outcomes:

PEC CE 03.1: Develop geometric figures using various commands.

PEC CE 03.2: Apply preliminary settings of CAD work sheet and develop plan of various buildings.

PEC CE 03.3: Develop elevation and section of various type of buildings with detailing.

PEC CE 03.4: Develop rain water harvesting, septic tank drawing and service plan of the building.

PEC CE 03.5: Develop the drawing and service plan of the building.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Elective Course	PEC CE 03	CAD Lab	1	2	2	1	6	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:
Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
PEC	PEC CE 03	CAD Lab	15	20	5	5	5	50	50	100

Scheme of Assessment:
Practical

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)					
			Progressive Assessment (PRA)					
			Class/Home Assignment 7 marks each (CA)	Viva	Class Attendance	Total Marks (CA+VV+AT)	End Semester Assessment (ESA)	Total Marks (PRA+ESA)
PEC	PEC CE 03-L	CAD Lab	35	10	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Sel Sketch a Graphical Representation of rain fall data Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PEC CE 03.1: Develop geometric figures using various commands.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**03**
SW	**02**
SL	**01**
Total	**19**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Develop detailed drawing of rain water **SO1.2** Develop detailed drawings of septic tank **SO1.3** Develop service plan of the building.	1. School building 2. Develop plan of single storied and multi storied buildings School building 3. Hospital building	**UNIT-I** Introduction of CAD 1.1 Develop detailed drawing of rain water 1.2 Develop detailed drawings of septic tank 1.3 Develop service plan of the building.	1. Develop service plan of the building.

SW-1 Suggested Sessional Work (SW):

a. Mini Project:
I. Sketch the plotting an area of project site.

b. Other Activities (Specify):
II. Quiz

PEC CE 03.2: Apply preliminary settings of CAD work sheet and develop plan of various buildings.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**03**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO2.1 Develop plan of single storied and multi storied buildings eg. Residential building **SO2.2** Develop plan of single storied and multi storied buildings eg. Library hall **SO2.3** Town hall	1. Develop detailed drawing of water tank. 2. Develop detailed drawings of septic tank 3. Develop service plan of the building	**Unit –II** Basic commands of CAD 2.1 School building 2.2 Develop plan of single storied and multi storied buildings School building 2.3 Hospital building	1. Develop plan of single storied and multi storied buildings eg. Library hall

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Develop detailed drawings of septic tank.

c. Other Activities (Specify):

II. Group Discussion

PEC CE 03.3: Develop elevation and section of various type of buildings with detailing.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**03**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Develop elevation and sectional views of single storied and multi storied buildings **SO3.2** Develop elevation and sectional views of single storied and multi storied buildings **SO3.3** Develop elevation and sectional views of single storied and multi storied buildings (Eg,	1. Detailing of building components like Doors 2. Detailing of building components like Doors, Windows 3. Detailing of building components like Doors	**Unit-3** Building Services drawing 3.1- Town hall Planning and drawing 3.2- School building Planning and drawing 3.3 Hospital building Planning and drawing	1. Develop elevation and sectional views of single storied and multi storied buildings.

Residential building, Library Hall)			

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. Develop elevation and sectional views of single storied and multi storied buildings.

b. Mini Project:
I. Group Discussion.

PEC CE 03.4: Develop rain water harvesting, septic tank drawing and service plan of the building.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**03**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Develop detailed drawing of rain water **SO4.2** Develop detailed drawings of septic tank **SO4.3** Develop service plan of the building	1. Develop detailed drawing of rain water 2. Develop detailed drawings of septic tank 3. Develop service plan of the building	**Unit 4.0** Water tank drawing 4.1 Develop detailed drawing of water tank 4.2 Develop detailed drawings of septic tank 4.3 Develop service plan of the building	1. Develop service plan of the building

SW-4 Suggested Sessional Work (SW):

a. Assignments:
I. Town hall Planning and drawing

b. Mini Project:
I. PPT presentation.

PEC CE 03.5: Develop the drawing and service plan of the building.

Approximate Hours

Item	Approx. Hours
CI	**03**
LI	**03**
SW	**02**
SL	**01**
Total	**09**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Develop detailed drawing of water tank **SO5.2** Develop detailed drawings of septic tank **SO5.3** Develop service plan of the building	1. Develop detailed drawing of rain water 2 Develop detailed drawings of septic tank 3 Develop service plan of the building	**Unit 5.0** 3-D elevation 5.1 Develop detailed drawing of rain water 5.2 Develop detailed drawings of septic tank 5.3 Develop service plan of the building	1. Develop detailed drawings of septic tank

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. Develop detailed drawing of rain water.

b. Mini Project:

I. Group discussion.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PEC CE 03.1: Develop geometric figures using various commands.	3	3	2	1	9
PEC CE 03.2: Apply preliminary settings of CAD work sheet and develop plan of various buildings.	3	3	2	1	9
PEC CE 03.3: Develop elevation and section of various type of buildings with detailing.	3	3	2	1	9
PEC CE 03.4: Develop rain water harvesting, septic tank drawing and	3	3	2	1	9

service plan of the building.					
PEC CE 03.5: Develop the drawing and service plan of the building.	3	3	2	1	9
Total Hours	15	15	10	05	45

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PEC CE 03.1	Introduction of CAD	03	01	01	05
PEC CE 03.2	Basic commands of CAD	02	03	02	07
PEC CE 03.3	Building Services drawing	02	04	04	10
PEC CE 03.4	Water tank drawing	03	07	05	15
PEC CE 03.5	3-D elevation	01	06	06	13
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to consultancy office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Civil Engineering Drawing	R.S. Malik, G.S. Meo	Computech Publications limited	2017
2.	Building Planning amd Drawing	S.S.Bhavikatti and M.V.Chitawadagi	I.K. International Publishing House pvt ltd.	2017

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Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PEC CE 03
Course Title: CAD Lab

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
PEC CE 03.1: Develop geometric figures using various commands.	1	2	3	2	3	2	3	3	2	3	2	3	2	3	2	3
PEC CE 03.2: Apply preliminary settings of CAD work sheet and develop plan of	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

various buildings.																
PEC CE 03.3: Develop elevation and section of various type of buildings with detailing.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PEC CE 03.4: Develop rain water harvesting, septic tank drawing and service plan of the building.	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3
PEC CE 03.5: Develop the drawing and service plan of the building.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	Cos No. &Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning(SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 03.1:** Develop geometric figures using various commands.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2, 3, 4, 5, 6**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 03.2:** Apply preliminary settings of CAD	SO1.1 SO1.2 SO1.3 SO1.4	**1**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9**	

	work sheet and develop plan of various buildings.				
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 03.3:** Develop elevation and section of various type of buildings with detailing.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**1, 2**	**Unit-3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 03.4**: Develop rain water harvesting, septic tank drawing and service plan of the building.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**1, 2, 3, 4**	**Unit-4: 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11, 4.12, 4.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**PEC CE 03.5:** Develop the drawing and service plan of the building.	SO1.1 SO1.2 SO1.3 SO1.4	**1,2**	**Unit 5: 5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9**	

Curriculum Development Team

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2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
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Semester-VII

Course Code: **PEC CE 04**
Course Title: **Building Planning & Management**
Pre-requisite: To understand the fundamental principles and concepts of planning and architecture for buildings. 2. To study about different views of layout. 3. To learn the development controls covered by building bye laws and national building code for buildings.
Rationale: Building drawing is a means of communication between owner architect, engineer and contractor. Civil engineering has to supervise various construction processes and execute civil Engineering structures. A civil Engineer is required to understand and prepare the drawings. He has to interpret drawings so that he can execute the works. Civil engineer should be competent to convert his ideas into the drawing. Drawing helps in detailing the structures with quality parameters. Drawings are essential for drafting specifications and tender documents. The knowledge of this subject is useful for building construction, estimating and costing, surveying, projects etc.

