



Your Dreams Our Goal
POORNIMA
UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)



**FACULTY OF ENGINEERING AND
TECHNOLOGY
PROGRAM: B.TECH**

**SCHEME & SYLLABUS
BOOKLET**

BATCH: 2025-2029

SCHEME & SYLLABUS (2025-2029)

**FACULTY OF ENGINEERING AND
TECHNOLOGY
PROGRAM: B. TECH**

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Disclaimer: The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.



Your Dreams Our Goal **POORNIMA** **UNIVERSITY**

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

Vision

Our vision is to create knowledge-based society with scientific temper, team spirit and dignity of labour to face global competitive challenges.

Mission

Our mission is to evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide quality education through faculty development, updating of facilities and continual improvement for meeting norms laid down by the government, keeping the stakeholders satisfied. Poornima University has forged industrial alliances with Top MNC's worldwide which assures high educational standards, up to- date and forward-thinking curricula, and professional relevance. At Poornima University you will have a distinct advantage through exposure to the corporate standard environment through industry sponsored infrastructure and expert faculty. The University involves global industry leaders in many ways.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



About Program and Program Outcomes (PO):

Title of the Program: Bachelor of Technology (B.Tech)

Nature of the Program: B.Tech is a full-time four-year program.

Program Outcomes (POs):

Graduates will be able to:

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 receive 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 projects 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):

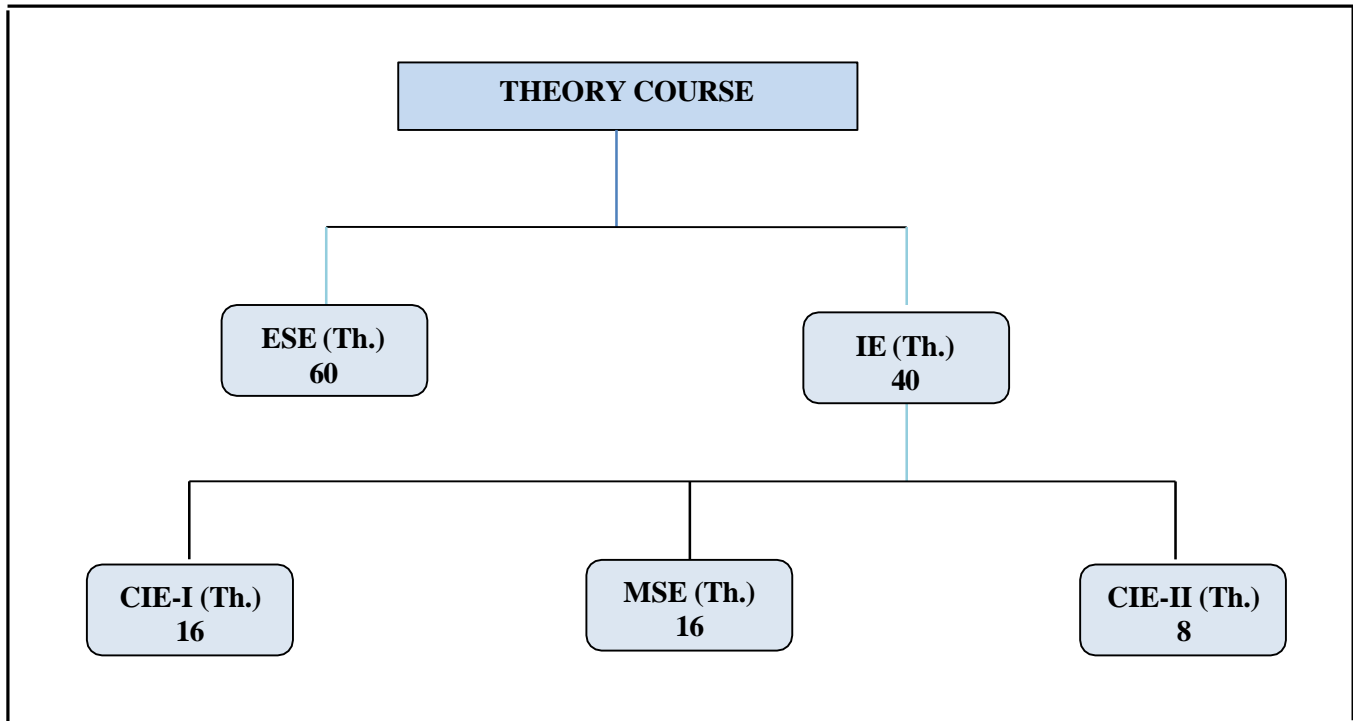
PSO1: Capability to manage large infrastructure projects ensuring safe and cost-effective execution of projects having knowledge of fast track construction and project management.

PSO2: Ability to use building software packages to calculate safe loads and stresses for designing structural members to ensure safety and serviceability.

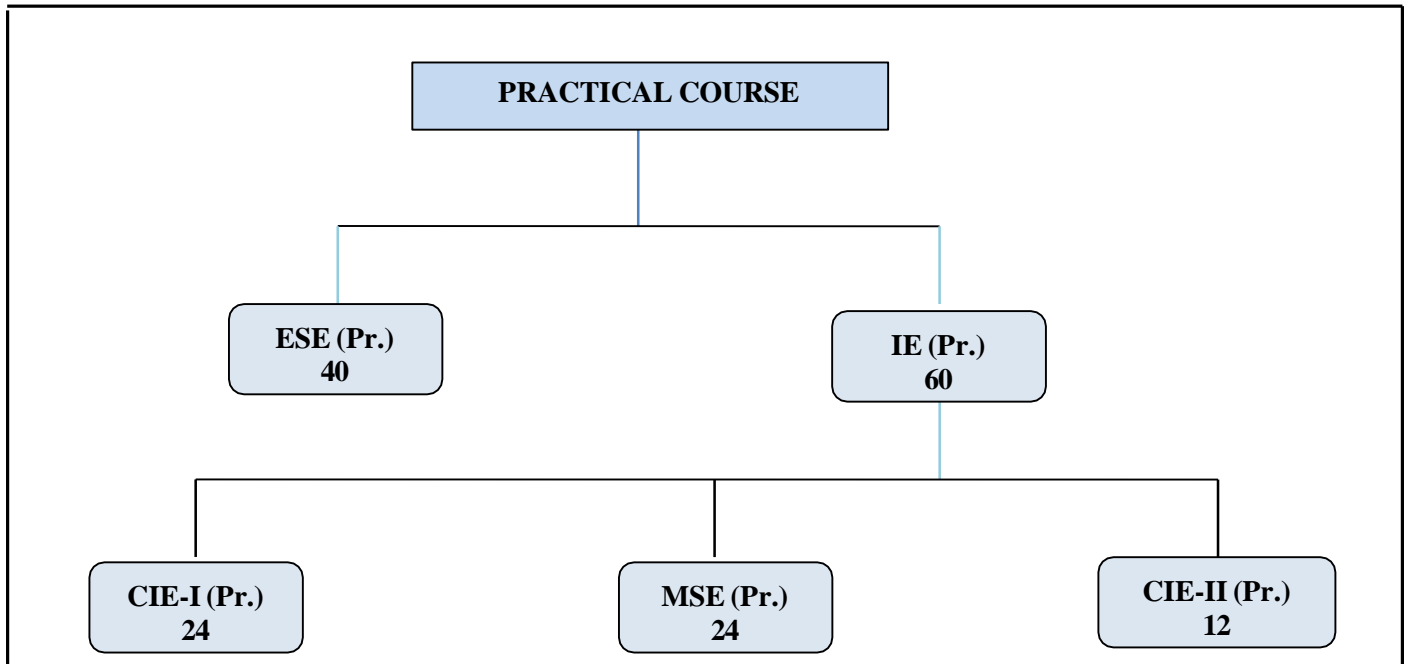
PSO3: Ability to provide innovative solutions for traffic safety and efficiency through intelligent transportation systems, and mitigate the environmental impact of construction by adopting green building concepts.

Examination System:

Marks Distribution of Theory Course:



A. Marks Distribution of Practical Course:



Th.: Theory, **Pr.:** Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

CO Wise Marks Distribution:

Exam Entity	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I	16 (8 + 8)	1 & 2	1 & 2	24 (12 + 12)
MSE	16 (8 + 8)	3 & 4	3 & 4	24 (12 + 12)
CIE-II (Activity/ Assignment)	8 (8)	5	5	12 (12)
ESE	60	-	-	40
TOTAL	100	-	-	100

Minimum Passing Percentage in All Exams:

S. No.	Program Name	Minimum Passing Percentage in		
		IE Component	ESE Component	Total Component
1	Course Work for PhD Registration	-	-	50%
2	B. Arch., FIRE Dept. (BBA, B. Com., MBA)	-	45%	50%
3	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	-	40%	40%
4	B. Tech., B. Des., BVA, BCA, B.Sc., BBA, B.Com., B.A. & any other program	-	35%	35%

SGPA Calculation

$$SGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i ,

G_i is the Grade Point for the subject I and $i = 1$ to n ,

n = number of subjects in a course in the semester

CGPA Calculation

$$CGPA = \frac{C_1G_1 + C_2G_2 + \dots + C_nG_n}{C_1 + C_2 + \dots + C_n}$$

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i ,

G_i is the Grade Point for the subject I and $i = 1$ to n ,

n = number of subjects in a course of all the semesters up to which CGPA is computed

Grading Table:

Table-A

Applicable for B.Arch., FIRE Courses
(BBA, B.Com, MBA), & PhD. Course Work

Table-B

Applicable for All Courses except Table-A

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	$90 \leq x \leq 100$
Excellent	A+	9	$80 \leq x < 90$
Very Good	A	8	$70 \leq x < 80$
Good	B+	7	$60 \leq x < 70$
Above Average	B	6	$50 \leq x < 60$
Fail	F	0	$x < 50$
Absent	Ab	0	Absent

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	$90 \leq x \leq 100$
Excellent	A+	9	$80 \leq x < 90$
Very Good	A	8	$70 \leq x < 80$
Good	B+	7	$60 \leq x < 70$
Above Average	B	6	$50 \leq x < 60$
Average	C	5	$40 \leq x < 50$
Pass*	P	4	$35 \leq x < 40$
Fail	F	0	$x < 35$
Absent	Ab	0	Absent

* Not applicable for master programs

CGPA to percentage conversion rule:

$$\text{Equivalent \% of Marks in the Program} = \text{CGPA} * 10$$

Award of Class

CGPA	Percentage	Equivalent Division
$7.50 \leq \text{CGPA}$	75% or more	First Division with Distinction
$6.00 \leq \text{CGPA} < 7.50$	$60\% \leq x < 75\%$	First Division
$5.00 \leq \text{CGPA} < 6.00$	$50\% \leq x < 60\%$	Second Division
$4.00 \leq \text{CGPA} < 5.00$	$40\% \leq x < 50\%$	Pass Class

Guidelines for Massive Open Online Courses (MOOCs)

(Session 2023-24)

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM-NPTEL.

1. Introduction of MOOCs: SWAYAM-NPTEL

About SWAYAM-NPTEL

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

Some highlights:

- Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects
- YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers
- More than 56000 hours of video content, transcribed and subtitled
- Most accessed library of peer-reviewed educational content in the world
- Translation of more than 12000 hrs of English transcripts in regional Indian languages

NPTEL Online Certification:

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.

Some statistics regarding the open online courses since March 2014 till Dec 2021

Completed courses: 3496;

Enrollments across courses: 1.58 CRORE +

Number of exam registrations: 15.1 LAKH +

All the statistics pertaining to completed courses are available at <https://beta.nptel.ac.in/courses>.

All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

2. MOOCs at Poornima University:

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

(a) MOOCs as Credit Courses

(For this document, only those MOOCs will be considered which are available only on NPTEL platforms)

- Credit and Non-credit SWAYAM-NPTEL MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.
- As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards): Open Elective (for batches entered till 2022) courses were available at University level in offline mode till 2022-23 for which relevant booklets were published. From session 2023-24, Multidisciplinary Courses are introduced in lieu of open elective courses as per NEP 2020. These courses carry 02 credits. These category/type of courses (similar/different) are available as MOOC courses on SWAYAM-NPTEL platform which are being introduced from session 2023-24 onwards for all the students. The respective Deans / HODs shall provide all the information to all the students pertaining to MOOCs as per details given below:
 1. Deans / HODs shall prepare a list of up to 10 appropriate MOOC courses (From NPTEL Only) of Minimum 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
 2. After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits (only 02) of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.
 3. The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean and provide the academic support to students as per requirement.

(b) Important points related to MOOCs at Poornima University

- Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.
- No attendance will be taken for MOOC courses.
- The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no internal exam (IE component) will be conducted by the department as well as by the Examination Cell.
- The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.
- The center of examination for MOOCs will be finalized by SWAYAM-NPTEL. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.
- NPTEL will award a certificate to all the students passing the examination.
- The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.
- An ESE Exam of each said MOOC course will also be conducted by the University as per University norms.
- The award of marks/grading will be computed as given below:

Award of marks/grading	Remarks
1. 20% weightage taken from MOOC Certificate +80% weightage taken from ESE Exam of Poornima University OR 2. 100% of weightage taken from MOOC Certificate Note: The Higher Marks/Grades of the above two will be considered	The Certificate of MOOC to be Submitted as per date notified by COE, Poornima University

- Any student who would not be able to clear/pass the said course, will be required to appear as a back exam candidate of the University as per PU norms. Students who have not passed the MOOC exam are required to register and participate in the next semester for either the same subject or a similar subject (Ensuring at least 60% of the syllabus matches with the back subject and also approved by respective Dean) offered through NPTEL.
- The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.
- The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.
- There will be no provision of re-evaluation of MOOC.

NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.

Attached Items:

Ability Enhancement Courses	Annexure-1
Value Added Course Booklet	Annexure-2

POORNIMA UNIVERSITY, JAIPUR
Faculty of Computer Science and Engineering
Faculty of Engineering and Technology

Name of Program: B.Tech. (Common for all) Duration: 4 Years Total Credits: 171

Teaching Scheme for Batch 2025-2029

Semester-I

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BTXCSA1101/ BTXCSA1102	Engineering Physics / Engineering Chemistry	3	-	-	40	60	100	3
BTXCCE1103	Programming in C	3	-	-	40	60	100	3
BTXCCV1104/ BTXCEE1105	Basics of Civil Engineering / Basics of Electrical and Electronics Engineering	3	-	-	40	60	100	3
BTXCSA1106/ BTXCME1107	Engineering Mathematics / Basic of Mechanical Engineering	3	-	-	40	60	100	3
A.2	Practical							
BTXCSA1201/ BTXCSA1202	Engineering Physics lab / Engineering Chemistry lab	-	-	2	60	40	100	1
BTXCCE1203	Programming in C Lab	-	-	2	60	40	100	1
BTXCCV1204/ BTXCEE1205	Computer Aided Design (CAD)/ Basics of Electrical and Electronics Engineering Lab	-	1	2	60	40	100	1
BTXCME1206/ BTXCME1207	Workshop Practice/ Engineering Graphics	-	1	2	60	40	100	1
BTXCCE1208	Exploratory Project-1	-	-	2	60	40	100	1
B.		Minor Stream Courses/ Department Electives						
B.1	Theory	-	-	-	-	-	-	-
B.2	Practical	-	-	-	-	-	-	-
C		Multidisciplinary Courses						
	-	-	-	-				
D		Ability Enhancement Courses (AEC)						
BEACHM1205	Applied English Communication Skills-I	-	-	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BELCSE1201	Skill Enhancement Course-I	-	-	2	60	40	100	1
F		Value Added Courses (VAC)						
BUVCSA1102	Environmental Studies	2	-	-	40	60	100	2
G		Summer Internship / Research Project / Dissertation						
Total		14	2	14				21
Total Teaching Hours		30						

POORNIMA UNIVERSITY, JAIPUR
Faculty of Computer Science and Engineering
Faculty of Engineering and Technology