Course Outcomes:

PEC CE 04 .1: Impart the symbols, sign and conventions from the given drawing.

PEC CE 04 .2: Prepare the line plan of Residential and public Building Using Principal of Planning.

PEC CE 04 .3: Prepare the Submission & working Drawing from the Given requirement for load Bearing structure.

PEC CE 04 .4: Prepare the Submission & working Drawing from the Given requirement for Framed structure.

PEC CE 04 .5: Draw Two- and three-Point Perspective Drawing for given small object

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Elective Course	PEC CE 04	Basic Electrical Engineering	2	0	2	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
Professional Elective Course	PEC CE 04	Building Planning & Management	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

EC CE 04 .1: Drawing of Building Elements

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Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Understanding Architectural Elements **SO1.2** Technical Drawing Skills **SO1.3** Construction Detailing: SO1.4 Building Codes and Regulations: **SO1.5** Develop effective communication skills through graphical representation, enabling clear communication of design intent to other stakeholders in the construction process. **Laboratory**- Drawing of various building element lIKS101e – Foundation, Door and Windows		UNIT-I Drawing of Building Elements 1.1- Drawing of various elements of buildings lIKS101e various types of footing 1.2- open foundation, raft, grillage 1.3 pile and well foundation 1.4- Drawing of frames of doors 1.5 Drawing of frames of Windows 1.6- Drawing of various types of doors 1.7 Drawing of various lintels and arches 1.8- Drawing of various stairs and staircase, trusses, flooring, roofs	1. Sketch of various type of foundation 2. Sketch the various types of door and Windows

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Write the various type of foundation with neat sketch.

b. Mini Project:

I. Draw the line plan of foundation and their type.

c. Other Activities (Specify):

Quiz

PEC CE 04 .2: Building Planning

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**02**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1. Understanding of Building Regulations and Codes **SO2.2** Space Planning and Functionality **SO2.3** Architectural Design Principles S**O2.4** Project Management **SO2.5** Environmental Considerations SO2.6 Familiarity with the use of technology tools and software in building planning, such as computer-aided design (CAD) software. **Laboratory** Conclude the laboratory exercise by summarizing key takeaways and reinforcing the importance of thorough planning in the field of architecture. Encourage participants to further explore building planning concepts and apply them to real-world projects.		**Unit –II Building Planning** 2.1 Classification of buildings 2.2 Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology 2.3 Design and drawing of Building, Design concepts and philosophies 2.4 Preparing sketch plans and working drawings of various types of buildings lIKS101e residential building, institutional buildings and commercial buildings, site plans, presentation techniques 2.5 Principles of planning 2.6 orientation in detailed drawings.	I. Discuss the various type of building code ii. Preparing sketch plans and working drawings of various types of buildings lIKS10 1e residential building, institutional buildings and commercial buildings, site plans, presentation techniques

SW-2 Suggested Sessional Work (SW):

a. Assignments:

a. Describe in detail principal of planning

b. Mini Project: Preparing sketch plans and working drawings of various types
c. of buildings lIKS101e residential building, institutional buildings and commercial buildings, site plans,
d. Other Activities (Specify): Group Discussion

PEC CE 04 .3: Analyse the three phase AC circuits and solve series and parallel magnetic circuits.

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**02**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
Theory **SO3.1** Understanding of Building Services **SO3.2** Plumbing and Sanitary Systems **SO3.3** Building Management Systems (BMS) **SO3.4** ICT (Information and Communication Technology) Infrastructure: **Laboratory** The objective of this laboratory session is to provide hands- on experience and practical knowledge related to building services. This includes understanding and working with various systems that contribute to the functionality and efficiency of buildings.		**Unit-3 Building Services** 3.1 - Introduction of Building Services lIKS101e water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems 3.2- principles of internal & external drainage systems 3.3- principles of electrification of buildings 3.4- tangential system, 3 .5- building safety and security systems, ventilation and lightening and staircases, 3.6 fire safety, thermal insulation, acoustics of buildings.	1. Prepare the layout map of plumbing drawing ii. Prepare a typical drawing of building water harvesting

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I List the accepted standards of water used for domestic purposes on the points discussed.
b. Mini Project: Sketch a Collar joint for Concrete and Asbestos cement pipe jointing.

C. Other Activities (Specify):
Class test

PEC CE 04 .4: Principles of architectural design

Approximate Hours

Item	Approx. Hours
CI	**06**
LI	**00**
SW	**02**
SL	**02**
Total	**10**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1. Innovation and Creativity **SO4.2**Project Development **SO4.3** Site Analysis and Contextual Design **SO4.4** Understanding Design Fundamentals **SO4.5** Develop the ability to critically evaluate architectural designs, both historical and contend		**Unit-4: Principles of architectural design** 4.1 Definition of architecture, factors influencing architectural development 4.2 Principles of architectural composition– Unity, balance, proportion, scale, rhythm, harmony, Accentuation and contrast 4.3 Architectural space and mass, visual and emotional effects of geometric forms 4.4 Space in architecture Positive and negative space. 4.5 Aesthetics: Visual perception. Protective: Protection from climate another element 4.6. architecture a part of the environment. Comfort factors.	1. Draw line plan to satiable scale for any public building 2. Draw the column plan and footing plan of any residential building.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
I. Draw the column plan and footing plan of any residential building.

PEC CE 04 .5: Perspective Drawing and Town Planning.

Approximate Hours

Item	Approx. Hours
CI	**04**
LI	**00**
SW	**02**
SL	**02**
Total	**08**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1Understanding Perspective Drawing Principles **SO5**.2 Integration of Town Planning Concepts **SO5**.3 Critical Thinking and Problem-Solving **SO5**.4 Communication Skills **SO5**.5 Project Development		**Unit 5: Perspective Drawing and Town Planning** 5.1-1 Elements of perspective drawing involving simple problems, one point and two-point perspectives 5.2- energy efficient buildings. 5.3 tilt and height distortion, town planning legislation and municipal acts, panning of control development schemes 5.4- urban financing, land acquisition, slum clearance schemes, pollution control aspects	1.State the requirements of a town planning legislation and municipal acts,.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

I. describe in detail two- and three-point perspective drawing.

b. Mini Project:

I. Hands-on Town Planning Exercise

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instructions (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
02CE302- 1. Impart the symbols, sign and conventions from the given	08	00	02	02	12

drawing					
02CE302- 2. Prepare the line plan of Residential and public Building Using Principal of Planning.	06	00	02	02	10
02CE302 3- Prepare the Submission & working Drawing from the Given requirement for load Bearing structure	06	00	02	02	10
02CE302-4. Prepare the Submission & working Drawing from the Given requirement for Frame	06	00	02	2	10
02CE302-5 Draw Two- and three-Point Perspective Drawing for given small object	04	00	02	02	08
Total Hours	30	00	10	10	50

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PEC CE 04 .1	Drawing of Building Elements	03	01	01	05
PEC CE 04 .2	Building Planning	02	03	02	07
PEC CE 04 .3	Building Services	02	04	04	10
PEC CE 04 .4	Principles of architectural design	01	05	10	15
PEC CE 04 .5	Perspective Drawing and Town Planning	03	06	04	13
	Total	11	23	16	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to consultancy office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Building Design and Drawing	Shah, Kale &Patki	TMH	2010
2.	Building Design and Drawing	MalIKS101 &Moe	LAXMI PUBLICATION (P) LTD	2016 - Second
3.	Building Planning & Management	D. C. Kulshreshtha	Standard Publishers Distributors.	2005
4.	FuArchitecture and Town Planning nd Building Planning Designing and Scheduling amentals of Electrical Engineering	S. C. Agrawal	Dhanpat Rai& Co.	2022
5.	Lecture note provided by Dept. of Civil engineering, AKS University, Satna.			