Name of Program: B.Tech. (Common for all) Duration: 4 Years Total Credits: 171

Teaching Scheme for Batch 2025-29

Semester-II

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BTXCSA2101 / BTXCSA2102	Engineering Physics / Engineering Chemistry	3	-	-	40	60	100	3
BTXCCE2103/	Introduction to Web Technology/ Programing in Python	3	-	-	40	60	100	3
BTXCCV2104/ BTXCCE2105	Basic of Civil Engineering / Basics of Electrical and Electronics Engineering	3	-	-	40	60	100	3
BTXCSA2106/ BTXCME2107	Engineering Mathematics / Basic of Mechanical Engineering	3	-	-	40	60	100	3
A.2	Practical							
BTXCSA2201/ BTXCSA2202	Engineering Physics lab / Engineering Chemistry lab	-	-	2	60	40	100	1
BTXCCE2203	Introduction to Web Technology Lab/ Programing in Python	-	-	2	60	40	100	1
BTXCCV2204/ BTXCCE2205	Computer Aided Design (CAD)/ Basics of Electrical and Electronics Engineering Lab	-	-	2	60	40	100	1
BTXCME2206/ BTXCME2207	Workshop Practice/Engineering Graphics	-	-	2	60	40	100	1
BTXCCE2208	Exploratory Project-2	-	-	2	60	40	100	1
B.		Minor Stream Courses/ Department Electives						
B.1	Theory							
BTXEME2116	Professional Elective - I	2	-	-	40	60	100	2
B.2	Practical							
	Nil	-	-	-	-	-	-	
C		Multidisciplinary Courses						
	MOOC Course-I	2	-	-				2
D		Ability Enhancement Courses (AEC)						
BEACHM2212	Quantitative & Verbal Aptitude Training-I	0	0	2	60	40	100	1

E		Skill Enhancement Courses (SEC)						
BELCSE2201	Skill Enhancement Course-II	-	-	2	60	40	100	1
F		Value Added Courses (VAC)						
	NIL							
G		Summer Internship / Research Project / Dissertation						
		-	-	-				
Total		16	0	14				23
Total Teaching Hours		30						

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B. Tech. Civil Engineering			Duration: 4 Years			Total Credits: 171		
<u>Teaching Scheme for Batch 2025-29</u>								
Semester-III								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCSA3101	Engineering Mathematics - II	3	0	0	40	60	100	3
BCVCCV3102	Fluid Mechanics	3	0	0	40	60	100	3
BCVCCV3103	Strength of Material	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV3201	Fluid Mechanics Lab	0	0	2	60	40	100	1
BCVCCV3202	Material Testing Lab	0	0	2	60	40	100	1
BCVCCV3203	Industrial application of CADD Lab	0	0	2	60	40	100	1
BCVCCV3204	Structural Drawing Lab	0	0	2	60	40	100	1
BCVCCV3205	Technical Seminar	0	0	2	60	40	100	1
B.		Minor Stream Courses / Department Electives						
B.1	Theory (Any one)							
BCVECV3111	Building Material & Construction	3	0	0	40	60	100	3
BCVECV3112	Sustainable Construction	3	0	0	40	60	100	
BCVECV3113	Building Regulations Bylaws	3	0	0	40	60	100	
B.2	Practical							
	-							
C		Multidisciplinary Courses						
	MOOC Course-II	2	0	0				2
D		Ability Enhancement Courses (AEC)						
BUACHM3215	Professional Skills-I	0	0	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BULCSE3201	Skill Enhancement Generic Course-III	0	0	2	60	40	100	1
F		Value Added Courses (VAC)						
BUVCVE3104	Green Built Environment	2	0	0	40	60	100	2
G		Summer Internship / Research Project / Dissertation						
	Total	16		14				23
Total Teaching Hours		30/30						

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-IV								
Course Code		Teaching Scheme			Marks Distribution			Credits
	Name of Course	Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCCV4101	Structure Analysis-I	3	0	0	40	60	100	3
BCVCCV4102	Surveying	3	0	0	40	60	100	3
BCVCCV4103	Concrete and Construction Technology	3	0	0	40	60	100	3
BCVCCV4104	Energy Efficiency in Buildings	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV4201	Surveying Lab	0	0	2	60	40	100	1
BCVCCV4202	Concrete Lab	0	0	2	60	40	100	1
BCVCCV4203	3-D Structural planning Lab	0	0	2	60	40	100	1
		Minor Stream Courses / Department Electives						
B.1	Theory							
BCVECV4111	Sustainability in Building Design and Construction	3	0	0	40	60	100	3
BCVECV4112	Admixture & Special Concrete	3	0	0	40	60	100	
BCVECV4113	Green Building Design	3	0	0	40	60	100	
B.2	Practical							
C		Multidisciplinary Courses (MC)						
	MOOC Course-III	2	0	0	40	60	100	2
D		Ability Enhancement Courses (AEC)						
BUACHM4224	Human Values and Professional Ethics	0	0	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BCVCSE4202	SETC-I	0	0	2	60	40	100	2
F		Value Added Courses (VAC)						
	-	-	-	-				
G		Summer Internship / Research Project / Dissertation						
Total		17	0	10				23
Total Teaching Hours								

	POORNIMA UNIVERSITY, JAIPUR							
	Faculty of Engineering and Technology							
	Name of Program: B.Tech. in Civil Engineering Duration: 4 years Total Credits: 171							
	Teaching Scheme for Batch 2025-29							
	Semester-V							
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCCV5101	Structural Analysis-II	3	0	0	40	60	100	3
BCVCCV5102	Design of Concrete Structures-I	3	0	0	40	60	100	3
BCVCCV5103	Design of Steel Structures-I	3	0	0	40	60	100	3
BCVCCV5104	Estimation and Costing	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV5201	Design of Concrete Structures-I Lab	0	0	2	60	40	100	1
BCVCCV5202	Design of Steel Structures-I Lab	0	0	2	60	40	100	1
BCVCCV5203	Cost Estimation lab	0	0	2	60	40	100	1
BCVCCV5204	Industrial Technical Seminar-I	0	0	2	60	40	100	1
B.		Minor Stream Courses / Department Electives						
B.1	Theory (Any One)							
BCVECV5111	Environmental Engineering	3	0	0	40	60	100	3
BCVECV5112	Solid Waste Management	3	0	0	40	60	100	
BCVECV5113	Water Resource Engineering	3	0	0	40	60	100	
B.2	Practical							
C		Multidisciplinary Courses						
	MOOC Course-IV	2	0	0				2
D		Ability Enhancement Courses (AEC)						
BUACHM5228	Professional Skills II	0	0	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BULCSE5201	Skill Enhancement Generic Course-IV	0	0	2	60	40	100	1
F		Value Added Courses (VAC)						
		-	-	-				
		Summer Internship / Research Project / Dissertation						
Total		17	0	12				23
Total Teaching Hours					29/29			

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-VI								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.	Major (Core Courses)							
A.1	Theory							
BCVCCV6101	Geotechnical Engineering-I	3	0	0	40	60	100	3
BCVCCV6102	Design of Concrete Structures II	3	0	0	40	60	100	3
BCVCCV6103	Design of Steel Structures II	3	0	0	40	60	100	3
BCVCCV6104	Transportation Engineering	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV6201	Geotechnical Engineering Lab-I	0	0	2	60	40	100	1
BCVCCV6202	Design of Concrete Structures-II Lab	0	0	2	60	40	100	1
BCVCCV6203	Design of Steel Structures II Lab	0	0	2	60	40	100	1
BCVCCV6204	Road Material Testing lab	0	0	2	60	40	100	1
BCVCCV6205	Academic Research Paper Writing and IPR	0	0	2	60	40	100	1
B.	Minor Stream Courses/ Department Electives							
B.1	Theory (Any One)							
BCVECV6111	Ground Improvement Techniques	3	0	0	40	60	100	3
BCVECV6112	Non-Destructive Testing	3	0	0	40	60	100	
BCVCBX6113	Indian Knowledge System In Architecture And Town	3	0	0	40	60	100	
B.2	Practical							
	-							
C	Multidisciplinary Courses							
	MOOC Course-V	2	0	0				2
D	Ability Enhancement Courses (AEC)							
		-	-	-				
E	Skill Enhancement Courses (SEC)							
BULCSE6201	Skill Enhancement Generic Course-VI	0	0	2	60	40	100	1
F	Value Added Courses (VAC)							
	-	-	-	-				
G	Summer Internship / Research Project / Dissertation							
BCVCCV6301	Minor Project	0	0	4	60	40	100	2
Total		17	0	16				
Total Teaching Hours		33 / 33						25

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-VII								
	Name of Course	Teaching Scheme			Marks Distribution			Credits
Course Code		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.	Major (Core Courses)							
A.1	Theory							
	MOOC Course	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV7201	Industrial Technical Seminar-II	0	0	4	60	40	100	2
B.	Minor Stream Courses / Department Electives							
B.1	Theory							
	-							
B.2	Practical							
	-							
C	Multidisciplinary Courses							
	-	-	-	-				
D	Ability Enhancement Courses (AEC)							
	-	-	-	-				
E	Skill Enhancement Courses (SEC)							
	-	-	-	-				
F	Value Added Courses (VAC)							
	-	-	-	-				
G	Summer Internship / Research Project / Dissertation							
BCVCCV7401	Internship	0	0	12	40	60	100	6
Total		3	0	16				
Total Teaching Hours		19						11

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-VIII								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCCV8101	Construction Planning & Management	3	0	0	40	60	100	3
BCVCCV8102	Geotechnical Engineering -II	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV8201	Project Management lab	0	0	2	60	40	100	1
BCVCCV8202	Geotechnical Engineering Lab II	0	0	2	60	40	100	1
BCVCCV8203	Water and Waste Water	0	0	2	60	40	100	1
B.		Minor Stream Courses/Department Electives						
B.1	Theory							
BCVECV8111	Water and Waste Water Engineering lab	3	0	0	40	60	100	3
BCVECV8112	Tenders & Contracts	3	0	0	40	60	100	
BCVECV8113	Repair & Rehabilitation of Structures	3	0	0	40	60	100	
C		Multidisciplinary Courses						
		-	-	-				
D		Ability Enhancement Courses (AEC)						
		-	-	-				
E		Skill Enhancement Courses (SEC)						
		-	-	-				
F		Value Added Courses (VAC)						
		-	-	-				
G		Summer Internship / Research Project / Dissertation						
BCVCCV8301	Major Project			15	60	40	100	10
Total		9		21				22
Total Teaching Hours		30						

POORNIMA UNIVERSITY, JAIPUR
Faculty of Computer Science and Engineering
Faculty of Engineering and Technology

Name of Program: B.Tech. (Common for all) Duration: 4 Years Total Credits: 171

Teaching Scheme for Batch 2025-2029

Semester-I

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BTXCSA1101/ BTXCSA1102	Engineering Physics / Engineering Chemistry	3	-	-	40	60	100	3
BTXCCE1103	Programming in C	3	-	-	40	60	100	3
BTXCCV1104/ BTXCEE1105	Basics of Civil Engineering / Basics of Electrical and Electronics Engineering	3	-	-	40	60	100	3
BTXCSA1106/ BTXCME1107	Engineering Mathematics / Basic of Mechanical Engineering	3	-	-	40	60	100	3
A.2	Practical							
BTXCSA1201/ BTXCSA1202	Engineering Physics lab / Engineering Chemistry lab	-	-	2	60	40	100	1
BTXCCE1203	Programming in C Lab	-	-	2	60	40	100	1
BTXCCV1204/ BTXCEE1205	Computer Aided Design (CAD)/ Basics of Electrical and Electronics Engineering Lab	-	1	2	60	40	100	1
BTXCME1206/ BTXCME1207	Workshop Practice/ Engineering Graphics	-	1	2	60	40	100	1
BTXCCE1208	Exploratory Project-1	-	-	2	60	40	100	1
B.		Minor Stream Courses/ Department Electives						
B.1	Theory	-	-	-	-	-	-	-
B.2	Practical	-	-	-	-	-	-	-
C		Multidisciplinary Courses						
	-	-	-	-				
D		Ability Enhancement Courses (AEC)						
BEACHM1205	Applied English Communication Skills-I	-	-	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BELCSE1201	Skill Enhancement Course-I	-	-	2	60	40	100	1
F		Value Added Courses (VAC)						
BUVCSA1102	Environmental Studies	2	-	-	40	60	100	2
G		Summer Internship / Research Project / Dissertation						
Total		14	2	14				21
Total Teaching Hours		30						

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (CO):	At the end of this course, learners will be able to:	Bloom Level	PO Mapping
CO1	Differentiate between Diamagnetism, Para magnetism and ferromagnetism	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO2	Understand the principle behind Newton's rings interference pattern, its construction using a plano-convex lens and a flat glass plate	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO3	Explain the concept of matter waves and describe their wave-particle duality using the de Broglie wavelength equation.	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Provide a solid foundation for understanding the principles behind many electronic devices and applications like Hall effect, PN Junction	L3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
CO5	Comprehensive foundation in the principles and applications of light amplification, He-Ne laser, and holography	L3	PO1, PO2, PO3, PO4, PO6, PO7

B. MAPPING MATRIX OF CO, PO, & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	1	-	-
WT. AVG	2.6	2.4	2.2	-	-	-	-	-	-	-	-	-	2.4	-	-

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO 3	PSO4	PSO5
CO1	-	-	-	-	1
CO2	-	-	-	-	1
CO3	-	-	-	-	1
CO4	-	-	-	-	1
CO5	-	-	-	-	1
Wt. AVG	-	-	-	-	1

D. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Material Science	07
2.	Wave optics	07
3.	Quantum Mechanics	08
4.	Semiconductor Physics	08
5.	Laser and Holography	06

E. DETAILED SYLLABUS

Unit	Unit Details
1.	Material Science
	<ul style="list-style-type: none"> • Introduction of Unit • Fundamentals of Crystal structure, • Para-magnetism, Diamagnetism, Ferromagnetism, Ferrimagnetism, Antiferromagnetic, Magnetic Permeability, Magnetization, Paramagnetic Susceptibility of Solid Substances, and Explanation of Hysteresis. • Conclusion of Unit
2.	Wave optics
	<ul style="list-style-type: none"> • Introduction of Unit • Interference of light, Types of Interference, coherent source, methods to produce coherent sources with examples. • Newton's rings: Principle, Construction, working and Applications, Anti Reflection Coating. • Fundamental idea about optical fiber, types of fiber, acceptance angle, numerical aperture. • Conclusion of Unit
3.	Quantum Mechanics
	<ul style="list-style-type: none"> • Introduction of Unit • Matter waves and properties. Group and Particle velocities & their relationship. • Compton scattering, wave function and its properties. • Heisenberg Uncertainty principle. • Time dependent and time independent Schrodinger wave equation. • Conclusion of Unit
4.	Semiconductor Physics
	<ul style="list-style-type: none"> • Introduction of Unit • Energy bands in semiconductors, • Types of semiconductors, Charge carriers, • Intrinsic and extrinsic materials, Carrier Concentration, Conductivity and Mobility, • Hall effect, • PN Junction diode, Zener diode, Solar Cell • Conclusion of Unit
5.	Laser and Holography
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction of LASER, Conditions for the Light Amplification, • Population Inversion and metastable state, pumping. • Types of lasers: He-Ne laser and diode laser and their working principle and Holography • Conclusion of Unit

F. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1	Materials Science and Engineering	by Raghavan V	Latest	PHI
2	Fundamentals Of Engineering Physics	SS Rawat	Latest	CBH Publications
3	Solid State Physics	By S. O. Pillai	Latest	NEW AGE
4	Concepts of modern physics	Beiser, Arthur	Latest	Mc Graw Hill
5	Introduction to Quantum Mechanics	David J. Griffiths and Darrell F. Schroeter	Latest	Cambridge University Press
Important Web Links				
1	https://jiet.claybits.com/			
2	https://jiet.claybits.com/physics/1-5			
3	https://jiet.claybits.com/physics/3-1			

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Enumerate the importance, synthesis and applications of polymers.	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO2	Illustrate the fundamental principles of water chemistry, applications of volumetric and analytical instrumentation	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO3	Explain the fundamental concepts of corrosion, its control and surface modification methods namely electroplating and electroless plating	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Impart the basic knowledge of chemistry and its principals involved in electrochemistry, energy storage devices and its commercial applications	L3	PO1, PO2, PO3, PO4, PO5 PO6, PO7
CO5	Learn about the manufacturing of cement and the chemistry involved in setting and hardening of it and also learn about the suitable use of lubricants	L2	PO1, PO2, PO3, PO4, PO6, PO7

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	-	1	1	-	-	-	-	-
CO2	2	1	2	1	-	2	2	-	-	-	-	-
CO3	3	2	2	1	-	2	2	-	-	-	-	-
CO4	3	1	2	1	1	2	2	-	-	-	-	-
CO5	2	1	1	1	-	2	2	-	-	-	-	-
Wt. AVG	2.6	1.2	1.6	1	1	1.8	1.8					

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	1
CO2	-	-	-	-	1
CO3	-	-	-	-	1
CO4	-	-	-	-	1
CO5	-	-	-	-	1
Wt. AVG	-	-	-	-	1

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Polymer Basics and Applications	7
2.	Water Chemistry and methods of analysis	8
3.	Corrosion and Metal finishing	7
4.	Electrochemistry and energy storage systems	7
5.	Engineering Materials	7

E. DETAILED SYLLABUS

Unit	Unit Details
1.	Polymer Basics and Applications
	<ul style="list-style-type: none">• Introduction of Unit• Introduction to Polymer chemistry:• Classification of Polymers and Types of polymerization• Plastics: Thermosets and Thermoplastics, Preparation, Properties and Uses of Polyethylene, Bakelite, Teflon, and Nylon• Flexible materials: Natural rubber, Vulcanization, Synthetic rubber- Preparation, Properties and Applications of SBR, Buna-N and flexible materials.• Conclusion of Unit
2.	Water Chemistry and Methods of Analysis
	<ul style="list-style-type: none">• Introduction of Unit Water• Sources of water, Impurities in water and effect of impurities• Municipal water supply: Requisites of drinking water, Alkaline Water: Benefits, Side Effects and Dangers• Steps involved in purification of water, Sedimentation, Coagulation, Filtration and Disinfection, Break Point Chlorination• Water Analysis: Hardness of water; Type of hardness, Degree of hardness, Units of hardness, Disadvantages of hard water, Determination of hardness by Complexometric (EDTA) method, Numerical based on hardness by EDTA method• Treatment of hard water: Lime-soda method, Permutit (zeolite) method, RO water treatment and Deionization or Demineralization method• Conclusion of Unit
3.	Corrosion and Metal Finishing
	<ul style="list-style-type: none">• Introduction of the Unit• Definition of corrosion and its Significance• Mechanisms of Corrosion: Chemical (Dry) corrosion and Electrochemical (Wet) corrosion• Types of corrosion: Galvanic corrosion, Concentration cell corrosion, Stress corrosion, Pitting corrosion• Methods of protection against corrosion: Galvanization, Sacrificial coatings etc.• Metal finishing: Technological importance, Electroplating and Electroless plating• Conclusion of Unit
4.	Electrochemistry and Energy Storage Systems
	<ul style="list-style-type: none">• Introduction of the Unit• EMF of cell, Free Energy, Single electrode potential, Nernst equation, Numerical problems based on Nernst Equation.• Electrodes: Calomel electrode and Glass electrode• Energy storage Systems: Introduction, Classification of batteries. Construction, working and applications of Li-ion batteries.• An electrochemical energy system for electric vehicles. Recycling of Lithium-ion batteries by direct cycling Method.• Conclusion & Real life applications.
5.	Engineering Materials

- Introduction of the Unit
- Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum.
- Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.
- Conclusion & Real life applications

RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1	Engineering chemistry: A Text book	S.K. Jain & K.D. Gupta	Jaipur Publishing House
2	Engineering chemistry: A Text book	S.S. Dara	S. Chand & Co
3	Engineering chemistry: A Text book	P.C. Jain	Dhanpat Rai & Sons.

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Learn data types, loops, functions, array, pointers, string, structures and files	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO2	Develop conditional and iterative statements to write C programs	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO3	Implement concept of string using array.	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Allocate memory dynamically using pointers	L3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
CO5	Application of file handling and dynamic memory allocation	L2	PO1, PO2, PO3, PO4, PO6, PO7

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	1	-	-	-	-	-
CO2	3	2	3	3	-	-	2	-	-	-	-	-
CO3	2	2	1	1	-	-	2	-	-	-	-	-
CO4	3	1	2	1	-	-	2	-	-	-	-	-
CO5	2	2	1	1	-	-	2	-	-	-	-	-
Wt. AVG	2.6	2	1.8	1.8			1.8					

C. Mapping matrix of CO & PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-		
CO2	2	-	-		
CO3	2	-	-		

CO4	3	-	-		
CO5	2	-	-		
Wt. AVG	2.4				

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to C Programming	7
2.	Decision Making & Looping	7
3.	Array and string	7
4.	Advance programming in C	8
5.	File handling & Additional features	7

E. DETAILED SYLLABUS

Unit	Unit Details
1.	<p>Introduction to C Programming</p> <ul style="list-style-type: none"> • Introduction of Unit • Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms. • Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters. • Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions • Conclusion & Real Life Application
2.	<p>Decision Making & Looping</p> <ul style="list-style-type: none"> • Introduction of Unit • Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case, Ternary Operator • Loop control in C – for loop, while loop, do-while loop • Control flow in C- break, continue and goto statement. • Conclusion & Real Life Application
3.	<p>Array and string</p> <ul style="list-style-type: none"> • Introduction of Unit • Types of arrays: One-dimensional, Two-dimensional. • Array memory representation • Array indexing and traversal • Operations on Arrays: Reading, Inserting, Deleting, searching • Advantages and limitations • Functions: Definition and need for functions, Advantages of using functions • Function declaration, definition, and call : Syntax and structure in C • Types of Functions: Built-in Functions, User-defined Functions • Function Parameters: Call by Value, Call by Reference • Recursion: Concept of recursion, Base case and recursive case • Scope rules- Local & global variables. • String : Definition of strings and memory representation • String declaration and initialization • Standard library functions (e.g., strlen, strcpy, strcmp, strcat in C) • Conclusion of the Unit
4.	<p>Advance programming in C</p> <ul style="list-style-type: none"> • Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function returning pointers. • Advance features- storage classes and dynamic memory allocation(• Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, typedef.

	<ul style="list-style-type: none"> • Unions – Declaration, uses • Enumerated data-types • Conclusion of the Unit
5.	<ul style="list-style-type: none"> • File handling & Additional features
	<ul style="list-style-type: none"> • Introduction of Unit • File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file • C Preprocessor- #define, #include, #undef, Conditional compilation directives. • C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. • Conclusion of the Unit

F. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1.	Letus C, 6 th Edition	Yashwant Kanitkar	PBP Publication
2.	The C programming Language	Richie and Kenninghan	BPB Publication, 2004
3.	Programming in ANSI C 3rd Edition, 2005	E. Balagurusamy	Tata McGraw Hill
Reference Book			
1	The C programming Language Richie and Kenninghan PBP Publication, 2004		
2	Programming in ANSI C 3rd Edition, 2005 Balaguruswamy Tata McGraw Hill		
Online resources			
1	https://www.programiz.com/c-programming/examples		
2	https://www.w3resource.com/c-programming-exercises		

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (CO):	At the end of this course, learners will be able to:	Bloom Level
CO1	Understand the various aspect of civil engineering, its novel areas and Career Prospects in Civil Engineering.	L1
CO2	Demonstrate the characteristics of different Construction Materials and construction techniques in Civil Engineering.	L1
CO3	Identify the various building components, and analyze the construction methods and basic principles.	L4
CO4	Understand different types of surveying works required in construction and compare different surveying instruments.	L1
CO5	Understand about the recent advancements in Civil Engineering.	L1

B. MAPPING MATRIX OF CO,PO, & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	-	1	-	3
CO2	2	3	1	2	-	-	-	-	-	-	-	-	2	-	3
CO3	3	2	2	2	-	-	-	-	-	-	-	-	1	-	3
CO4	3	3	1	2	-	-	-	-	-	-	-	-	1	-	3
CO5	3	3	2	2	-	-	-	-	-	-	-	-	2	-	3
WT. AVG	2.8	2.6	1.6	1.8									1.6		3

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-		
CO2	2	-	-		
CO3	2	-	-		
CO4	3	-	-		
CO5	2	-	-		
Wt. AVG	2.4				

D. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Introduction to Civil Engineering	08
2.	Construction Materials and techniques	08
3.	Building Construction	08
4.	Basic Surveying	08
5.	Advancements in Civil Engineering	08

E. DETAILED SYLLABUS

Unit	Unit Details
•	Introduction to Civil Engineering
	<ul style="list-style-type: none"> • Introduction • Different disciplines of Civil Engineering, Scope and prospects • Role of a Civil Engineer • Units of measurement, Unit conversion (Length, Area, Volume) • Infrastructure Engineering, Sustainability • Automation and Robotics in Construction • Novel areas in Construction industry • Career Prospects in Civil Engineering
•	Construction Materials and techniques
	<ul style="list-style-type: none"> • Introduction • Cement – Types, properties, grades, Concrete– PCC and RCC, Cement mortar • Stone, Requirements of good building stone, General types of stone used in Construction. • Bricks, Modular and Standard bricks, Characteristics of good brick, Special bricks –fly ash bricks. • Timber, Structure of timber, General properties and uses of good timber, Use of bamboo in construction • Asphalt, bitumen and tar used in construction, their properties and uses • Types of Stone Masonry (Rubble masonry, Ashlar Masonry) and Brick Masonry (English bond and Flemish bond).
•	Building Construction
	<ul style="list-style-type: none"> • Introduction • Classification of Buildings as per National Building Code Group A to I • Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure • Building Components - Functions of Building Components, Substructure-Foundation, Plinth & Superstructure. • Selection of site for different types of Buildings • Basic principles of building planning. • Pre-engineered steel building, Pre-fabricated buildings
•	Basic Surveying
	<ul style="list-style-type: none"> • Introduction • Survey – Principles, purpose and use • Types & Classification of surveying • Instruments used in chain survey: Chains, Tapes, Arrow, Ranging rod, Line ranger, Offset rod, Open cross staff, Optical square • Ranging: Direct and Indirect Ranging • Methods of chaining, obstacles in chaining. • Errors in chain and tape, Numerical based on errors in length due to incorrect length of chain & tape. • Modern surveying instruments– EDM, Total station, GPS
•	Advancements in Civil Engineering
	<ul style="list-style-type: none"> • Introduction • Smart city and it's features, Plastic Roads • Mass Transportation systems-BRTS, Metro • Green building, Rain water harvesting systems • Affordable housing & their features • Building Information Modeling (BIM), 3D Printing Technology for Construction, Advanced Civil Engineering Materials

F. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
•	Basics of Civil Engineering	S.S. Bhavikatti	Latest	New Age International Publishers
•	Basic Civil Engineering	B C Punmia, Ashok K Jain, Arun K Jain	Latest	Laxmi Publications
•	Basic Civil Engineering	G K Hiraska	Latest	Dhanpat Rai Publication
•	Basic Civil Engineering	Jhonson Victor D and Esther Malini	Latest	Allied Publishers Limited, Madras
•	Basic Civil Engineering	Arunachalam N	Latest	Pratheeba Publishers, Coimbatore
Important Web Links				
1	https://archive.nptel.ac.in/courses/105/106/105106201/			
2	https://onlinecourses.nptel.ac.in/noc22_ce42/preview			

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (CO):	At the end of this course, learners will be able to:	Bloom Level
CO1	Apply basic electrical concepts, including various circuit analysis techniques and fundamentals of theorem to solve numerical problem related to basic electrical circuit.	L4
CO2	Demonstrate the fundamentals of AC circuits and Electric Installation by calculating voltage, current, impedance, and power factors.	L1
CO3	Compare various electrical machines and the process of energy conversion specifying the type and characteristics of the power source supplying these machines, such as AC or DC, voltage levels, frequency, etc.	L3
CO4	Understand the fundamental principles of semiconductor devices such as diodes and transistors, knowing their roles in switching and amplification.	L1
CO5	Understand the working principles of communication systems, Transducers and fundamentals of IoT.	L1

B. MAPPING MATRIX OF CO,PO, & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	2	-	2	-	-	1	-	-	-	-	-	2	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	1	2	-	-
WT. AVG	2.2	2.6	1	2			1					1	2.2		

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-		
CO2	2	-	-		
CO3	2	-	-		
CO4	3	-	-		
CO5	2	-	-		
Wt. AVG	2.4				

D. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Basic Concepts of Electrical Engineering	08
2.	Alternating Quantities and Electrical Installations	08
3.	Electrical Machines	07
4.	Basic Electronics	08
5.	Communication Systems and IoT	08

E. DETAILED SYLLABUS

Unit	Unit Details
1.	Basic Concepts of Electrical Engineering
	<ul style="list-style-type: none">• Introduction of Unit• Basic circuit elements and sources; Ohms law; Kirchhoff's laws; Series and Parallel connection of circuit elements; Star-delta transformation;• Mesh current analysis; Node voltage analysis;• Theorems: Statement and Numerical Problems of Thevenin's and Norton theorem• Conclusion of Unit
2.	Alternating Quantities and Electrical Installations
	<ul style="list-style-type: none">• Introduction of Unit• Alternating voltages and currents: RMS, average, maximum values, Single Phase RL, RC, RLC series circuits, Power in AC circuits, Power Factor,• Electrical Safety, Fuses and Earthing• Conclusion of Unit
3.	Electrical Machines
	<ul style="list-style-type: none">• Introduction of Unit• Construction, working principle and applications of DC Machines, Single phase Transformers, Three phase Induction motors, Single phase induction motors.• Special machines -Stepper motor, Universal motor and BLDC motor• Conclusion of Unit
4.	Basic Electronics
	<ul style="list-style-type: none">• Introduction of Unit• Characteristics: PN junction diode, Zener diode, Rectifier, Voltage regulator.• Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.• Conclusion of Unit
5.	Communication Systems and IoT
	<ul style="list-style-type: none">• Introduction of Unit• Basics of Communication: Types of Communication, Amplitude and Frequency Modulation.• Introduction to Transducers, Thermocouple, RTD, Load Cell and Bimetallic Strip.• An overview of Internet of Things-Building blocks of IoT, IoT enabling technologies, Characteristics of IoT systems• Conclusion of Unit

F. RECOMMENDED STUDY MATERIAL

S.No	Reference Book	Author	Edition	Publication
1	Electrical and Electronic Technology	Edward Hughes et al,	Latest	Pearson Publication
2	Basic Electrical & Electronics Engineering	V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar	Latest	Wiley India
3	Basic Electrical & Electronics Engineering	Van Valkenburge	Latest	Cengage learning
4	Basic Electrical and Electronics Engineering by,	Muthusubramaniam	Latest	TMH
5	Basic Electrical & Electronics Engineering	Ravish Singh	Latest	TMH
Important Web Links				
1	https://nptel.ac.in/courses/108108076/			
2	https://nptel.ac.in/courses/117103063/			
3	https://nptel.ac.in/courses/108/101/108101091/			

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Calculating eigen values and eigen vector	L4	PO1, PO5, PO6,
CO2	Determining ordinary differential equation and its types.	L3	PO1. PO2, PO3
CO3	Sketching standard curves using curve tracing.	L3	PO1, PO2, PO3, PO4
CO4	Calculating gamma function and double integration.	L4	PO1, PO2, PO3, PO4,
CO5	Associating Gradient, Divergence and Curl, Directional derivatives	L2	PO1, PO2, PO4

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	--	1	1	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	2	3	1	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-
CO5	2	1		1	-	-	-	-	-	-	-	-
Wt. AVG	2.8	2	2.3	1	1	1	-	-	-	-	-	-

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	-
CO2	3	-	-	-	-
CO3	3	-	-	-	-
CO4	3	-	-	-	-
CO5	3	-	-	-	-
Wt. AVG	3	-	-	-	-

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Matrices	7
2.	Ordinary Differential Equations	8
3.	Applications of Differential Calculus	8
4.	Integral Calculus	8
5.	Vector Calculus	8