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PEC CE 04
Course Title: Building Planning & Management

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
02CE302- 1. Impart the symbols, sign and conventions from the given drawing	1	2	3	2	3	2	3	2	3	2	1	2	2	2	2	1
02CE302- 2. Prepare the line plan of Residential and public Building Using	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Principal of Planning.																
02CE302 3- Prepare the Submission & working Drawing from the Given requirement for load Bearing structure	3	2	3	2	2	1	2	3	2	3	2	3	2	2	2	1
02CE302-4. Prepare the Submission & working Drawing from the Given requirement for Frame	2	2	1	2	3	2	3	2	3	2	3	2	3	2	3	3
02CE302-5 Draw Two- and three-Point Perspective Drawing for given small object	3	2	3	2	2	1	2	3	2	3	2	3	2	2	2	1

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**02CE302- 1**. Impart the symbols, sign and conventions from the given drawing	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**Unit 01- 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7**	**Unit-1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7,1.8,1.9,1.10,1.11,1.12,1.13,1.14,1.15,1.16,1.17**	**As mentioned above**
PO:1,2,3,4,5,6,7, 8,9,10,11,12	**02CE302- 2**. Prepare the line	SO1.1 SO1.2	**Unit 02- 2.1, 2.2**	**Unit-2: 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8, 2.9, 2.10, 2.11,**	

PSO 1, 2	plan of Residential and public Building Using Principal of Planning.	SO1.3 SO1.4		**2.12, 2.13**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**02CE302 3-** Prepare the Submission & working Drawing from the Given requirement for load Bearing structure	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	**Unit 03- 3.1, 3.2**	**Unit-3 :** **3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11,**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**02CE302-4**. Prepare the Submission & working Drawing from the Given requirement for Frame	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5 SO1.6	**Unit 04- 4.1, 4.2, 4.3, 4.4**	**Unit-4:** **4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,**	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1, 2	**02CE302-5** Draw Two- and three-Point Perspective Drawing for given small object	SO1.1 SO1.2 SO1.3 SO1.4	**Unit 05- 5.1, 5.2, 5.3**	**Unit 5:** **5.1,5.2,5.3, 5.4, 5.5, 5.6, 5.7, 5.8,**	

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Semester-VII

Course Code: **PEC CE 05**

Course Title: **Construction Planning and Management**

Pre-requisite: Essential aspects of construction planning include the generation of required activities, analysis of the implications of these activities, and choice among the various alternative means of performing activities.

Rationale: Construction management aims to deliver high-quality construction projects in the allotted time and budget while meeting safety standards and the owner's expectations. It establishes systems and procedures to ensure all construction activities are completed according to plan.

Course Outcomes:

PEC CE 05 .1: Understanding the construction project schedules.

PEC CE 05 .2: Analyze methods, materials, and equipment used to construct projects.

PEC CE 05 .3: Understanding the Construction Contracts Understanding the Tenders Understanding the concept of Arbitration Understanding the Legal Requirements.

PEC CE 05 .4: Analyze construction documents for planning and management of construction processes.

PEC CE 05 .5: Understand the legal implications of contract, common, and regulatory law to manage a construction project.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Professional Elective Course	PEC CE 05	Construction Planning and Management	3	0	2	1	7	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PEC	PEC CE 05	Construction Planning and Management	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

PEC CE 05 .1: Preliminary and Detailed Investigation Methods:

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 To determine if there is a need for a full investigation, formal accusation, and trial. **SO1.2** What is scheduling construction? **SO1.**3 What is CPM & PERT with example? **SO1.4** What's the difference between shuttering and centering? **SO1.5** What is layout work in civil engineering?		**Unit –I: Preliminary and Detailed Investigation Methods:** 1.1 Methods of construction 1.2- Form work 1.3 Centering 1.4- Schedule of construction 1.5 Job layout 1.6- Principles of construction management 1.7 Modern management techniques lIKS101e CPM with network analysis. 1.8- Modern management techniques lIKS101e PERT with network analysis. 1.9 Network Solving	1. What are three examples of primary research? 2.What is the difference between CPM and PERT?

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. a Assignments: What is the formula for the critical path method?

b. Mini Project:

I. How do you draw a CPM diagram?

c. Other Activities (Specify):

Quiz

PEC CE 05 .2: Construction Equipment's

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)

SO2.1. Ability to design and conduct experiment as well as analyze and interpret data. SO2.2 What are the salient features of a bulldozer? SO2.3 What is the scope of construction engineering? SO2.4 What equipment is needed for construction work? SO2.5 What is the purpose of equipment?		Unit-2 Construction Equipment's 2.1 Factors affecting selection. 2.2 investment and operating cost. 2.3 Output of various equipment's 2.4 Brief study of equipments required for various jobs such as earth work 2.5 Brief study of equipments required for various jobs such as dredging 2.6 Brief study of equipments required for various jobs such as conveyance 2.7 Brief study of equipments required for various jobs such as concreting 2.8 Brief study of equipments required for various jobs such as hoisting, pile driving 2.9 Brief study of equipment's required for various jobs such as compaction and grouting.	1. What is a construction equipment? 2. What is the most important machine in construction?

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Which is major construction equipments?

b. Mini Project:

What are the types of Construction Equipment maintenance?

c. Other Activities (Specify):

Group Discussion

PEC CE 05 .3: Tenders & Contracts

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 What is the evaluation of tenders? SO3.2 Why is EMD needed in tender? SO3.3 What is difference between bid and tender? SO3.4 What is the purpose of a deposit? SO3.5 What is the contractor agreement?		**Unit-3: Tenders & Contracts** 3.1 Different types of Tenders & Contracts 3.2- Notice inviting tenders 3.3- Contract document 3.4- Departmental method of construction, 3.5- Rate list 3.6- Security deposit and earnest money 3.7- Conditions of contract 3.8- Arbitration 3.9 - Administrative approval, technical sanction.	1. What are the criteria for tender? ii. What is the tender process with government?

SW-3 Suggested Sessional Work (SW):

a. Assignments:
I. What are the different parts of contract condition?
b. Mini Project:
Draw the flow diagram of stages which are used in construction industry.

c. Other Activities (Specify):
Class test

PEC CE 05 .4: Specifications & Public Works Accounts

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 What are the assets in a public work division denotes?		**Unit-4: Specifications & Public Works Accounts** 4.1 Importance, types of	I. How do you deal with measurement errors?

SO4.2. What is the full form of MPWA in accounting? **SO4.3** What is the learning outcome specification? **SO4.4** What is the major purpose of an imprest cash fund? **SO4.5** What happens if measurement book is lost?		specifications 4.2 Specifications for various trades of engineering works. 4.3 Various forms used in construction works 4.4 Measurement book, cash book 4.5 Materials at site account 4.6 Imprest account 4.7 Tools and plants 4.8 Various types of running bills 4.9 Secured advance, final bill.	ii What are the failures in measurement?

SW-4 Suggested Sessional Work (SW):

a. Assignments:
Assignments: What is the standard measurement book and measurement book?

b. Mini Project:
I. How do you write a MB book?

d. Other Activities (Specify):
Class Test

PEC CE 05 .5: Site Organization & Systems Approach to Planning.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**02**
Total	**13**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Students will know the development and the judicial setup of Laboure Laws. **SO5.2** An org chart helps staff learn who owns which areas, who senior staff		**Unit 5: Site Organization & Systems Approach to Planning** 5.1-Accommodation of site staff, contractor's staff 5.2- Various organization charts and manuals 5.3 Personnel in construction,	I. Why are Laboure laws important in human resource management? ii. What is site accommodation?

members are, and the types of departments that exist within the organization. **SO5.3** The main objective of assignment problem is to minimize the total time to complete a set of tasks, or to maximize skill ratings, or to minimize the cost of the assignments. **SO5. 4** eliminating hazards that would otherwise be controlled by either administrative controls or use of personal protective equipment as a barrier between a hazard and a worker. **SO5.5** provision of first aid, protective gear, and safety equipment.		welfare facilities 5.4- Laboure laws and human relations 5.5 Safety engineering 5.6- Problem of equipment management, 5.7- Assignment model, transportation model 5.8 Waiting line modals with their applications. 5.9- Shovel truck performance with waiting line method.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

What are the 4 Laboure laws?

b. Mini Project:

What are organization charts and manuals?

c. Other Activities (Specify):

What are the duties of a safety engineer?

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
PEC CE 05.1: Understanding the construction project schedules.	9	2	1	12
PEC CE 05.2: Analyze methods, materials, and equipment used to construct projects.	9	2	1	12
OEC CE 03.3: Understanding the Construction Contracts Understanding the Tenders Understanding the concept of Arbitration Understanding the Legal Requirements.	9	2	2	13
PEC CE 05.4: Analyze construction documents for	9	2	2	13

planning and management of construction processes.				
PEC CE 05 .5: Understand the legal implications of contract, common, and regulatory law to manage a construction project.	9	2	2	13
Total Hours	45	10	08	63

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PEC CE 05 .1	Preliminary and Detailed Investigation Methods	03	01	01	05
PEC CE 05 .2	Construction Equipments	02	06	02	10
PEC CE 05 .3	Tenders & Contracts.	03	07	05	15
PEC CE 05 .4	Specifications & Public Works Accounts	-	10	05	15
PEC CE 05 .5	Site Organization & Systems Approach to Planning.	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to pwd office
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Construction Engineering and Management	Dr. S. Seetharaman	Umesh Publication	First edition, 2017.
2.	Construction Planning, Equipment, and method	By Robert L. Peurifoy	A. H. Wheeler & Co. Ltd, Allahabad	8 October 2021

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)

Course Code: PEC CE 05

Course Title: Construction Planning and Management

Course Outcomes	**Program Outcomes**												**Program Specific Outcomes**			
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
	Engineering Knowledge	**Problem analysis**	**Design/development of solutions**	**Conducting investigations of complex problems**	**Modern tool usage**	**The engineer and society**	**Environment and sustainability**	**Ethics**	**Individual and team work:**	**Communication**	**Project management and finance**	**Lifelong learning**	**Survey, map and layout of structures**	**Specify, analyse and design structures**	**Plan, analyse and design water structures**	**Modern tools usage for research & employability**
PEC CE 05.1: Understanding the construction project schedules.	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3
PEC CE 05.2: Analyze methods, materials, and equipment used to	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

construct projects.																
OEC CE 03.3: Understanding the Construction Contracts Understanding the Tenders Understanding the concept of Arbitration Understanding the Legal Requirements.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PEC CE 05.4: Analyze construction documents for planning and management of construction processes.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
PEC CE 05 .5: Understand the legal implications of contract, common, and regulatory law to manage a construction project.	2	1	2	3	2	3	2	3	2	3	2	2	1	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**

PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**PEC CE 05.1**: Understanding the construction project schedules.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1.** Preliminary and Detailed Investigation Methods **1.1,1.2,1.3,1.4,1.5.,1.6,1.7,1.8,1.9**	**As mentioned above**
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**PEC CE 05.2**: Analyze methods, materials, and equipment used to construct projects.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2 Construction Equipments 2.1,2.2,2.3,2.4,2.5.2.6,2.7,2.8,2.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03.3**: Understanding the Construction Contracts Understanding the Tenders Understanding the concept of Arbitration Understanding the Legal Requirements.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: Tenders & Contracts 3.1. 3.2, 3.3, 3.4, 3.5,3.6,6.7,3.8,3.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**PEC CE 05.4**: Analyze construction documents for planning and management of construction processes.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4 Specifications & Public Works Accounts 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,**	

PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**PEC CE 05 .5:** Understand the legal implications of contract, common, and regulatory law to manage a construction project.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 Site Organization & Systems Approach to Planning 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,8.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
4. Mr. Devendra Singh, Assistant Professor, Dept. of Civil Engineering
5. Mrs. Shraddha Panday, Teaching Associate, Dept. of Civil Engineering
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Semester-VII

Course Code: **PROJ CE 02**
Course Title: **Engineering Project-II**
Pre-requisite: In-depth knowledge about selected research area.
Rationale: The objective of research project is to identify the Problems related to Civil engineering and develop a solution for respective problem. The students will be able to develop technical mind set to deal different issues related to civil engineering that directly or indirectly affects the society.

Course Outcomes:

PROJ CE 02 .1: Identify the real-world power system problems

PROJ CE 02 .2: Analyze, design and implement solution methodologies.

PROJ CE 02 .3: Apply modern engineering tools for solution

PROJ CE 02 .4: learn about different software development process models, software, engineering principles and develop an ability to apply them to software design of real-life problems.

PROJ CE 02 .5: Write technical reports following professional ethics.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
PROJ	PROJ CE 02	Engineering Project-II	0	10	0	06	16	05

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PROJ	PROJCE 02	Engineering Project-II	10	10	10	15	5	50	50	100

Evaluation Method:

The student will give a seminar based on his/her training report, before an expert committee constituted by the Department of Civil Engineering. The evaluation will be based on the following criteria: Quality of content presented. Proper planning for presentation. Effectiveness of presentation. Depth of knowledge and skills. Attendance record, daily diary, departmental reports shall also be analyzed a long with the Internship Report. Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in student.