E. DETAILED SYLLABUS

Unit	Unit Details
1.	Matrices 1.Introduction of Unit 2.Rank of a Matrix, Normal form of a Matrix 3.Consistency of systems of linear equations 4.Eigen Values and Eigen Vectors 5.Cayley-Hamilton Theorem (without proof) 1.Conclusion of Unit
2.	Ordinary Differential Equations <ul style="list-style-type: none">• Introduction of Unit• First order and first-degree differential equations-Separable Variables,• Homogenous and reducible to homogeneous equation• Linear Equation and reducible to linear form, Exact Equation, Reducible to Exact• Conclusion of Unit
3.	Applications of Differential Calculus <ul style="list-style-type: none">• Introduction of Unit• Asymptotes• Multiple points• Curve tracing for standard Curves (Cartesian Curves only)• Conclusion & Real-life applications
4.	Integral Calculus <ul style="list-style-type: none">• Introduction of Unit• Gamma functions and their properties• Double integrals, Double integral by changing into polar form• Areas by Double Integration• Change of order of integration• Conclusion of Unit
5.	Vector Calculus <ul style="list-style-type: none">• Introduction of Unit• Scalar and Vector field• Differentiation and Integration of Vector functions• Gradient, Divergence and Curl• Conclusion of Unit

RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Edition	Publication
1.	Higher Engineering Mathematics	B S Grewal	Latest	Khanna Publications, Delhi,
2.	Higher Engineering Mathematics	Ramana, B.V	Latest	Tata McGraw-Hill.
3	Engineering Mathematics: A Tutorial Approach	Ravish R Singh and M Bhatt	Latest	Tata McGraw-Hill
4	Calculus and Analytical Geometry	Thomas and Finney,	Latest	Narosa Publishing, New Delhi
5	Advanced Engineering Mathematics	Erwin Kreyszig	Latest	John Wiley and Sons

Important Web Links:

1	https://nptel.ac.in/courses/111105134/
2	https://nptel.ac.in/courses/122/101/122101001/
3	https://www.classcentral.com/course/swayam-engineering-mathematics-i-13000

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Understand the fundamentals of various manufacturing processes, including casting, forming, and additive manufacturing, and identify their real-life industrial applications.	L2	PO1, PO2, PO5
CO2	Demonstrate the knowledge of thermodynamic laws and apply them to refrigeration and air-conditioning systems.	L2	PO1, PO2, PO3, PO5
CO3	Explain the construction of automobiles, working principles, and performance parameters of internal combustion engines.	L3	PO1, PO2, PO3, PO5
CO4	Illustrate the concepts of aerodynamics, electric vehicle architecture, and evaluate the performance of electric vehicles.	L3	PO1, PO2, PO5
CO5	Describe the basic elements of automation and robotics, including control systems.	L2	PO1, PO2, PO5, PO6, PO7, PO8

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-
CO4	3	2	2	-	2	-	-	-	-	-	-	-
CO5	3	2	-	-	2	1	2	2	-	-	-	-
Wt. AVG	3	2.4	2		2	1	2	2				

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3
CO1	-	-	3
CO2	-	-	3
CO3	2	-	3
CO4	-	-	3
CO5	2	-	2
Wt. AVG	2		2.8

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	Manufacturing Processes	9
2	Thermal Engineering	9
3	Automobile and IC Engines	8
4	Aerodynamics and Electric Vehicles	7
5	Automation and robotics	7

E. DETAILED SYLLABUS

Unit	Unit Details
1	Manufacturing Processes
	Introduction of Unit Metal Casting Process: Introduction to casting process, sand casting, pattern and their types, pattern materials, moulding sand, casting defects. Metal Forming Processes: Introduction to metal forming, hot and cold working process, Forging, Rolling, Extrusion, Drawing. Additive manufacturing: Introduction, definition of AM by ASTM, types of AM, Fused Deposition Modeling (FDM) and Laser Powder Bed Fusion (LPBF) Conclusion of Unit including Real Life Application
2	Thermal Engineering
	Introduction of Unit Thermodynamics: Thermodynamic system, surroundings, boundary, state, characteristics, process, cycle, zeroth law, first law and second law of thermodynamics. Refrigeration and air conditioning: classification and types of refrigeration systems, vapour compression system, vapour absorption system, and window air-conditioning system. Conclusion of Unit including Real Life Application
3	Automobile and IC Engines
	Introduction of Unit Automobile: historical development of automobiles, automobile components, types of automobiles. IC Engine: Heat engine, types of heat engine, component of IC Engine, working principle of SI and CI engine, two stroke and four stroke engines. Theoretical and actual indicator diagrams, performance parameters of IC Engines, calculation of power - efficiency. Conclusion of Unit including Real Life Application
4	Aerodynamics and Electric Vehicles
	Introduction of Unit Aerodynamics: introduction, jet engine, types of jet engine, aerodynamic forces, turbojet engine. Electric Vehicles: Architecture of an electric vehicle, essentials and performance of electric vehicles – Traction motor characteristics, tractive effort, transmission requirements, vehicle performance, advantage and limitations, battery heat management system. Conclusion of Unit including Real Life Application
5	Automation and robotics
	Introduction of Unit Automation: Basic elements, flexible manufacturing system (FMS), level of automation, hardware component of automation, types of automation, control system, open loop and closed loop system, social issues of automation Robotics: Definition of robot, history of robot, law of robotics, classification of robot, SCARA robot, advantage, limitations and application, social issues of robotics Conclusion of Unit including Real Life Application

F. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication
1	Manufacturing technology Volume I	P N Rao	Latest	McGraw Hill Publication
2	Basics of Mechanical Engineering	R.K. Rajput	Latest	Laxmi Publication
3	IC Engines	V. Ganesan	Latest	McGraw Hill Publication

A. Course Outcomes: -

CO	Cognitive Level	Course Outcomes
CO-1	Understand	Understand the fundamentals of internet technologies, protocols, and the client-server architecture to build a foundation for web development.
CO-2	Apply	Apply HTML and CSS concepts to create static web pages with structured layout and styling.
CO-3	Apply	Use JavaScript to implement interactivity and handle events through DOM manipulation and scripting logic.
CO-4	Analyze	Analyze and implement dynamic server-side functionality using PHP, including form handling, sessions, and cookies.
CO-5	Create	Design and deploy functional websites using modern deployment tools and platforms, and demonstrate practical knowledge of website management.

B. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to HTML And Internet	6
2.	HTML& CSS	9
3.	JAVASCRIPT	10
4.	PHP	7
5.	Practical web site development	7

C. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to HTML And Internet
	<ul style="list-style-type: none"> Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP,TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST Conclusion of the Unit
2.	HTML& CSS
	<ul style="list-style-type: none"> Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More HTML Tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images. New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geo location, Micro data, Drag and Drop Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing. Conclusion of the Unit
3.	JAVASCRIPT
	<ul style="list-style-type: none"> Introduction of the Unit Features, syntax, and script integration methods (inline, internal, external) Variables (var, let, const), data types, operators, Control structures (if, switch, loops), functions, and scope DOM structure: nodes, elements & attributes, accessing elements: getElementById, querySelector, etc., Modifying content, style, and attributes dynamically

	<ul style="list-style-type: none"> Common events (click, mouseover, keydown), Using addEventListener, preventing default actions, Event bubbling and delegation. Conclusion of the Unit
4.	PHP
	<ul style="list-style-type: none"> Introduction of the Unit Role of PHP in server-side web development, Comparison with client-side scripting (JavaScript), Syntax and embedding PHP in HTML Variables, data types, constants, and operators, Control structures: if, else, switch, loops, Functions and arrays Overview of PHP superglobals: \$_GET, \$_POST, \$_REQUEST, \$_SERVER\$_SESSION, \$_COOKIE, \$_FILES, \$_ENV, \$_GLOBALS Dynamic content generation, Including external files (include, require), Using PHP to show form input, session info, etc. Conclusion of the Unit
5.	Practical web site development
	<ul style="list-style-type: none"> Introduction of the Unit Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, Protocols used for web application deployment : Deploy web application on : GitHub, Netlify, Vercel, Replit, Firebase etc. Web authoring tools, Web hosting, website maintenance, generating traffic to your website. Conclusion of the Unit

D. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2.	Introducing Web Development	Jorg Krause	2017	Apress 2017
3.	HTML & CSS: The Complete Reference	Thomas Powell	2010	McGrawHill, Fifth Edition.
Reference Book				
1	HTML and CSS: Design and Build Websites – by Jon Duckett			
2.	Head First HTML and CSS: A Learner’s Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY			
Online Resources				
1	https://www.w3schools.com/html/html_links.asp			
2	https://www.tutorialrepublic.com/html-tutorial/html-links.php			

E. CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	2	2
CO4	3	3	3	2	-	-	-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Understand the basic Python syntax, including data types, Keywords, Variables, and Identifiers.	L1	PO1,PO2,PO3
CO2	Demonstrate basic operators and understand the concept of Decision making, Conditional Statements and loops for problem solving	L2	PO1,PO2,PO3
CO3	Execute and use the concept of Lists, Tuple, Dictionaries, functions, and different python packages.	L3	PO1,PO2,PO5
CO4	Evaluate various object-oriented programming design principles to create structured python class and objects.	L4	PO1,PO2
CO5	Illustrate and Handle files in python which are raised during the execution of Python scripts	L4	PO1,PO3,PO12

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	1	-	-	-	-	-	-	-	-	-
CO3	2	3	-	-	1	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	-	2	-	-	-	-	-	-	-	-	1
Wt. AVG	2.6	2.5	1.3		1							1

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	-
CO2	2	-	-	-	-
CO3	1	-	3	-	-
CO4	2	-	-	-	-
CO5	2	1	-	-	-
Wt. AVG	1.8	1	3		

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Python Programming	7
2.	Python Operators and Control Flow statements	7
3.	Data Structures, Python Functions and Packages	7
4.	Object Oriented Programming	8
5.	File I/O Handling and Exception Handling	7

E. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to Python Programming
	<ul style="list-style-type: none">• Introduction to Unit• What is Python,• Uses of Python Programming Language / Python Applications• Features of Python Programming Language• Python-2 and Python-3 differences• Python environment setup — Installation and working of IDE• Running Simple Python scripts to display 'welcome' message.• Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Python building blocks — Identifiers, Keywords, Indention, Variables, Comments• Conclusion of unit
2	Python Operators and Control Flow statements
	<ul style="list-style-type: none">• Introduction to Unit• Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence• Control Flow:<ul style="list-style-type: none">• Conditional Statements (if, if ... else, nested if)• Looping in python (while loop, for loop, nested loops)• Conclusion of Unit
3	Data Structures, Python Functions and Packages
	<ul style="list-style-type: none">• Introduction to Unit• Lists, Tuple, Sets• String and Slicing• Use of Python built• User defined functions and its types• Using standard packages (math, scipy, Numpy, pandas)• Conclusion of Unit
4	Object Oriented Programming
	<ul style="list-style-type: none">• Introduction of Unit• Creating Classes and Objects• Inheritance• Method Overloading and Overriding• Data Hiding• Types of Methods : Instance Methods , Static Methods , Class Methods• Conclusion of Unit
5	File I/O Handling and Exception Handling
	<ul style="list-style-type: none">• Introduction of Unit• Types of File• File Objects, File Built-in Function, File Built-in Methods• File Built-in Attributes• Read/write operations Reading Text

- Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors
- Regular expressions
- Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
	Core Python Programming	Chun, JWesley	Pearson,2007
	Head First Python	Barry,Paul	Orielly,2010
	Learning Python	Lutz, Mark	O Rielly, 2009

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Introduction to scope of environmental studies & concept of ecology, ecosystem and biodiversity.	L2	PO7, PO8, PO12,
CO2	Implement innovative ideas of controlling different categories of Environmental Pollution.	L3	PO7, PO8, PO11, PO12,
CO3	Environmental issues & various Environmental Acts, regulations and International Agreements.	L2	PO7, PO8, PO11, PO12,
CO4	Social issues related to population, resettlement and rehabilitation of project affected persons. Demonstrate disaster management w.r.t floods, earthquakes, cyclones and hurts	L2	PO7, PO8, PO11, PO12,
CO5	Determination of local environmental assets with simple ecosystems and identify local flora and fauna	L4	PO7, PO8, PO11, PO12,

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	—	—	—	—	—	—	2	2	—	—	—	1
CO2	—	—	—	—	—	—	3	2	—	—	1	1
CO3	—	—	—	—	—	—	2	3	—	—	1	1
CO4	—	—	—	—	—	—	3	2	—	—	1	1
CO5	—	—	—	—	—	—	2	3	—	—	1	1
Wt. AVG							2.4	2.4			1	1

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	—	—	1	—	—
CO2	—	1	1	—	—
CO3	—	1	1	—	—
CO4	—	1	1	—	—
CO5	—	1	1	—	—
Wt. AVG		1	1		—

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Environmental Studies	5
2.	Environmental Pollution and its Control	5
3.	Environmental Policies & Practices	5
4.	Human Communities and the Environment	5
5.	Field Work	4

E. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Environmental studies
	<ul style="list-style-type: none">• Introduction of Unit• Multidisciplinary nature of environmental studies Concept of sustainability and sustainable development.• Ecosystem: Structure and function of ecosystem• Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\• Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem• Aquatic ecosystems• Biodiversity and Conservation• Conclusion of the Unit
2.	Environmental Pollution and its Control
	<ul style="list-style-type: none">• Introduction of Unit• Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution• Nuclear hazards and human health risks• Solid waste management: Control measures of urban and industrial waste.• Pollution case studies• Conclusion of the Unit
3.	Environmental Policies & Practices
	<ul style="list-style-type: none">• Introduction of Unit• Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture• Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.• Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act.• International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)• Conclusion of the Unit
4.	Human Communities and the Environment
	<ul style="list-style-type: none">• Introduction of Unit• Human population growth: Impacts on environment, human health and welfare.• Resettlement and rehabilitation of project affected persons; case studies.• Disaster management: floods, earthquake, cyclones and landslides.• Conclusion of the Unit
5.	Field Work
	<ul style="list-style-type: none">• Introduction of Unit• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.• Study of common plants, insects, birds and basic principles of identification.• Study of simple ecosystems-pond, river, Delhi Ridge, etc.• Conclusion of the Unit

RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication
1	Environmental Studies	ErachBarucha	Latest	UGC
2	Environmental Studies	Benny Joseph	Latest	Tata McgrawHill
3	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
4	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
5	Environmental Science and Engineering	Meenakshi	Latest	Prentice Hall India.

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course outcomes	On completion of this course, the students will be able:	Bloom Level
CO-1	To perform experiment and determine the wavelength using newton's ring setup & dispersive power of prism for violet, red & yellow color using spectrometer	L4
CO-2	To perform experiment and determine wavelength of prominent lines of mercury by plane diffraction grating using spectrometer	L3
CO-3	To measure the numerical aperture of an optical fiber and the coherent length and coherent time by using He-Ne Laser.	L3
CO-4	Determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode and determine forward and reverse bias resistance for semiconductor diode.	L5
CO-5	To determine the height of a given line drawn on wall by sextant, determine time constant (both current and voltage graphs are to be plotted)	L5

B. MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	-	-	-	-	2	2	-	-	3
CO2	3	3	2	-	-	-	-	-	-	-	2	3	-	-	3
CO3	2	3	2	-	-	-	-	-	-	-	2	3	-	-	3
CO4	3	3	1	2	-	-	-	-	-	-	1	3	-	-	3
CO5	3	3	1	-	-	-	-	-	-	-	2	3	-	-	3
Average	3	2.8	1.6	2	-	-	-	-	-	-	1.8	2.8	-	-	3

C. List of Experiment –

1.	To determine the wavelength of Sodium light by Newton's Ring.
2.	To determine the dispersive power of material of a prism for violet, red & yellow colour of Mercury light with the help of spectrometer.
3.	To determine the wavelength of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4.	To verify the expression for the Resolving Power of Telescope.
5.	To measure the numerical aperture of an optical fiber by He-Ne Laser.
6.	To determine the coherent length and coherent time by using He-Ne Laser.
7.	To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8.	To study the characteristics of semiconductor diode and determine forward and reverse bias resistance.
9.	To determine the height of a given line drawn on wall by sextant.

10.	To study Charging and Discharging of a condenser and determine time constant (both current and voltage graphs are to be plotted)
11.	To determine the high resistance by method of leakage, using a Ballistic Galvanometer.
12.	To specify the specific resistance of a material of a given wire by Carey Foster's bridge.

Virtual Lab Link: <https://www.vlab.co.in/>

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Analyze the strength of NaOH and Na ₂ CO ₃ solutions	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO2	Measure hardness and chloride content of water	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO3	Analyze hardness strength of Ferrous Ammonium sulphate solution and CuSO ₄ solution	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Determine the different properties of lubricating oil	L3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
CO5	Use different instruments & analytical techniques.	L2	PO1, PO2, PO3, PO4, PO6, PO7

B. Mapping matrix of CO, PO & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	-	1	1	-	-	-	-	-
CO2	2	1	2	1	-	2	2	-	-	-	-	-
CO3	3	2	2	1	-	2	2	-	-	-	-	-
CO4	3	1	2	1	1	2	2	-	-	-	-	-
CO5	2	1	1	1	-	2	2	-	-	-	-	-
Wt. AVG	2.6	1.2	1.6	1	1	1.8	1.8					

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	1
CO2	-	-	-	-	1
CO3	-	-	-	-	1
CO4	-	-	-	-	1
CO5	-	-	-	-	1
Wt. AVG	-	-	-	-	1

D. LIST OF EXPERIMENTS

1	To determine the strength of NaOH and Na ₂ CO ₃ in a given alkali mixture.
2	To determine the strength of Ferrous Ammonium sulphate solution with the help of K ₂ Cr ₂ O ₇ solution using diphenyl amine as internal indicator.
3	To determine the hardness of water by EDTA method.
4	To determine the amount of chloride content in drinking water

5	To determine the strength of CuSO ₄ solution with the help of hypo solution.
6	To determine the acid value of a given oil.
7	To determine the viscosity of a given lubricating oil by Redwood viscometer.
8	To determine the flash and fire point of a given lubricating oil.
9	To determine the cloud and pour point of a given oil.
10	Synthesis of Bakelite.
11	Determination of pH by pH-metric titration.
12	Estimation of an acid (weak/strong) by Conductometric titration.

E. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1	Engineering Chemistry	Dr. Mahima Tulsian	Jhunjhunuwala Publication
2	Engineering Chemistry Lab Manual	Dr. N. Rama Jyothi	Shine Book publication
3	Chemistry	Dr. Sanjay Sharma	College Book House

Virtual Lab Link: <https://www.vlab.co.in/>

COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Gain concept of functional hierarchical code organization.	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO2	Work with textual information, characters and strings	L1	PO1, PO2, PO3, PO4, PO6, PO7
CO3	Implement file handling concepts	L2	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Implement real time applications using the power of C language features.	L3	PO1, PO2, PO3, PO4, PO5, PO6, PO7
CO5	Overcome and solve possible errors during program execution	L2	PO1, PO2, PO3, PO4, PO6, PO7

B. Mapping matrix of CO, PO & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	2	-	-	-	-	-
CO2	2	3	3	1	-	-	2	-	-	-	-	-
CO3	3	2	2	3	-	-	2	-	-	-	-	-
CO4	2	1	1	2	-	-	2	-	-	-	-	-
CO5	3	1	2	1	-	-	2	-	-	-	-	-
Wt. AVG	2.6	1.8	1.8	2			2					

C. Mapping matrix of CO & PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-		
CO2	2	-	-		
CO3	3	-	-		
CO4	2	-	-		
CO5	1	-	-		
Wt. AVG	2.2				

D. LIST OF EXPERIMENTS

1	a) Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x a) Write a program that reads a floating-point number and then displays the right-most digit of the integral part of the number.
2	a) Program to find largest and smallest number from four given numbers Program to find whether a year is leap or not
3	a) Write a C program in which enters any number by the user and perform the operation of Sum of

	digits of entered number. Write a C Program to convert Decimal number to Binary number
4	a) Find the sum of this series upto n terms $1+2+3+4+5+6+\dots$ b) Program to print Armstrong's numbers from 1 to 100 Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
5	a) Write a C Program to print the reverse of an integer number b) Write a C program to check if the given Number is Prime or Not Write a C program to perform the factorial of given number
6	a) Write a C program to find maximum and minimum element in the Array b) Write a C program to Search the given element is in the Array or not (Linear Search) Write a C program to check if the given array is sorted or not
7	a) write a C program to perform Matrix addition and multiplication operations. Write a C Program to perform Transpose of a Matrix
8	a) Write a C Program to check if the given string is palindrome or not using Function b) Write a C Program to check if the given two strings are Anagram or not using Function Write a program to determine the length of the string and find its equivalent ASCII codes.
9	a) Write a C program to find nth Fibonacci number using Recursion Write a C Program to Find factorial of a number using Recursion
10	a) Write a C program to reverse an array using pointers and using Functions. (Dynamic Memory allocation for array) Write a C program to copy the contents of one array to another using pointers. (Dynamic Memory allocation for array)
11	a) Write C Program to create a Book Structure and Pass this Book Structure as Argument to a function and print the total data in that function. a) Write C Program to create a Array of Books Structure and Pass this Book Structure as Argument to a function and return the book which has highest price.
12	a) Write a C program to open a text file and count the total number of lines, words, and characters. a) Write a C program that reads data from source.txt and copies it to destination.txt.

E. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1	Let us C	Yashwant Kanetkar	6th Edition
2	The C programming Language	Richie and Kenninghan	2nd Edition 2004
3	Programming in ANSI C	E Balaguruswamy	3rd Edition, 2005

Virtual Lab Link: <https://www.vlab.co.in/>

COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Understand basic functions of commands, their techniques and fundamentals used in drafting and drawing.	L2	PO1,PO2
CO2	Demonstrate the fundamentals of commands through line diagram.	L2	PO1,PO2, PO3
CO3	Compare various shortcut keys and their different use case in drafting.	L4	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO9
CO4	Understand the fundamental principles of Blocks, Hatching, and texts of drawings.	L2	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,P O10,PO11,PO12
CO5	Creating the layout of 2D plans in the workspace.	L6	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,P O10,PO11,PO12

B. Mapping matrix of CO, PO & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	1	1	1	3	1	2	-	1	-	-	-
CO4	3	3	2	3	3	2	2	2	2	1	1	1
CO5	3	3	3	3	3	3	3	3	2	2	2	2
Wt. AVG	3	2	2	2.3	3	2	2.3	2.5	1.6	1.5	1.5	1.5

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO 3	PSO4	PSO5
CO1	1	-	-	-	-
CO2	1	-	-	-	-
CO3	1	-	-	-	-
CO4	1	-	-	-	-
CO5	1	-	-	-	-
Wt. AVG	1	-	-	-	-

D. LIST OF EXPERIMENTS

1	Introduction to AutoCAD and Drawing Tools Draw Different Shapes using Line, Polyline Circle, and Polygon.
2	Draw Different Shapes using Rectangle Use of Dimensions in Circle, rectangles, Line and other shapes.
3	Modify Drawings in AutoCAD using Modification Tools. Offset and Mirror Different Shapes and Lines.
4	Use Trim, Extend & Align, Scale and Stretch Command
5	Use of Text, Line, Block and Conversion Tools.
6	Introduction to Layers, How to add, Modify layers in layer manager.
7	Introduction of Hatch Command in AutoCAD
8	Opening and Modifying properties in AutoCAD
9	2D Plan of 1 BHK Residential Structure
10	2D Pine Flat Dam
11	2D Sewerage Treatment Plant of Poornima University
12	Line Diagram of T shaped Building
	Virtual Lab
1	https://www.autodesk.in/campaigns/autocad-tutorials
2	https://web.autocad.com/login

COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Assemble and understand the operation of house wiring systems	L1	PO1, PO2,
CO2	Gain the ability to prepare and test connections for single-phase and three-phase induction motors using auto transformers	L2	PO1, PO2, PO3,
CO3	Develop the skills to connect and measure the electrical parameters (voltage, current, and power) of various lighting systems, such as fluorescent lamps, sodium vapor lamps, and halogen lamps.	L3	PO1, PO2, PO3
CO4	Proficient in identifying, testing, and applying various electronic components, such as resistors, conductors, capacitors, diodes, LEDs, LCDs, BJTs,	L2	PO1, PO2, PO3
CO5	Verify the truth tables of basic logic gates (AND, OR, NOT, NOR, NAND) and understand their applications.	L2	PO1, PO2, PO4

B. Mapping matrix of CO, PO & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-								
CO2	3	2	3	-								
CO3	3	2	3	-								
CO4	3	3	2	-								
CO5	3	2	2	2								
Wt. AVG	3	2.4	2.4	2								

LIST OF EXPERIMENTS

1	Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2	Prepare the connection of ceiling fan along with the regulator and vary the speed.
3	Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.
4	Prepare the connection of three phase squirrel cage induction motor through 3-Phase Autotransformer and vary the speed.
5	Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.
6	Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zenger Diode,

	LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
7	Measure the frequency, voltage, current with the help of CRO.
8	Assemble the single phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
9	Verify the truth table of AND, OR, NOT, NOR and NAND gates
10	Introduction to IOT. Printing of a Hello World on LCD Screen using Arduino
11	Controlling the Light Emitting Diode (LED) with a push button and Interfacing of the Relay with Arduino.
12	Introduction to Raspberry Pi and Programming of available GPIO pins of the corresponding device using native programming language. Interfacing of I/O devices like LED/Switch etc., and testing the functionality.
Virtual Lab	
1	To perform Ohm's Law http://vlabs.iitkgp.ernet.in/be/exp4/index.html
2	Half Wave Rectification http://vlabs.iitkgp.ernet.in/be/exp6/index.html
3	VI Characteristics of Diode http://vlabs.iitkgp.ernet.in/be/exp5/index.html

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

COURSE OUTCOMES (Cos)	At the end of this course, learner will be able to :	Bloom Level	PO Mapping
CO – 01	Prepare a model of T Lap and T- Briddle Joint through carpentry shop	L3	PO1, PO2, PO3
CO – 02	Understand the working principle and components of lathe machines and also perform basic lathe operations such as turning, facing, chamfering, and knurling.	L2	PO1, PO2, PO3
CO – 03	Understand the difference between gas welding and arc welding and their applications.	L2	PO1, PO2, PO3
CO – 04	prepare a model on fitting shop through filling, drilling and tapping operation	L3	PO1, PO2, PO3
CO – 05	Understand the making of prototype model through foundry shop	L2	PO1, PO2, PO3

B. MAPPING MATRIX OF CO, PO, & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	-	—	—	—	—	—	—	—	—
CO 2	3	1	2	-	—	—	—	—	—	—	—	—
CO 3	3	2	1	-	-	—	—	—	—	—	—	—
CO 4	3	2	1	-	-	—	—	—	—	—	—	—
CO 5	3	2	1	-	-	—	—	—	—	—	—	—
WT. AVG	3	1.8	1.2									

C. DETAILED SYLLABUS

1	Carpentry Shop <ul style="list-style-type: none"> • Timber, definition, engineering applications, seasoning and preservation • Plywood and ply boards
2	Machine Shop <ul style="list-style-type: none"> • Introduction to machine shop tools with emphasis on lathe machine operations. • Practical exercises on turning, facing, chamfering, and knurling of cylindrical components.
3	Welding Shop <ul style="list-style-type: none"> • Definition of welding, brazing and soldering processes and their applications • Oxyacetylene gas welding process, equipment and techniques, types of flames and their applications • Manual metal arc welding technique and equipment, AC and DC welding • Electrodes: Constituents and functions of electrode coating, welding positions • Types of welded joints, common welding defects such as cracks, undercutting, slag inclusion and boring
4	Fitting Shop <ul style="list-style-type: none"> • Files, materials and classification.
5	Sheet metal shop <ul style="list-style-type: none"> • Introduction to sheet metal tools, operations (cutting, bending, folding), and safety practices. • Hands-on fabrication of simple components like trays, boxes, and funnels using sheet metal techniques.
6	Foundry Shop <ul style="list-style-type: none"> • Moulding Sands, constituents and characteristics • Pattern, definition, materials types, core prints • Role of gate, runner, riser, core and chaplets • Causes and remedies of some common casting defects like blow holes, cavities, inclusions

D. RECOMMENDED STUDY MATERIAL - Lab Manual

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

COURSE OUTCOMES (Cos)	At the end of this course, learner will be able to :	Bloom Level	PO Mapping
CO – 01	Understand basic technical drawing concepts, including lines, lettering, dimensions, and scales, through the creation of sketches and drawings.	L2	PO2, PO4,PO5
CO – 02	Construct conic sections (ellipse, parabola, and hyperbola) on drawing sheets, showcasing practical application skills.	L3	PO4,PO5,
CO – 03	Apply knowledge of projection techniques to represent complex objects, such as regular polygons in different positions.	L3	PO1,PO3,PO4,PO5
CO – 04	Differentiate between types of projections, such as orthographic projections with first and third angle conventions. Proficiently project points, straight lines, and planes in different positions	L3	PO1, PO4
CO – 05	Analyze knowledge of sectional views and machine drawing techniques to communicate design and manufacturing details effectively	L3	PO1, PO4

B. MAPPING MATRIX OF CO, PO, & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	-	2	-	2	2	—	—	—	—	—	—	—
CO 2	-	-	-	3	2	—	—	—	—	—	—	—
CO 3	3	-	2	2	2	—	—	—	—	—	—	—
CO 4	3	-	-	2	-	—	—	—	—	—	—	—
CO 5	3	-	-	3	-	—	—	—	—	—	—	—
WT. AVG	3	2	2	2.5	2							

C. List of Experiments

1.	<ul style="list-style-type: none"> ● Lines, Lettering and Dimension (Sketch Book) ● Scales: Representative Fraction, plain scales, diagonal scales, (In drawing sheet 1)
2.	<ul style="list-style-type: none"> ● Conic Sections: Construction of ellipse, parabola and hyperbola by different methods (in drawing sheet 2)
3.	<ul style="list-style-type: none"> ● Type of Projection, Orthographic projection: first angle and third angle projection (in drawing sheet) ● Projection of Points ● Projection of Straight lines ● Projection of planes: Different positions of plane lamina like: regular polygon (four problems in drawing sheet 3)
4.	<ul style="list-style-type: none"> ● Orthographic Projections (3 Problems in drawing sheet 4)
5.	<ul style="list-style-type: none"> ● Sectional Views (2 Problems) and Riveted joints, lap joints, butt joints, (drawing sheet 5)

D. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1	Engineering Drawing	N. D. Bhatt	Latest	Charotar Publishing House PVT. LTD.
Virtual Lab				
1	https://kdm-iitkgp.vlabs.ac.in/exp/simple-drawing-board/theory.html			
2	https://cse18-iiith.vlabs.ac.in/			

E. RECOMMENDED STUDY MATERIAL

S. No.	Reference Book	Author	Edition	Publication
1	Engineering Drawing	N. D. Bhatt	Latest	Charotar Publishing House PVT. LTD.
Virtual Lab				
1	https://kdm-iitkgp.vlabs.ac.in/exp/simple-drawing-board/theory.html			
2	https://cse18-iiith.vlabs.ac.in/			

A. Course Outcomes: -

CO	Cognitive Abilities	Course Outcomes
CO – 01	Understand	To understand the core concepts of HTML, CSS, and client-server architecture in building static web pages.
CO – 02	Apply	To apply styling and layout techniques using CSS for designing visually appealing and responsive web pages.
CO – 03	Apply	To implement interactive features using JavaScript and validate user input on web forms.
CO – 04	Analyze	To analyze and develop dynamic web pages using PHP for server-side scripting and file handling.
CO – 05	Evaluate	To evaluate user interaction data and apply session tracking techniques in PHP for personalized web content.