AKS University

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Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PROJ CE 02
Course Title: Engineering Project-II

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
CO.1: Identify the real-world power system problems	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO2: Analyze, design and implement solution methodologies	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

CO3: Apply modern engineering tools for solution	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO4: learn about different s software development process models, software, engineering principles and develop an ability to apply them to software design of Real-life problems	1	2	1	2	2	2	1	3	1	2	3	2	1	3	4	2
CO5: Write technical reports following professional ethics	2	3	1	2	1	2	1	2	2	1	2	2	2	2	2	1

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Semester-VII

Course Code: **OEC CE 03**
Course Title: **Design of Steel Structure**
Pre-requisite: The pre requisites for studying the design of steel structures typically include a solid understanding of structural analysis, mechanics of materials, and engineering mathematics. Familiarity with relevant design codes and standards, such as AISC (American Institute of Steel Construction) in the United States of equivalent codes in other regions, is essential. Additionally, a background in civil or structural engineering is often required to grasp the complexities of designing steel structures.
Rationale: Studying the design of steel structures is crucial for several reasons. Steel is a popular construction material due to its strength, versatility and durability. Understanding its design principles allows engineers to create safe and efficient structures for various applications, from buildings to bridges. Additionally, steel structures often need to meet specific codes and standards, making a thorough understanding of design essential to ensure compliance and safety in construction projects

Course Outcomes:

OEC CE 03 .1: Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.

OEC CE 03 .2: Design various tension and compression members.

OEC CE 03 .3: Design flexural members i.e. beams and plate girders.

OEC CE 03 .4: Design of columns and their bases.

OEC CE 03 .5: Design of multi storey frames and gantry girders.

Scheme of Studies:

Category code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective Course	OEC CE 03	Design of Steel Structure	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
OEC	OEC CE 03	Design of Steel Structure	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

OEC CE 03 .1: Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.

Approximate Hours

Item	Approx. Hours
CI	**09**

LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Introduction to steel, various forms, properties and uses. **SO1.2** Different types of connections. **SO1.3** Design of welded, bolted and riveted connections. **SO1.4** Concentric and eccentric connections. **SO1.5** Classification of various steel sections.		**Unit-1.0 Basis of Structural Design and Connection Design** 1.1 Introduction; Metallurgy of steel; Structural properties of steel; 1.2 Design philosophies; Limit state method; Partial load factors; Loading and load combination on structures. 1.3 Local buckling and section classification. 1.4 Types of connections; Welded connections; Types of joints and welds. 1.5 Connection design; Concentric connection; Eccentric connections 1.6 Bolted connections; Force transfer mechanism; Failure mechanism 1.7 Analysis of bolt groups 1.8 Beam column connections 1.9 Shear connection; Moment connection.	1. Know about all the types of rolled steel sections available in the market. 2. Evaluated the load carrying capacity of eccentric connections.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Connections, their types and load carrying capacity of various connections and their efficiencies

b. Mini Project:

I. Prepare a chart representing all the rolled steel sections along with neat sketches and markings

c. Other Activities (Specify):

Show the complete load transfer mechanism in a bolted/riveted connection and a welded connection. Also differentiate and give your comments.

OEC CE 03 .2: Design various tension and compression members.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Tension members and their types. **SO2.2** Strength of tension members i.e. yielding, rupture and block shear. **SO2.3** Compression members and their types. **SO2.4** Concept of slenderness ratio. **SO2.5** Design strength of compression members.		Unit-2 Design of Compression and Tension Members 2.1 Types of tension member. 2.2 Behavior of tension members. 2.3 Design of tension member; yielding; section rupture; Block shear. 2.4 Tension splices; Lug angles; Concept of shear lag. 2.5 Types of compression members. 2.6 Slenderness ratio . 2.7 Basis of current codal provision for compression member design. 2.8 Elastic buckling .2.9 Strength Evaluate the strength of a column with lacings and battens. curves; Design compression members.	1.Enlist various codal provisions for design of tension and compression 2. Evaluate the strength of a column with lacings and battens.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

I. Differentiate between short, intermediate and long columns and evaluate their strengths in bucking. .

b. Mini Project:

Prepare a chart representing various tension and compression members with proper labeling and mention each and every part on it.

c. Other Activities (Specify):

pictures of various tension and compression members in a truss system and also prepare a neat and clean chart with those pictures representing each.

OEC CE 03 .3: Design flexural members i.e. beams and plate girders.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Introduction to beams and its types **SO3.2** Design criteria of beams. **SO3.3** Introduction to plate girders, its parts and design criteria. **SO3.4** Stiffeners and its types. **SO3.5** Design of beam column connections.		**Unit-3: Design of Flexural Members.** 3.1 Introduction to Beam and its types. 3.2 Lateral stability of beams; Lateral torsional buckling of symmetric beams. 3.3 Design strength of Laterally supported and Unsupported beams in bending. 3.4 Shear strength of steel beams. 3.5 Web buckling and crippling 3.6 Design of beams; Built-up beams 3.7 Design of plate girders. 3.8 Types of stiffeners; Flange and web splices. 3.9 Design of beam- columns subjected to combined tension and bending.	I. Different cross sections of beams. 2. Assumptions and mechanisms involved in design of beams.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

I. Properly differentiate between beam and plate girders.

iii. Mention all the parts of a plate girder with neat sketches to support your answer.

iv. Mention all the design steps for designing a plate girder.

b. Mini Project:
Enlist all the types of stiffeners and their uses. Support your answer with neat sketches.

c. Other Activities (Specify):
A hands-on project to design and build a small-scale model of a plate girder bridge.

OEC CE 03 .4: Design of columns and their bases.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Shear Strength and factors affecting it. **SO4.2** Mohr's theory and Mohr Coulomb Theory **SO4.3** Different types of Shear Strength Tests. **SO4.4** Define effective strength parameters and also their determination. **SO4.**5 Triaxial shear test and Unconfined compression test.		Unit-4 Design of Columns and Column Bases 4.1. Introduction to columns and various design criteria's relating to columns. 4.2. Design of single section 4.3. Design of compound section. 4.4. Design of laced and battened type columns. 4.5. Various types of column bases. 4.6 Design of column bases. 4.7 Slab base. 4.8 Gusseted base. 4.9 Grillage foundation	I. Enlist all the important codal provisions required in designing Columns and their bases. ii. Various types of column bases and foundations.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
Draw a typical connection of a column with its base. Show the load transfer mechanism when load transfers from a column to its base.

b. Mini Project:
I. A hands on project to design and build a small-scale model of a column connection to its base.

d. Other Activities (Specify):
Prepare a poster showing various sections of column connections with their bases.

OEC CE 03 .5: Design of multi storey frames and gantry girders.

Approximate Hours

Item	Approx. Hours
CI	**08**
LI	**00**
SW	**02**
SL	**01**
Total	**11**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Introduction to industrial buildings**.** SO5.2 Various types of trusses. **SO5.3** Design of truss systems. **SO5.4** Gantry girders and all its parts **SO5.5** Design of gantry girder.		Unit 5: Design of Industrial Buildings 5.1. Introduction to industrial buildings. 5.2. Frames; Multistory frames. 5.3. Various types of trusses and their selection 5.4. Design of purlin and elements of truss. 5.5. Effect of wind loads on purlin and truss. 5.6. Bracing systems. 5.7. Introduction to gantry girders. 5.8. Parts of a gantry girder. 5.9. Design criteria of a gantry girder.	1.Understand various types of trusses. 2. Know all the parts of a truss and identify the various tension and compression members in a given truss system.

SW-5 Suggested Sessional Work (SW):

a. Assignments:
List the different types of trusses along with neat sketches.
Enlist all the parts of a truss system and also mention use of each.

b. Mini Project:
Prepare a poster depicting all the parts of a gantry girder.

c. Other Activities (Specify):
Prepare a working model of a gantry girder.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
OEC CE 03 .1: Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.	9	2	1	12
OEC CE 03 .2: Design various tension and compression members.	9	2	1	12
OEC CE 03.3: Design flexural members i.e. beams and plate girders.	9	2	1	12
OEC CE 03 .4: Design of columns and their bases.	9	2	1	12
OEC CE 03 .5: Design of multi storey frames and gantry girders.	9	2	1	12
Total Hours	45	10	05	60

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
OEC CE 03 .1	Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.	03	01	01	05
OEC CE 03 .2	Design various tension and compression members.	02	06	02	10
OEC CE 03 .3	Design flexural members i.e. beams and plate girders.	03	07	05	15
OEC CE 03 .4	Design of columns and their bases.	-	10	05	15
OEC CE 03 .5	Design of multi storey frames and gantry girders.	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to industrial workshops
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Fundamentals of Structural Steel Design	Gambhir M. L	McGraw Hill Education	First edition, 2017.
2.	Design of Steel Structures	Dayaratnam P	A. H. Wheeler & Co. Ltd, Allahabad	2008

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: OEC CE 03
Course Title: Design of Steel Structure

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
OEC CE 03 .1: Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.	1	2	3	2	3	2	3	2	3	2	3	1	2	3	2	3
OEC CE 03 .2:	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Design various tension and compression members.																
OEC CE 03.3: Design flexural members i.e. beams and plate girders.	2	1	2	3	2	3	2	3	2	3	2	3	2	3	2	3
OEC CE 03 .4: Design of columns and their bases.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 03 .5: Design of multi storey frames and gantry girders.	3	2	2	1	2	3	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03 .1**: Understand the basic concept of designing steel structural elements and design the riveted, bolted and welded joints.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.,1.6,1.7,1.8,1.9**	**As mentioned above**

PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03 .2**: Design various tension and compression members.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2** **2.1,2.2,2.3,2.4,2.5.2.6,2.7,2.8,2.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03.3**: Design flexural members i.e. beams and plate girders.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3:** **3.1. 3.2, 3.3, 3.4, 3.5,3.6,6.7,3.8,3.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03 .4**: Design of columns and their bases.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4** **4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03 .5:** Design of multi storey frames and gantry girders.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5** **5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,8.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
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Semester-VII

Course Code: **OEC CE 04**
Course Title: **Foundation Engineering**
Pre-requisite: Student should have familiarity with subjects such as structural engineering, geotechnical engineering, soil mechanics, and construction materials. Additionally, a strong grasp of mathematics and physics, as well as skills in problem solving and critical thinking, will contribute to the success in foundation engineering studies.
Rationale: Studying foundation engineering is crucial for several reasons. Foundations are base of any structure, providing stability and support. By understanding foundation engineering, one can ensure the safe and efficient design of buildings and infrastructure. This field involves analyzing soil behavior, considering structural loads, and mitigating risks such as settlement or instability. Proficiency in foundation engineering is vital for constructing resilient and durable structures, preventing foundation failures, and ultimately ensuring the safety and longevity of built environments.

Course Outcomes:

OEC CE 04.1: Understand the types of foundation and evaluate the type of foundation to be used after soil investigation.

OEC CE 04.2: Understand various terminologies related to shallow foundations and their design.

OEC CE 04.3: Understand various terminologies related to deep foundations and their design.

OEC CE 04.4: Evaluate the type of foundation to be used at sites with problematic soil conditions.

OEC CE 04.5: Understand the various forces acting on earth retaining structures and design them accordingly.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective Course	OEC CE 04	Foundation Engineering	3	0	1	1	5	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure
outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
OEC	OEC CE 04	Foundation Engineering	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:
This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

OEC CE 04.1: Understand the types of foundation and evaluate the type of foundation to be used after soil investigation.

Approximate Hours

Item	Approx. Hours
CI	**09**

LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO1.1 Introduction to foundations and its types. SO1.2 Different types of connections. SO1.2 Factors governing selection of foundation SO1.3 Objectives of soil exploration program. SO1.4 Methods of soil exploration. SO1.5 Soil samples and soil samplers.		**Unit-1.0 Selection of foundation and Sub-soil exploration/investigation** 1.1 Introduction to foundation and Types of foundation. 1.2 Factors affecting the selection of type of foundations. 1.3 Steps in choosing types of foundation based on soil condition. 1.4 Objectives and planning of exploration program. 1.5 Methods of exploration-wash boring and rotary drilling-depth of boring. 1.6 Soil samples and soil samplers- representative and undisturbed sampling. 1.7 Field penetration tests: SPT, SCPT, DCPT. 1.8 Introduction to geophysical methods. 1.9 Bore log, report writing.	1. Properties of different types of foundations.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

I. Study different types of foundations and which type of foundation you would suggest for different soil and loading conditions

b. Mini Project:

I. Make a poster representing different types of samplers and which sampler is suggested for different soils.

c. Other Activities (Specify):

Prepare a poster depicting all the geophysical methods of soil exploration.

OEC CE 04.2: Understand various terminologies related to shallow foundations and their design.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO2.1 Introduction to shallow foundations. **SO2.2** Bearing capacity theories. **SO2.3.** Settlement of foundation and its estimation. **SO2.4** Proportioning of footing for equal settlement. **SO2.5** Allowable bearing pressure.		Unit-2 Shallow Foundation 2.1 Introduction to shallow foundations and significant depth 2.2 Design criteria, modes of shear failures. 2.3 1.3 Detail study of bearing capacity theories (Prandtl, Rankine, Terzaghi, 2.4 Bearing capacity determination using IS Code. 2.5 Settlement, components of settlement & its estimation, permissible settlement 2.6 Proportioning of footing for equal settlement. 2.7 Allowable bearing pressure. Bearing capacity from in-situ tests (SPT, 2.8 Factors affecting bearing capacity. 2.9 2Contact pressure under rigid and flexible footings. Floating foundation.	1.Comparison between various design theories of shallow foundation. 2.Factors affecting bearing capacity of soil and footing for different soils

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Write down all the modes of shear failure and explain each.
ii. ii. Differentiate between the pressure distribution below the rigid and flexible footing for cohesive as well as non-cohesive soils.

b. Mini Project:
Preparation of a constant head permeameter model and thus determining the permeability for a soil sample.

c. Other Activities (Specify):
Presentation of a poster depicting all the in-situ tests for determination of bearing capacity of soil.

OEC CE 04.3: Understand various terminologies related to deep foundations and their design.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO3.1 Compaction of soil. **SO3.2** Factors affecting compaction of soil. **SO3.3** Determination of Optimum moisture content and maximum dry density. **SO3.4** Consolidation of soil. **SO3.5** Computation of initial and final settlement of different soil deposits.		**Unit-3: Pile foundations.** 3.1 Introduction to deep foundations and Load transfer mechanism. 3.2 Types of piles and their function. 3.3 Factors influencing selection of pile 3.4 Method of installation of piles and their load carrying characteristics for cohesive and granular soils. 3.5 Piles subjected to vertical loads- pile load carrying capacity from static formula 3.6 Piles subjected to vertical loads- pile load carrying capacity from dynamic formulae (ENR and Hiley) 3.7 Pile load test.	i. Learn about all the types of deep foundations ii. Capacity of piles subjected to horizontal loads iii. Methods of installation of piles.

		3.8 Pile group: carrying capacity, efficiency and settlement. 3.9 Negative skin friction.	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Comparison between shallow and deep foundations.
2. Group action of piles and group efficiency.
3. Static and dynamic formulae for bearing capacity of deep foundations.

b. Mini Project:

Explain the concept behind negative skin friction, all the factors governing it and its effect on the bearing capacity of piles.

c. Other Activities (Specify):

Comparison chart showing the methods of installation of piles and their load carrying characteristics for cohesive and granular soils.

OEC CE 04.4: Evaluate the type of foundation to be used at sites with problematic soil conditions.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO4.1 Introduction to expansive and compressible soils. **SO4.2** Under-reamed pile foundation. **SO4.**3 Design of shootings on expansive and compressible soils. **SO4.4** Introduction to		**Unit-4 Design of Columns and Column Bases** 4.1 Significant characteristics of expansive and collapsible soils. 4.2 Footing on such soils. 4.3 Problems and preventive measure. 4.4 Under-reamed pile foundation. 4.5 Its concept, design & field	Know about all those soils which are not ideal for a footing.

geosynthetic materials SO4.5 Types and functions of geosynthetic materials		installation. 4.6 Introduction to geo- synthetic materials 4.7 Types of geo-synthetic materials. 4.8 Functions of geo- synthetic materials. 4.9 Uses of geo-synthetic materials.	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

I. Describe in detail all the soils which are un favorable for foundations on them.

ii. Describe the measures required to be taken for foundations on expansive soils.

b. Mini Project:

I. Collect an expansive soil sample and determine its shear strength and also suggest the type of footing to be used for that soil condition.

d. Other Activities (Specify):

Power Point Presentation on the types of geo-synthetic materials and their function.

OEC CE 04.5: Understand the various forces acting on earth retaining structures and design them accordingly.

Approximate Hours

Item	Approx. Hours
CI	**09**
LI	**00**
SW	**02**
SL	**01**
Total	**12**

Session Outcomes (SOs)	Laboratory Instructions (LI)	Classroom Instructions (CI)	Self Learning (SL)
SO5.1 Concept of earth pressure. **SO5.2 Active, passive and earth pressure at rest.** **SO5.3** Rankine's and coulombs' theories of design of earth retaining walls		Unit 5: Lateral earth Pressure retaining walls. 5.1 Introduction to earth pressures. 5.2 Active, Passive and Earth pressure at rest. 5.3 Rankine's theory of earth pressure	1. Understand the difference between earth pressure at rest, active and passive earth pressure. 2. Evaluate the safety of retaining walls against overturning

SO5.4 Retaining walls and its types. SO5.5 Stability analysis of earth retaining walls.		5.4 Earth pressures in layered soils. 5.5 Coulomb's earth pressure theory. 5.6 Culmann's graphical method. 5.7 Types of retaining walls. 5.8 Stability of retaining walls against overturning, sliding, 5.9 Bearing capacity and drainage from backfill. Reinforced earth retaining walls.	and sliding.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Understand the difference between earth pressure at rest, active and passive earth pressure.
2. Evaluate the safety of retaining walls against overturning and sliding.

b. Mini Project:

Compare the assumptions and design criteria made by the Rankine and coulomb and also Cullman.

c. Other Activities (Specify):

Prepare a chart depicting the earth pressure distribution in layered soils.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
OEC CE 04.1: Understand the types of foundation and evaluate the type of foundation to be used after soil investigation.	9	2	1	12
OEC CE 04.2: Understand various terminologies related to shallow foundations and their design.	9	2	1	12
OEC CE 03.3: Understand various terminologies related to deep foundations and their design.	9	2	1	12
OEC CE 04.4: Evaluate the type of foundation to be used at sites with problematic soil conditions.	9	2	1	12
OEC CE 04.5: Understand the various forces acting on earth retaining structures and design them accordingly.	9	2	1	12
Total Hours	45	10	05	60

Suggestion for End Semester Assessment

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
OEC CE 04.1	Understand the types of foundation and evaluate the type of foundation to be used after soil investigation.	03	01	01	05
OEC CE 04.2	Understand various terminologies related to shallow foundations and their design.	02	06	02	10
OEC CE 04.3	Understand various terminology related to deep foundations and their design.	03	07	05	15
OEC CE 04.4	Evaluate the type of foundation to b used at sites with problematic soi conditions.	-	10	05	15
OEC CE 04.5	Understand the various forces actin on earth retaining structures an design them accordingly.	03	02	-	05
	Total	11	26	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Visit to construction site
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books

S. No.	Title	Author	Publisher	Edition &Year
1.	Text book of Soil Mechanics and Foundation Engineering	Murthy, V.N. S	CBS Publishers Distribution Ltd., NewDelh	2014
2.	Soil Mechanics and Foundation Engineering	Arora, K.R.	Standard Publishers and Distributors, New Delhi	7thEdition,2017(Reprint
3.	Soil Mechanics and Foundations	Punima, B.C.	Laxmi Publications Pvt. Ltd. New Delhi	16th Edition 2017.

AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: OEC CE 04
Course Title: Foundation Engineering

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
OEC CE 04.1: Understand the types of foundation and evaluate the type of foundation to be used after soil investigation.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 04.2:	2	1	2	3	2	3	2	3	2	3	2	3	2	3	2	3

Understand various terminologies related to shallow foundations and their design.																
OEC CE 03.3: Understand various terminologies related to deep foundations and their design.	3	2	3	2	2	2	1	2	3	2	3	2	3	2	3	2
OEC CE 04.4: Evaluate the type of foundation to be used at sites with problematic soil conditions.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
OEC CE 04.5: Understand the various forces acting on earth retaining structures and design them accordingly.	2	1	2	3	2	3	2	3	2	3	2	3	2	1	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 04.1**: Understand the types of foundation and evaluate the type	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. 1.1,1.2,1.3,1.4,1.5.,1.6,1.7,1.8,1.9**	**As mentioned above**

	of foundation to be used after soil investigation.				
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 04.2**: Understand various terminologies related to shallow foundations and their design.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2 2.1,2.2,2.3,2.4,2.5.2.6,2.7,2.8,2.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 03.3**: Understand various terminologies related to deep foundations and their design.	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: 3.1. 3.2, 3.3, 3.4, 3.5,3.6,6.7,3.8,3.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 04.4**: Evaluate the type of foundation to be used at sites with problematic soil conditions.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 4 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**OEC CE 04.5:** Understand the various forces acting on earth retaining structures and design them accordingly.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-5 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,8.9**	

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Curriculum Development Team

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Semester-VII

Course Code: **SEM CE 03**
Course Title: **Seminar**
Pre-requisite: Students should have basic knowledge on design and presentation of technical seminar.
Rationale: The student possesses knowledge of the processes involved in the manufacture of cement and concrete. Additionally, the student should be familiar with the latest trends in cement manufacturing and the challenges faced by the cement industry. Presenting the latest technological advancements in cement manufacturing is essential for the seminar.

Course Outcomes:

SEM CE 03.1: Identification and objective of the seminar topic, along with a literature review that includes recent technological trends.

SEM CE 03.2: In-depth analysis and interpretation of technical data related to the seminar topic, including case studies and practical implementation examples.

SEM CE 03.3: Preparation and delivery of the seminar presentation, including a question-and-answer session.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
PROJ	SEM CE 03	Seminar	0	6	0	1	3	3

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT+ AT)	End Semester Assessment	Total Marks (PRA + ESA)
PROJ	SEM CE 03	Seminar	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

Course Outcome	Activities	Time Schedule (in hours)	
		Class Activity Per week (1 Credit)	Self-Learning /Home activity Per week
SEM-CE03.1: Identification and objective of the seminar topic, along with a literature review that includes recent technological trends.	1. Introduction and fundamentals Seminar 2. SO1. Objectives of the Seminar 3. SO2. Identification and Overview of Topics to be Covered 4. SO3.Importance and Relevance of the Seminar in Current Industry Trends SO4. Introduction to the Technical Field 5. SO5. Basic Concepts and Terminology 6. SO6.Historical Development and Milestones	6	5

	7. SO7. Current State of the Technology		
SEM-CE03.2: In-depth analysis and interpretation of technical data related to the seminar topic, including case studies and practical implementation examples	2.0 In-depth Technical Sessions and preparation of presentation SO2.1. Module 1: Advanced Theoretical Concepts - Key Theories and Principles - Mathematical Foundations - Models and Algorithms SO, 2.2 Module 2: Practical Applications - Industry Applications - Case Studies - Real-world Scenarios SO, 2.3 Module 3: Practical Implementation - Step-by-step Guide to Solving a Problem - Coding and Development - Debugging and Optimization	14	15
SEM-CE03.3: Preparation and delivery of the seminar presentation, including a question-and-answer session.	Preparation of seminar content in proper presentation format and seminar presentation SO3.1 Presentation and Quartion answer session SO3.2 Seminar feedback and over view	10	10
	Total	30	30

Suggestion for End Semester Assessment

COURSE OUTCOME	**Unit Titles**	**Marks Distribution**			**Total Marks**
		R	**U**	**A**	
SEM-CE03.1: Identification and objective of the seminar topic, along with a literature review that includes recent technological trends**.**	Introduction and fundamentals Seminar	05	05	00	010
SEM-CE03.2: In-depth analysis and interpretation of technical data related to the seminar topic, including case studies and practical implementation examples	n-depth Technical Sessions and preparation of presentation	00	10	05	15
SEM-CE03.3: Preparation and delivery of the seminar presentation, including a question-and-answer session	Preparation of seminar content in proper presentation format and seminar presentation	00	10	15	25
	Total	05	25	20	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method Group Discussion
4. Role Play
5. Demonstration
6. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT Blog, Facebook, Twitter, WhatsApp, Mobile, online sources)
7. Brainstorming

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: SEM CE 03
Course Title: Seminar

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
SEM-CE03.1: Identification and objective of the seminar topic, along with a literature review that includes recent technological trends.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

SEM-CE03.2: In-depth analysis and interpretation of technical data related to the seminar topic, including case studies and practical implementation examples	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
SEM-CE03.3: Preparation and delivery of the seminar presentation, including a question-and-answer session	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

Legend:1–Low,2–Medium,3-High

Course Curriculum Map

Pos &PSOs No.	**Cos No. &Titles**	**SOs No.**	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	SEM-CE03.1: Identification and objective of the seminar topic, along with a literature review that includes recent technological trends**.**	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. Introduction and fundamentals Seminar 1.1,1.2,1.3,1.4,1.5.,1.6,1.7,1.8,1.9**	**As mentioned in page number 2 TO 6**

PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**SEM-CE03.2:** In-depth analysis and interpretation of technical data related to the seminar topic, including case studies and practical implementation examples	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit- 2 In-depth Technical Sessions and preparation of presentation 2.1,2.2,2.3,2.4,2.5.2.6,2.7,2.8,2.9**	
PO1,2,3,4,5,6,7,8 9,10,12 PSO1,2,3,4	**SEM-CE03.3:** Preparation and delivery of the seminar presentation, including a question-and-answer session	SO1.1 SO1.2 SO1.3 SO1.4		**Unit-3: Preparation of seminar content in proper presentation format and seminar presentation 3.1. 3.2, 3.3, 3.4, 3.5,3.6,6.7,3.8,3.9**	

Curriculum Development Team

1. Mr. Vishutosh Bajpai, Assistant Professor, Dept. of Civil Engineering
2. Mr. Aditya Budhadhra, Assistant Professor, Dept. of Civil Engineering
3. Mrs. Richa Tripathi, Assistant Professor, Dept. of Civil Engineering
4. Mr. Devendra Singh, Assistant Professor, Dept. of Civil Engineering
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AKS University

Faculty of Engineering and Technology

Department of Civil Engineering

Curriculum of B.Tech.(Civil Engineering) Program

Revised as on 01 August 2023

Semester-VIII

Course Code: **PROJ/OJT CE 04**
Course Title: **Engineering Project-III**
Pre-requisite: Knowledge of subjects of civil engineering,
Rationale: Students get the chance to apply the abilities they have learnt in the classroom through internships. Students should also be given the chance to improve such abilities, get in sight in to the working world, and profit from the knowledge and counsel of mentors or supervisors.

Course Outcomes:

PROJ/OJT CE 04.1: Engage in industry initiatives as part of the internship.

PROJ/OJT CE 04.2: Demonstrate how to use the sophisticated equipment and methods the used during their internship.

PROJ/OJT CE 04.3: Engage with employees of the industry while maintaining the discipline and engineering processes that are required

PROJ/OJT CE 04.4: Gain knowledge of appropriate workplace on duct and strength and their ability to operate in a team and with others.

PROJ/OJT CE 04.5: Create expert work report and presentations.

Scheme of Studies:

Category Code	Course Code	Course Title	Scheme of Studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
PROJ	PROJ/OJT CE 04	Engineering Project-III	0	0	0		0	12

Legend:

CI: Class room Instruction (Includes different instructional strategies. Lecture (L) and Tutorial (T)and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Category Code	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)							
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	End Semester Assessment	Total Marks (PRA+ESA)
PROJ	PROJ/OJT CE 04	Engineering Project-III	0	0	0	0	0	0	100	100

Evaluation Method:

The student will give a seminar based on his/her training report, before an expert committee constituted by the Department of Civil Engineering. The evaluation will be based on the following criteria: Quality of content presented. Proper planning for presentation. Effectiveness of presentation. Depth of knowledge and skills. Attendance record, daily diary, departmental reports shall also be analyzed a long with the Internship Report. Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in student.

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COs, POs and PSOs Mapping

Program Title: B.Tech. (Civil Engineering)
Course Code: PROJ OJT CE 04
Course Title: Engineering Project-III

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering Knowledge	Problem analysis	Design/development of solutions	Conducting investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work:	Communication	Project management and finance	Lifelong learning	Survey, map and layout of structures	Specify, analyse and design structures	Plan, analyse and design water structures	Modern tools usage for research & employability
CO1: Engage in industry initiatives as part of their internship.	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO2: Demonstrate how to see the sophisticated equipment and	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3

methods the used during training																
CO3 Engage with employees of the industry while maintaining the Discipline and engineering processes that are required	3	2	3	2	2	1	2	3	2	3	2	3	2	3	2	3
CO4: Gain knowledge of appropriate workplace conduct and strength ability to operate in a team And with others.	1	2	1	2	2	2	1	3	1	2	3	2	1	3	4	2
CO5: Create expert work report sand presentations	2	3	1	2	1	2	1	2	2	1	2	2	2	2	2	1

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