B. List of Experiments: -

1	<p>a. Create a web page using basic HTML features like tags, attributes, elements and page title</p> <p>b. How to install and configure a web server</p>
2	<p>a. Create My Profile Page and make it functional by making use of headings, paragraphs, lists, images and links.</p> <p>b. Enhance the above web page using CSS include the following:</p> <ol style="list-style-type: none"> 1. Use different font styles. 2. Set back ground image for both the page and single elements on the page. 3. Control the repetition of image with back ground-repeat property. 4. Define style for links as a:link, b:active, c:hover, d:visited. 5. Add customized cursors for links.
3	<p>Design an HTML form titled "Workshop Registration" using <form> tags as below:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Workshop Registration Form</p> <p>Full Name: <input type="text"/></p> <p>Email Address: <input type="text"/></p> <p>Gender: <input type="radio"/> Male <input type="radio"/> Female <input type="radio"/> Other</p> <p>Select Your Skills:</p> <p><input type="checkbox"/> HTML</p> <p><input type="checkbox"/> CSS</p> <p><input type="checkbox"/> JavaScript</p> <p><input type="checkbox"/> PHP</p> <p>Country: <input type="text" value="India"/></p> <p>Comments or Expectations:</p> <div style="border: 1px solid gray; height: 20px; width: 100%;"></div> <p style="text-align: center;"><input type="button" value="Submit"/> <input type="button" value="Reset"/></p> </div>
4	<p>Create the following webpage:</p> <ol style="list-style-type: none"> a. Show the class time table in a tabular format. b. Create a web page using HTML to show your geolocation.
5	Create a webpage using HTML for audio and video player.
6	Create a log in registration form and validate it using JavaScript.
7	<ol style="list-style-type: none"> a) Create a page with a <p> element and a <button>. When the button is clicked, change the paragraph text to "You clicked the button!". b) Create a button and a <p> element. Every time the button is clicked, increment and display a counter in the <p>. c) Create a page with a <button> labeled "Click Me". When clicked, it should display the current date and time in a <div> using JavaScript and the click event.

8	a) Create an HTML page with an input field. On keydown, display the key pressed in a next to the input field. b) Create a dropdown (<select>) with color options (e.g., red, blue, green). Change the page background to the selected color on change. c) Create an image that changes to another image when hovered over, and reverts back when the mouse leaves. d) Create a Full To-Do List with Add, Done, Show Done, and Delete Functionality
9	Create a log in registration form using PHP.
10	Create a dynamic web page by using PHP conditional operators, loops and strings .
11	Develop a PHP web application tracks the user as how many times visited and last visited time
12	Develop a static website using HTML, CSS & JavaScript

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2	Introducing Web Development	Jorg Krause	2017	Apress2017
3	HTML & CSS: The Complete Reference	Thomas Powell	2010, Fifth Edition	McGrawHill,
Reference Book				
1	HTML and CSS: Design and Build Websites – by Jon Duckett			
2.	Head First HTML and CSS: A Learner’s Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY			

D. CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	2	-	-	-	-	2	-	3	2	-	2
CO2	2	-	3	-	2	-	-	-	-	-	-	2	-	-	2
CO3	2	2	3	-	3	-	-	-	-	-	-	2	-	-	3
CO4	2	3	3	2	3	-	-	-	-	-	-	3	-	2	2
CO5	2	3	3	-	3	-	-	-	-	-	-	3	-	-	2

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Understand why Python is a useful scripting language for developers.	L2	PO1, PO2, PO3
CO2	Develop problem solving and critical thinking skills in fundamental enable techniques like conditionals and loops.	L3	PO1, PO2, PO3
CO3	Execute python program with concept of functions, List, Dictionary, structure, class & object.	L3	PO1, PO2, PO4
CO4	Integrate the key issues in Python code, develop and experiment with python programming.	L4	PO1, PO2, PO5
CO5	Linking read and write data from/to files in Python and Develop Python programs step-wise by defining functions with turtle.	L4	PO1, PO3, PO5

B. Mapping matrix of CO, PO & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	1	-	-	-	-	-	-	-	-	-
CO3	2	3	-	1	-	-	-	-	-	-	-	-
CO4	3	2	-	-	1	-	-	-	-	-	-	-
CO5	3	-	2	-	1	-	-	-	-	-	-	-
Wt. AVG	2.6	2.5	1	1	1							

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
			3		
CO1	3	-	-	-	-
CO2	2	-	-	-	-
CO3	2	-	3	-	-
CO4	2	-	-	-	-
CO5	1	-	-	-	3
Wt. AVG	2		3		3

D. LIST OF EXPERIMENTS

1	a) Write a python program to check if the number is prime or not. b) Write a python program to find greatest of four numbers entered by user.
2	Write and run a Python program that asks the user for a temperature in Celsius and converts and output the temperature in Fahrenheit.
3	Write python program to perform following operations on Lists: a) Create list b) Access list c) Update list (Add item, Remove item) d) Delete list

4	<p>Here is an algorithm to print out n! (n factorial) from 0! to 19!:</p> <ol style="list-style-type: none"> 1. Set f = 1 2. Set n = 0 3. Repeat the following 20 times: <ol style="list-style-type: none"> a. Output n, "!", = ", f b. Add 1 to n c. Multiply f by n <p>Using a for loop, write and run a Python program for this algorithm.</p>
5	<p>Modify the program above using a while loop so it prints out all of the factorial values that are less than 1 billion.</p>
6	<p>Write a python program to find the minimum in the array and find its index in the array.</p>
7	<p>Write a python program to implement bubble sort using function.</p>
8	<p>Write a python program to read 3 subject marks and display pass or failed using class and object.</p>
9	<p>Draw the Target symbol (a set of concentric Squares, alternating red and white) in a graphics window that is 200 pixels wide by 200 pixels high. Hint: Draw the largest circle first in red, then draw the next smaller circle in white, then draw the next smaller circle in red. Graphical objects drawn later appear "on top of" graphical objects drawn earlier.</p> <div data-bbox="591 701 857 926" data-label="Image"> </div>
10	<p>Create a 5 X 5 rectangle whose top left corner is at (row*5, col*5). (Where is the bottom right corner?) If the sum of the row and col numbers is even, set the fill color of the rectangle to white, otherwise set it to black. Then draw the rectangle.</p> <div data-bbox="574 1062 849 1283" data-label="Image"> </div>
Virtual Lab	
1	<p>Simulate python program to perform all Arithmetic Operations.</p>
2	<p>Simulate python program to analyze the concept of Constructor and Inheritance.</p>
3	<p>Simulate python program using Math, datetime, random and operator Module.</p>

LAB OUTCOMES: After Successful completion of the lab students will be able to-

COURSE OUTCOMES (Cos)	At the end of this course, learner will be able to :	Bloom Level	PO Mapping
CO – 01	Predict a problem of current relevance to society using research and analytical skills.	L2	PO1, PO2, PO3, PO6, PO7, PO9, PO10, PO12
CO – 02	Formulate the problem and identify suitable modeling paradigms through collaborative discussions and research.	L3	PO1,PO2,PO3, PO4, PO6, PO7, PO9, PO10, PO11, PO12
CO – 03	Categorize the problem and identify the solution methodology using systematic problem-solving techniques.	L3	PO1, PO2, PO3, PO4, PO6, PO7, PO9, PO10, PO11, PO12
CO – 04	Simulate and design systems using various modern tools and software applications.	L4	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO9, PO10, PO11, PO12
CO – 05	Validate the results and prepare a comprehensive project report.	L4	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO9, PO10, PO11, PO12

MAPPING MATRIX OF CO, PO, & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	1	-	—	2	1	—	1	1	—	2
CO 2	3	3	3	2	—	2	2	—	2	2	1	2
CO 3	3	3	2	2	-	2	2	—	2	2	1	2
CO 4	3	3	3	2	3	2	2	—	3	3	2	3
CO 5	3	3	3	3	3	2	2	—	3	3	2	3
WT. AVG	3	3	2.4	2.25	3	2	1.8	-	2.2	2.2	1.5	2.4

GUIDELINES:

1. The Project group must complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in first term on or before the last day of the second term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.
7. The guide should be internal examiner for oral examination.
8. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.

The evaluation at final oral examination should be done jointly by the internal and external examiner.

Phases:

Project work is divided into the following phases:

Phase I

- Allocation of groups(Max. 4 Members & Min. 2 Members) & guide
- Black board presentation on topics as per the choice & feasibility
- Submission of abstract & synopsis of the project

Phase II

- Procurement of the components
- 2D/3D figure or model
- Paper work like any circuit diagram and tentative cost

Phase III

- Working Model of the project
- Mounting the components
- Final hardware evaluation/presentation
- Submission of the final hardware to the coordinator.

Phase V

- Final report submission (after project exhibition)
- Paper presentation on the selected project in seminars /conferences/journals
- Viva voce

Deadlines of Phases:

The Project will be covered in 13 weeks from starting of semester. The time allocated to each phase is as follow:

Phase -1: Maximum 2 weeks

Phase -2: Maximum 3 weeks

Phase -3: Maximum 6 weeks

Phase- 4: Maximum 2 weeks

Distribution of Marks:-

Total Marks 100

Break up of marks (100)

Performance of Phase 1 :15

Performance of Phase 2 :20

Performance of Phase 3 :20

Performance of Phase 4 :45

Total :**100**

Note: 1. Performance marks of Phase 1/2/3/4 will be given by Coordinators, Guide and external (if any) on completion of the respective phase.

2. Presentation and demonstration will be taken by Project Coordinator, Guide.

3. Guide feedback will be collected by Project Coordinator.

Code: BTXECE2111**Introduction to cloud technology****2 Credits [LTP:2-0-0]****Course Outcomes: -**

CO	Cognitive Abilities	Course Outcomes
CO – 01	Remember	Study importance of Cloud computing, various deployment and Service models.
CO – 02	Understand	Analyse three Layered Architectural Requirement of Cloud computing.
CO – 03	Apply	Study Comparative Analysis of Requirement at various layers.
CO – 04	Analyze	Understand various threats and security issues of cloud computing with solutions.
CO – 05	Evaluate	Study how virtualization improves performance and capacity of cloud services.

OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Understanding cloud computing	8
2.	Cloud computing technology	8
3.	Fault Tolerance	7
4.	Security Management in Cloud	7
5.	Virtualization	6

DETAILED SYLLABUS

Unit	Unit Details
1.	Understanding cloud computing
	Introduction to Cloud Computing <ul style="list-style-type: none"> ● Benefits and Drawbacks - ● History and Evolution of Cloud Computing, ● Types of clouds, Private and Public clouds, ● Cloud Computing architecture, ● Cloud computing infrastructure, ● Merits of Cloud computing, ● Practical applications of cloud computing, ● Cloud computing delivery models and services (IaaS, PaaS, SaaS) ● Obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, ● Conclusion of the Unit
2.	Cloud Architecture Technology and Architectural Requirements
	<ul style="list-style-type: none"> ● The Business Case for Clouds ● Hardware and Infrastructure ● Accessing the cloud ,Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud ● Cloud Storage – Standards ● Software as a Service ● Discovering Cloud Services Development tools ● Three Layered Architectural Requirement Provider Requirements ● Service Centric Issues - Interoperability – QoS. ● Conclusion of Unit
3.	Fault Tolerance

	<p>Fault Tolerance</p> <ul style="list-style-type: none"> • Data Management Storage and Processing • Virtualization Management-Scalability • Load Balancing • Cloud Deployment for Enterprises • User Requirement • Comparative Analysis of Requirement. • Conclusion of Unit
4.	Security Management in Cloud
	<ul style="list-style-type: none"> • Security Management Standards • Security Management in the Cloud Availability Management • – SaaS Availability Management - PaaS Availability Management – IaaS Availability Management • - Access Control - Security Vulnerability, Patch, and Configuration Management – Privacy in Cloud The Key Privacy Concerns in the Cloud - Security in Cloud Computing • Conclusion of Unit
5.	Virtualization
	<ul style="list-style-type: none"> • Introduction of Unit • Objectives - Benefits - Virtualization Technologies – • Data Storage Virtualization – Storage Virtualization • Improving Availability using Virtualization • Improving Performance using Virtualization • Conclusion of Unit

RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Cloud Computing and SOA Convergence in your Enterprise A Step by Step Guide	David S Linthicum		Addison Wesley Information Technology Series
2.	Cloud Computing: Principles and Paradigms	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski		John Wiley and Sons Publications, 2011
3.	Cloud Computing Theory and Practice	Dan C Marinescu, Elsevier		2013
Reference Book				
1.	Michael Miller, “Cloud Computing – Web-Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education, New Delhi, 2009.			
2.	Cloud Computing Specialist Certification Kit – Virtualization Study Guide			
Online Resources				
1.	https://www.geeksforgeeks.org/cloud-computing/			
2.	https://aws.amazon.com/what-is-cloud-computing/			

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	-	-	-	-	-	-	-	3	-	-
CO2	2	3	3	1	-	-	2	-	-	-	-	-	1	-	-
CO3	3	2	2	3	2	-	-	-	-	-	-	-	3	-	-
CO4	2	1	1	2	-	-	2	-	-	-	-	-	2	-	-
CO5	3	1	2	1	-	-	2	-	-	-	-	-	2	-	-

A. COURSE OUTCOME

COURSE OUTCOMES (Cos)	At the end of this course, learner will be able to :	Bloom Level	PO Mapping
CO – 01	Understand fundamental mechanics laws and principles to analyse systems of forces and moments accurately.	L2	PO1, PO2
CO – 02	Apply concepts of machine design and moment of inertia to optimize lifting machines and understand their mechanical behaviour.	L3	PO1, PO2, PO3, PO4
CO – 03	Analyse frictional effects in mechanical systems and optimize power transmission efficiency using belt drive principles.	L4	PO1, PO2, PO3, PO4
CO – 04	Evaluate particle and rigid body dynamics using kinematic and kinetic principles to predict system behaviour accurately.	L5	PO1, PO2, PO4
CO – 05	Evaluate work, power, and impact in mechanical systems, analysing collision impacts effectively using principles of energy conservation.	L5	PO1, PO2, PO4

B. MAPPING MATRIX OF CO, PO, & PSO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	3	-	-	-	-	-	-	-	-	-	-
CO 2	3	3	3	2	-	-	-	-	-	-	-	-
CO 3	2	3	3	3	-	-	-	-	-	-	-	-
CO 4	2	3	-	3	-	-	-	-	-	-	-	-
CO 5	2	3	-	3	-	-	-	-	-	-	-	-
WT. AVG	2.2	3	3	2.75								

C. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Fundamentals of Mechanics	8
2.	Machine & Moment of Inertia	8
3.	Friction & Belt Drive	7
4.	Dynamics of Particles	8
5.	Work, Power & Impact	8

D. DETAILED SYLLABUS

Unit	Unit Details
1.	Fundamentals of Mechanics
	<ul style="list-style-type: none"> • Introduction of Unit • Fundamental laws of mechanics, Principle of transmissibility. • System of forces, Resultant force, Resolution of force. • Introduction of Moment and Couples, Varignon's Theorem Statement, Equilibrium concept, Lami's theorem Statement. Simple problems • Conclusion of Unit
2.	Machine & Moment of Inertia

	<ul style="list-style-type: none"> • Introduction of Unit • Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Law of machine. • Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Introduction of Parallel axis and perpendicular axis theorem (Statement), M.I of composite section- I, T and L only. • Conclusion of Unit
3.	Friction & Belt Drive
	<ul style="list-style-type: none"> • Introduction of Unit • Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Numerical on Ladder. • Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Ratio of tensions and power transmission by flat belt drives. Simple problems • Conclusion of Unit
4.	Dynamics of Particles
	<ul style="list-style-type: none"> • Introduction of Unit • Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration. • Kinetics of Particles and Rigid Bodies: Newton's laws, Linear Momentum, Equation of motion in rectangular coordinate, D' Alembert principle. • Conclusion of Unit
5.	Work, Power & Impact
	<ul style="list-style-type: none"> • Introduction of Unit • Work, Energy and Power: Work of a force, weight, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy. • Impact: Collision of elastic bodies, types of impact, conservation of momentum, Newton's law of collision. • Conclusion of Unit

E. RECOMMENDED STUDY MATERIAL

Sr.No	Reference Book	Author	Edition	Publication
1.	Vector Mechanics for Engineers	Beer and Johnston	Latest	Tata McGraw Hill
2.	Engineering Mechanics	D S Kumar	Latest	S K Kataria & Sons
3.	Engineering Mechanics Statics	Meriam, J. L. & Kraige, L. G	Latest	John Wiley & Son
4.	Engineering Mechanics	S. Ramamruthan	Latest	Dhanpat Rai Pub.
5.	Engineering Mechanics	Shames	Latest	Pearson Education
Important Web Links				
1.	https://nptel.ac.in/courses/112103109/			
2.	https://nptel.ac.in/courses/112106286/			
3.	https://freevideolectures.com/course/2264/engineering-mechanics			

A. Course Outcomes: -

CO	Cognitive Abilities	Course Outcomes
CO – 01	Remember	Recall the basic concepts of cyber security, common attacks, and key terminologies such as the CIA triad and attack vectors.
CO – 02	Understand	Explain the process of setting up a cybersecurity lab and the fundamental concepts of Linux, Windows, and Active Directory environments.
CO – 03	Apply	<i>Use networking knowledge to interpret how the web and common protocols function within cyber security contexts.</i>
CO – 04	Apply	Apply cryptographic techniques and tools to ensure data confidentiality, integrity, and authentication in secure communications.
CO – 05	Analyze	Analyze application vulnerabilities, security tools, and current trends like IoT and AI in cybersecurity for evaluating modern threat landscapes.

B. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Cyber Security Fundamentals	7
2.	Lab Environment Setup & Operating System Basics	7
3.	Networking Security Essentials	7
4.	Cryptography and Data Protection	7
5.	Application Security, Tools & Emerging Trends	8

C. DETAILED SYLLABUS

Unit	Unit Details
1.	Cyber Security Fundamentals
	<ul style="list-style-type: none"> • Introduction to Unit • CIA Triad and Core Security Terminologies • Types of Cyber Threats and Attack Vectors • Common Cyber Attacks (e.g., Phishing, DDoS, MITM) • Overview of Offensive and Defensive Security • Careers and Certifications in Cyber Security • Conclusion of Unit
2.	Lab Environment Setup & Operating System Basics
	<ul style="list-style-type: none"> • Introduction to Unit • Setting up a Cyber Security Lab (VirtualBox/VMware, ISOs) • Linux Fundamentals and Linux Shell Basics • File System Permissions and User Management in Linux/Windows • Windows Fundamentals and PowerShell Basics • Introduction to Active Directory and Domain Concepts • Google Hacking Techniques and Search Operators • Conclusion of Unit
3.	Networking Security Essentials
	<ul style="list-style-type: none"> • Introduction to Unit • OSI Model and TCP/IP Model in Context of Cyber Security • Common Network Protocols Intro (TCP, UDP, ICMP, DNS, DHCP, etc.) • Network Services (SSH, FTP, SMB, NFS etc.) • How the Web Works (URL, DNS, Hosting, IP, Ports) • Deep Dive into HTTP and HTTPS for Web Security • Network Security Devices: Firewalls, IDS, IPS • VPNs and Encrypted Communication • Wireless Network Security and Network Segmentation

4.	Cryptography and Data Protection
	<ul style="list-style-type: none"> • Introduction to Unit • Basics of Cryptography and its Role in Cyber Security • Symmetric vs Asymmetric Encryption • Hashing Algorithms (MD5, SHA, etc.) • Digital Signatures and Message Authentication • Public Key Infrastructure (PKI) • Cryptographic Protocols (SSL/TLS, IPSec) • Password Cracking and Other Cryptography Tools Intro • Conclusion of Unit
5.	Application Security, Tools & Emerging Trends
	<ul style="list-style-type: none"> • Introduction to Unit • Common Web Vulnerabilities (OWASP Top 10, CVEs) • Key Tools Overview: <ul style="list-style-type: none"> • Burp Suite • Nmap • Metasploit • Hydra • Wireshark • Security Awareness & Social Engineering • Security Policies and Cyber Governance • Emerging Areas: IoT Security, Cloud Security, AI in Security • Conclusion of Unit

D. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Computer security fundamentals (5th ed.)	Easttom, W.	1 st , 2023	Pearson IT
2.	Introduction to Cyber Security	Jeetendra Pandey	1st Edition, 2017	Uttarakhand Open University,
Reference Book				
1.	Fundamental of Cyber Security Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, (Principles, Theory and Practices) BPB Publications 2018.			
2.	Cyber Security Essentials, James Graham, Richard Howard, Ryan Olson, CRC Press			
Online Resources				
1.	https://tryhackme.com/path/outline/presecurity			
2.	https://tryhackme.com/path/outline/jrpenetrationtester			

D. CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	3	2	-	2	-	-	-	-	-	-	2	3	-	-
CO3	3	3	-	-	2	-	-	-	-	-	-	2	3	2	-
CO4	3	2	3	-	3	-	-	-	-	-	-	2	2	2	-
CO5	3	3	2	2	2	-	-	-	-	-	-	3	2	-	-

A. Course Outcomes: -

CO	Cognitive Abilities	Course Outcomes
CO – 01	Understanding	Describe the evolution of industrial revolutions and the future trends in emerging technologies.
CO – 02	Applying	Explain the fundamentals of Data Science and its value chain, including data acquisition, storage, and visualization.
CO – 03	Analyzing	Analyze the applications of Artificial Intelligence and Internet of Things in sectors like education, business, and smart infrastructure.
CO – 04	Analyzing, Evaluating	Differentiate between AR, VR, and MR and examine their applications in various fields such as healthcare and education.
CO – 05	Evaluating, Creating	Evaluate various emerging technologies like blockchain, quantum computing, and additive manufacturing and discuss ethical issues related to cybersecurity and digital privacy.

B. CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	2	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	2	2
CO4	3	3	3	2	-	-	-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3

C. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Evolution of Technologies	5
2.	Data Science	5
3.	Artificial Intelligence (AI) and Internet of Things (IoT)	5
4.	Augmented Reality (AR) and Virtual Reality (VR)	4
5.	Ethics in Technology and Other Emerging Technologies	5

D. DETAILED SYLLABUS

Unit	Unit Details
1.	Evolution of Technologies
	<ul style="list-style-type: none"> Introduction of Unit Includes Historical background of the industrial revolution, (IR1.0, IR2.0, IR3.0, IR.4.0 and IR5.0) Role of data for emerging technologies Human to Machine interaction, Cyber Physical Systems Future trends in emerging technologies. The Future of Work: Shifts Driven By Emerging Technologies Conclusion & Real Life Application
2.	Data Science
	<ul style="list-style-type: none"> Introduction of Unit Overview of Data Science, Data and information, Data types and representation Data Value Chain Data Acquisition, Analysis, Curating, Data storage and big data. Data visualization Conclusion & Real Life Application

3.	Artificial Intelligence (AI) and Internet of Things (IoT)
	<ul style="list-style-type: none"> • Introduction of Unit • AI, Levels of AI, Types of AI, Application of AI in Business and Education • AI tools and platforms • Generative AI • Overview of IoT, working process of IoT, • Overview of IoT Architecture, • Application of IOT at Smart grid, smart city and smart farming. • Conclusion & Real Life Application
4.	Augmented Reality (AR) and Virtual Reality (VR)
	<ul style="list-style-type: none"> • Introduction of Unit • Introduction to AR, VR. • Augmented Reality Vs Mixed Reality (MR). • Architecture of AR systems. • Application of AR systems in Medical Assistance, Entertainment and Education. • Conclusion & Real Life Application
5.	Ethics in Technology and Other Emerging Technologies
	<ul style="list-style-type: none"> • Introduction of Unit • Block Chain Technology, • Cloud and quantum computing • Additive Manufacturing Technology • Flying Drones • Ethics, Digital Privacy and cyber security • Engineering Security and The Transition to Prosperity • Conclusion & Real Life Application

E. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Emerging Technology	Dr. Sanjay Sharma	Khanna Publishers	First Edition
2.	Emerging Technology For Engineers	Ms. Vasudha Tiwari, Dr. Sunil Kumar Chaudhary	Vayu Education Of India	First Edition
3.	IIBF X Taxmann's Emerging Technologies	Indian Institute of Banking & Finance	Taxmann Publications Private Limited	2024
Reference Book				
1	Emerging Exponential Technologies	Dr Deepak G Kulkarni, Dr. Prayag Gokhale	Himalaya Publishing House	2020
2	Introduction to Artificial Intelligence	Rajendra Akerkar	Eastern Economy Edition	2 nd Edition
Online Resources				
1.	"An introduction to Data Science", Oxford Artificial Intelligence Society. https://www.careers.ox.ac.uk/files/datascienceinformationoxfordaisocietypdf			

Course Outcomes: -

CO	Cognitive Abilities	Course Outcomes
CO – 01	Understand	Understand IoT architecture, characteristics, and evolution.
CO – 02	Apply	Apply knowledge of IoT hardware and communication models in real-time applications.
CO – 03	Analyze	Analyze IoT platforms and cloud technologies for effective data handling and analytics.
CO – 04	Create	Design and implement basic IoT systems using programming and sensor integration.
CO – 05	Evaluate	Evaluate IoT use cases in industry and address related security and privacy concerns.

OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Internet of Things	6
2.	IoT Hardware and Communication	8
3.	IoT Platforms and Data Management	8
4.	IoT Programming and Interfacing	8
5.	IoT Applications and Security	7

DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Internet of Things
	<ul style="list-style-type: none"> ● Introduction of Unit ● Definition, Characteristics, Applications ● History and Evolution of IoT ● 4/5-Layer Architecture ● Components of IoT: Sensors, Actuators, Embedded Systems ● RFID, Bluetooth, ZigBee, Wi-Fi, 4G/5G, Cloud Computing ● Security, Privacy, Interoperability ● Conclusion of the unit
2.	IoT Hardware and Communication
	<ul style="list-style-type: none"> ● Introduction of Unit ● Arduino, Raspberry Pi, ESP8266, NodeMCU ● Request-Response, Publish-Subscribe ● Application of Protocol:-MQTT, CoAP, HTTP, LoRa, ZigBee ● MAC, IP, TCP/UDP Layers, IPv6 ● Conclusion of the unit
3.	IoT Platforms and Data Management
	<ul style="list-style-type: none"> ● Introduction of Unit ● AWS IoT, Google Cloud IoT, IBM Watson, Microsoft Azure ● Edge vs Cloud Computing ● NoSQL Databases for IoT (e.g., MongoDB) ● Basics of Data Analytics and Visualization ● Real-Time and Batch Processing ● Conclusion of the Unit

4.	IoT Programming and Interfacing
	<ul style="list-style-type: none"> ● Introduction of Unit ● Python/C++ for IoT ● Reading Sensor Data (Temperature, Humidity, etc.) ● Controlling Actuators (LED, Motors) ● Real-time data acquisition and control using IoT board ● Use of APIs like OpenWeatherMap, ThingSpeak, Blynk ● Conclusion of the Unit
5.	IoT Applications and Security
	<ul style="list-style-type: none"> ● Introduction of Unit ● Smart Homes, Smart Cities, Healthcare, Industrial IoT ● Security Threats and Solutions ● Encryption, Authentication, Secure Communication ● Data Privacy, Ethical Use of IoT Data ● Trends and Emerging Technologies (AIoT, Digital Twin) ● Conclusion of the Unit

RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Internet of Things: A Hands-On Approach	Arshdeep Bahga, Vijay Madiseti	1st Edition (2014)	Universities Press
2.	Internet of Things: Architecture and Design	Raj Kamal	2nd Edition (2021)	McGraw Hill Education
3.	Internet of Things: Principles and Paradigms	Rajkumar Buyya, Amir Vahid Dastjerd	1st Edition (2016)	Morgan Kaufmann (Elsevier)
Reference Book				
1.	The Internet of Things: Enabling Technologies, Platforms, and Use Cases by Pethuru Raj and Anupama C. Raman			
2.	Internet of Things by Jeeva Jose			
Online Resources				
1.	Introduction to Internet of Things (IoT) – Set 1 GeeksforGeeks			
2.	Introduction to Internet of Things - Course			

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	2	-	1	2	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	1	3	2	-
CO3	2	3	3	2	-	-	-	-	-	-	-	2	3	2	-
CO4	2	2	3	-	-	-	-	-	-	-	-	1	3	3	-
CO5	2	2	2	-	-	-	-	-	-	-	-	2	2	2	-

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Understand and apply measures of central tendency, dispersion, skewness, and kurtosis for basic statistical analysis.	L1	PO2, PO3, PO4, PO12
CO2	Apply statistical methods including correlation, regression, and curve fitting to interpret relationships between variables.	L3, L5	PO2, PO3, PO4, PO5
CO3	Demonstrate foundational knowledge of probability concepts and solve problems using probability rules and Bayes' Theorem	L2	PO2, PO3, PO4, PO5
CO4	Identify and analyze discrete and continuous probability distributions including Binomial, Poisson, Exponential, and Normal.	L4	PO2, PO3, PO4, PO5
CO5	Understand and apply sampling techniques, hypothesis testing, and chi-square test for making inferences from data.	L2	PO2, PO3, PO4, PO12

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	2	1	-	-	-	-	-	-	-	3
CO2	-	2	3	2	3	-	-	-	-	-	-	-
CO3	-	2	3	2	3	-	-	-	-	-	-	-
CO4	-	1	3	2	3	-	-	-	-	-	-	-
CO5	-	2	2	1	-	-	-	-	-	-	-	3
Wt. AVG		1.6	2.6	1.6	1.8							1.

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	3
CO2	-	-	-	-	3
CO3	-	-	-	-	3
CO4	-	-	-	-	3
CO5	-	-	-	-	3
Wt. AVG					3

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Basic Statistics	7
2.	Statistical Methods & Curve Fitting	8
3.	Probability	7
4.	Probability Distributions	7
5.	Sampling Theory	7

E. DETAILED SYLLABUS

Unit	Unit Details
1	Basic Statistics
	<ul style="list-style-type: none"> ● Introduction to Unit ● Basic Statistics: Measures of central tendency, measures of dispersion, range quartile deviation, mean deviation, standard deviation, coefficient of variation, Skewness and Kurtosis, simple problems. ● Conclusion of the Unit
2	Statistical Methods & Curve Fitting
	<ul style="list-style-type: none"> ● Introduction of Unit ● Statistical Methods: correlation and regression –Karl Pearson’s coefficient of correlation and rank correlation problems, regression analysis-lines of regression, simple problems. ● Curve fitting: curve fitting by the method of least square-fitting the curves of the form $Y=ax+b$, $y=abx$, $y=ax^2+bx+c$ ● Conclusion of the Unit
3	Probability
	<ul style="list-style-type: none"> ● Introduction of Unit ● Introduction, sample space and events, ● Axioms of probability, Addition and multiplication theorems, conditional probability, ● Bayes’ Theorem, simple problems. ● Conclusion of the Unit
4	Probability Distributions
	<ul style="list-style-type: none"> ● Introduction to Unit ● Random variables (discrete and continuous), probability mass/density function ● Binomial, Poisson, Exponential and normal distributions ● Simple problems (no derivations for mean and standard deviation) ● Conclusion of the Unit
5	Sampling theory
	<ul style="list-style-type: none"> ● Introduction of Unit ● Introduction to sampling distributions, ● Standard error, type-I and type-II errors. ● Test of hypothesis of means, students’ distribution, ● Chi-square distribution as a test of goodness of fit problems. ● Conclusion of the Unit

F. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1.	Higher Engineering Mathematics	B. S. Grewal	Khanna publishers,44th Ed.2018
2.	An Introduction to Statistical Methods	C.B. Gupta	Vikas Publishing House Pvt Ltd; Twenty Third edition
3.	Introduction to Data Analytics	Eldhose P Sim	Notion Press

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Remember how to identify systems with Artificial Intelligence. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	L1	PO2, PO3, PO4, PO12
CO2	Apply appropriate search strategies to solve AI problems. Evaluate the efficiency and effectiveness of different search algorithms.	L3, L5	PO2, PO3, PO4, PO5
CO3	Understand the fundamentals of Constraint Satisfaction Problems (CSP). Explain the importance and applications of CSPs in AI.	L2	PO2, PO3, PO4, PO5
CO4	Analyze adversarial search in game playing and find out optimal solution using different algorithms. Analyzing Different types of games.	L4	PO2, PO3, PO4, PO5
CO5	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, Speech recognition and other machine learning models.	L2	PO2, PO3, PO4, PO12

B. Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	2	1	-	-	-	-	-	-	-	3
CO2	-	2	3	2	3	-	-	-	-	-	-	-
CO3	-	2	3	2	3	-	-	-	-	-	-	-
CO4	-	1	3	2	3	-	-	-	-	-	-	-
CO5	-	2	2	1	-	-	-	-	-	-	-	3
Wt. AVG		1.6	2.6	1.6	1.8							1.

C. Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	3
CO2	-	-	-	-	3
CO3	-	-	-	-	3
CO4	-	-	-	-	3
CO5	-	-	-	-	3
Wt. AVG					3

D. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Artificial Intelligence	7
2.	Problem solving by Search	8
3.	Constraint Satisfaction Problems	7
4.	Adversarial Search and Game Playing	7
5.	AI Applications	7

E. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to Artificial Intelligence
	<ul style="list-style-type: none"> ● Introduction to Unit ● Definition of Artificial Intelligence ● Why do we study AI? What is AI? ● Views of AI: Acting Humanly, Thinking Humanly, Thinking Rationally and Acting Rationally ● Areas of AI, Agents and environments ● PEAS (Performance measure, Environment, Actuators, Sensors) ● Environment types ● Agent types: Simple reflex agents, Model-based reflex agents, Goal-based agents and Utility-based agents ● Examples of Agent ● Conclusion of the Unit
2	Problem solving by Search
	<ul style="list-style-type: none"> ● Introduction of Unit ● Problem-solving agents, Problem formulation ● Example problems: 8-Puzzle problem and 8-queens problem ● Basic search algorithms ● Un-informed search strategies: Breadth-first search, Depth-first search, Depth-limited search, Uniform-cost search and ● Iterative deepening search ● Informed Search Algorithms: Best-first search, A* search, Hill-climbing search, and Genetic algorithms ● Conclusion of the Unit
3	Constraint Satisfaction Problems
	<ul style="list-style-type: none"> ● Introduction to Constraint Satisfaction Problems (CSP) ● Why do we need to consider CSPs? ● Constraint Propagation ● CSP Vs Search problems ● Real-world CSPs, Finite vs. Infinite CSP ● CSP as a Search Problem: Backtracking search for CSPs, Forward checking for CSPs and Local search for CSPs ● Conclusion of the Unit
4	Adversarial Search and Game Playing
	<ul style="list-style-type: none"> ● Introduction to Adversarial Search and Game Playing ● Games: Definition, Search vs. Games and Game Tree ● Optimal decisions in Games: Mini max algorithm and α-β pruning with example ● Imperfect, real-time decisions ● Partially Observable Games ● State-of-the-Art Game Programs: Chess on Deep Blue, Chess on standard PCs, Checkers on Chinook and Backgammon: TD-Gammon ● Conclusion of the Unit
5	AI Applications
	<ul style="list-style-type: none"> ● Introduction of Unit ● Language Models ● Information Retrieval, Extraction ● Natural Language Processing ● Machine Translation, Speech Recognition ● Expert system: Introduction, phases, architecture, Expert system Vs Traditional system ● Robot, Hardware, Planning, Moving ● Conclusion of the Unit

F. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1.	Artificial Intelligence: A Modern Approach	S. Russell and P. Norvig	Prentice Hall
2.	Artificial Intelligence: A Systems Approach (Computer Science),	M. Tim Jones	Jones and Bartlett Publishers
3.	Prolog: Programming for Artificial Intelligence	I. Bratko	Addison-Wesley Educational Publishers Inc

A. COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes (COs)	At the end of this course, learners will able to:	Bloom level	PO Mapping
CO1	Develop dynamic and interactive web interfaces using JavaScript, DOM manipulation, and external libraries such as jQuery and jQuery UI.	L1	PO2, PO3, PO4, PO12
CO2	Demonstrate proficiency in TypeScript and ES6 features including classes, modules, promises, and transpilation techniques.	L3, L5	PO2, PO3, PO4, PO5
CO3	Build modular, scalable single-page applications (SPAs) using Angular with components, services, routing, and dependency injection.	L2	PO2, PO3, PO4, PO5
CO4	Create rich user interfaces using ReactJS by managing states, components, and performing CRUD operations with backend integration.	L4	PO2, PO3, PO4, PO5
CO5	Implement asynchronous web applications using Node.js, Express, and Promises for building responsive and real-time APIs.	L2	PO2, PO3, PO4, PO12

Mapping matrix of CO & PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	2	1	-	-	-	-	-	-	-	3
CO2	-	2	3	2	3	-	-	-	-	-	-	-
CO3	-	2	3	2	3	-	-	-	-	-	-	-
CO4	-	1	3	2	3	-	-	-	-	-	-	-
CO5	-	2	2	1	-	-	-	-	-	-	-	3
Wt. AVG		1.6	2.6	1.6	1.8							1.

Mapping matrix of CO & PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	3
CO2	-	-	-	-	3
CO3	-	-	-	-	3
CO4	-	-	-	-	3
CO5	-	-	-	-	3
Wt. AVG					3

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	JavaScript and jQuery	7
2.	TypeScript and ECMAScript (ES6)	8
3.	Angular	7
4.	React JS	7
5.	Web APIs and Asynchronous Applications	7

B. DETAILED SYLLABUS

Unit	Unit Details
1	JavaScript and jQuery
	<ul style="list-style-type: none">● Introduction to Unit● Understanding the DOM,● DHTML and manipulating the HTML5 Document,● Validating UI,● Working with external JavaScript libraries like jQuery and jQueryUI● Conclusion of the Unit
2	TypeScript and ECMAScript (ES6)
	<ul style="list-style-type: none">● Introduction of Unit● Understanding TypeScript and ECMAScript,● Understanding Prototypes,● Classes, Properties, Methods, Events, and Constructors,● Scoping and Modules,● Understanding and Working with Promise,● Transpiling TypeScript● Conclusion of the Unit
3	Angular
	<ul style="list-style-type: none">● Introduction to Unit● How Angular works, Angular Modules, Angular Components,● Templates and Styles● Routing, Observables, Components and Databinding,● Services and Dependency Injection,● Data binding the UI● Conclusion of the Unit
4	React JS
	<ul style="list-style-type: none">● Introduction to Unit● How ReactJS works,● JSX, React Components,● Event Management, State Management,● Data binding the UI and performing CRUD operations with the Web API using MongoDB,● React Enriching the UX● Conclusion of the Unit
5	Web APIs and Asynchronous Applications
	<ul style="list-style-type: none">● Introduction of Unit● Node & Express Environment,● HTTP Requests & Routes-Handle requests to an Express with routes,● Asynchronous JavaScript- Manage asynchronous JavaScript control flow with Promises● Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Publication
1.	Full Stack Development with MongoDB	Manu Sharma	BPB Publications
2.	Front-End: Curso Completo de HTML, CSS e JavaScript	P A Gabrie	Tech Stuff House
3.	Front End Web Design and Development	Dr. Isha Gupta	Authorspress

Ability Enhancement Courses

Semester I

BEACHM1205	Applied English Communication- I	Credits: 1 (1-0-2)
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COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

CO No.	Course Outcome	Bloom's Taxonomy Level
CO1	Develop critical and creative thinking by solving hypothetical problems using limited resources.	Create
CO2	Exhibit persuasive communication and reasoning in debates and decision-making tasks.	Evaluate
CO3	Demonstrate collaboration and interpersonal skills through group-based storytelling and enactments.	Apply
CO4	Enhance public speaking confidence through extempore and stage-based activities.	Apply
CO5	Present innovative ideas and concepts effectively in front of an audience.	Create

OUTLINE OF THE COURSE

Unit No.	Unit Name	Hours
1	Collaborative Thinking and Problem-Solving Skills	3
2	Narration, Dialogue, and Group Presentation Skills	3
3	Formal and Impromptu Public Speaking	3
4	Functional and Contextual English Communication	3
5	Creativity, Ideation, and Visual Interpretation	3

DETAILED SYLLABUS

Unit	Unit Details
1	Collaborative Thinking and Problem-Solving Skills
	<ul style="list-style-type: none"> ● Introduction to Unit ● Team vs Wild – Scenario-based survival task emphasizing teamwork and critical thinking. ● Who Gets the Heart? – Ethical dilemma debate for persuasive speaking and reasoning ● Conclusion of the Unit
2	Narration, Dialogue, and Group Presentation Skills
	<ul style="list-style-type: none"> ● Introduction of Unit ● Debate – Structured argumentative speaking to enhance critical thinking and leadership. ● Extempore – Impromptu individual speeches to build spontaneity and stage confidence ● Theatrix – Paired roleplays to practice situational dialogues and collaborative speaking ● Conclusion of the Unit
3	Formal and Impromptu Public Speaking
	<ul style="list-style-type: none"> ● Introduction to Unit ● Story Mason – Group storytelling for stage interaction and creativity. ● Picture Connector – Visual storytelling by linking images to construct and narrate a cohesive idea ● Insane Inventor – Solo presentation of imaginative products to foster innovation and clarity ● Conclusion of the Unit

4	Functional and Contextual English Communication
	<ul style="list-style-type: none"> ● Introduction to Unit ● Shopping Roleplay – Day-to-day dialogue practice in a simulated shopping scenario. ● Tourism Pitch – Team-based promotion of a location to enhance descriptive and persuasive communication. ● Interpersonal Interaction Practice – Real-life communication drills for fluent and functional English usage ● Conclusion of the Unit
5	Creativity, Ideation, and Visual Interpretation
	<ul style="list-style-type: none"> ● Introduction of Unit ● Picture connector: To make the students participate in group interactions, create dialogue and present on the stage. Students link various pictures from newspapers to come up with a pictorial representation of a story or idea and narrate/present the same. ● Creativity and presentation skills are concentrated. Students also learn to connect various variables and come up with concrete ideas" ● Insane Inventor: To make students present a creative idea or a product on stage. This is an individual task-based presentation session. This helps students instigate innovation and creative thinking along with presentation skills. ● Body Language and Professionalism Understanding body language helps students communicate more effectively and professionally. This skill enhances their ability to build trust, make positive impressions, and navigate workplace environments with confidence. ● Conclusion of the Unit

Semester II

BEACHM2212	QUANTITATIVE AND VERBAL APTITUDE TRAINING-I	Credits: 1 (1-0-2)
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COURSE OUTCOMES AND THEIR RESPECTIVE MAPPING

Course Outcomes	Details of Course Outcomes	Bloom's Taxonomy Level
CO1	Understand concepts of number systems, percentages, and interest to solve quantitative problems.	Understand
CO2	Analyze data from tables, pie charts, and bar graphs to derive conclusions and evaluate the sufficiency of information.	Analyze
CO3	Demonstrate accuracy in solving logical reasoning problems involving arrangements, blood relations, and visual patterns.	Apply
CO4	Apply grammatical rules and sentence structures to identify and correct errors in English usage.	Apply
CO5	Develop effective reading, comprehension, and vocabulary skills to enhance verbal aptitude and communication.	Create

OUTLINE OF THE COURSE

UNIT NO.	UNIT NAME	HOURS
1	Foundations of Quantitative Reasoning	3
2	Applied Arithmetic and Data Analysis	3
3	Logical and Analytical Reasoning	3
4	Verbal Mastery and Grammar Essentials	3
5	Reading, Vocabulary & Data Interpretation	3

DETAILED SYLLABUS

Unit	Unit Details
1	Foundations of Quantitative Reasoning
	<ul style="list-style-type: none"> ● Introduction to Unit ● Number System – I Number system, Power cycle ● Number System – II Remainder cycle, Factors, Multiples, HCF & LCM ● Reading Comprehension: Speed Reading Strategies, RC types, Tackling Strategies ● Conclusion of the Unit
2	Applied Arithmetic and Data Analysis
	<ul style="list-style-type: none"> ● Introduction of Unit ● Data Arrangement – I Linear and Circular Arrangements ● Data Arrangement – II Multi-dimensional Arrangement, Blood Relations ● Time and Work – I Work with efficiencies, Pipes and Cisterns ● Conclusion of the Unit
3	Logical and Analytical Reasoning
	<ul style="list-style-type: none"> ● Introduction to Unit ● Time and Work – II Work equivalence, Division of wages ● Sentence Correction – I Subject-Verb Agreement, Modifiers, Parallelism ● Conclusion of the Unit
4	Verbal Mastery and Grammar Essentials
	<ul style="list-style-type: none"> ● Introduction to Unit ● Sentence Correction – II Pronoun Agreement, Verb Tenses, Comparisons ● Sentence Correction – III Prepositions, Determiners ● Conclusion of the Unit

5	Reading, Vocabulary & Data Interpretation
	<ul style="list-style-type: none"> ● Introduction of Unit ● Reasoning – I Coding-Decoding, Series ● Reasoning – II Analogy, Odd Man Out, Visual Reasoning ● Percentage & Interest – I Percentages, Percentage Change, S.I. ● Percentage & Interest – II C.I., Relation between S.I. and C.I. ● Verbal & DI Sentence Completion, Para-jumbles, Vocabulary, DI & DS ● Conclusion of the Unit

Skill Enhancement Courses

Semester I

BELCSE 1201

Skill Enhancement Course

Credits: 1 (1-0-2)

Course: Soft Skills 1

COURSE OUTCOMES: On completion of the course a student will be able to:

- Demonstrate effective communication skills through the use of appropriate body language, email etiquette, and impression management in academic and professional settings.
- Apply goal setting, habit formation, and time management strategies to enhance personal productivity and academic success.
- Collaborate efficiently in teams by understanding team dynamics, sharing responsibilities, and achieving common goals.
- Construct grammatically correct and contextually appropriate sentences using correct tenses, sentence structures, speech forms, and punctuation.
- Enhance language fluency and expression using idioms, phrasal verbs, collocations, gerunds, and infinitives in both written and spoken communication.

S. No.	Topic	Sub-Topics
1	Body Language and Professionalism	Understanding body language helps students communicate more effectively and professionally. This skill enhances their ability to build trust, make positive impressions, and navigate workplace environments with confidence.
2	Habit Formation	By understanding how habits are formed, students can create positive routines that boost productivity and success. This topic empowers them to adopt habits that support their personal and academic growth, while also learning how to break negative habits.
3	Goal Setting	Goal setting helps students stay focused and motivated. By teaching them to set clear, achievable goals, we ensure they have a roadmap for success, whether in their education, career, or personal life.
4	Impression Management	Impression management enables students to present themselves effectively in various social and professional settings. This skill is vital for building strong professional relationships, gaining trust, and achieving career success.
5	Team Building	Team building helps students understand the dynamics of effective collaboration. This topic teaches them how to work together, share responsibilities, and achieve common goals, which are essential skills in almost every workplace.

6	Time Management	Time management skills are essential for students to balance academic workloads, personal life, and professional responsibilities. By teaching them how to prioritize tasks and manage their time effectively, we help them reduce stress and increase productivity.
7	Email Writing	Helps participants write clear and professional emails with the right tone and structure. Covers greetings, body, closings, and common errors to avoid. Includes real-life practice for confident workplace communication.
8	Classification of sentences	Learning different types of sentence and their application help one to choose appropriate sentence for appropriate function.
9	Tenses	Tense is the skeleton of English language and proper usage of tense forms ensures proper meaning conveyed.
10	Forms and Speech and Voice	Use of direct and indirect speech is essential for speaking ability in English. Voices help in writing convincing and diplomatic sentence/paragraphs.
11	Idioms and Phrasal Verbs	Idioms add flavour and richness to the English language. The author/speakers will sound savvy if idioms and phrasal verbs are appropriately used.
12	Collocations, Gerund and Infinitives	Company of words are called collocations and proper use of collocations brings finesse in one's language. Gerund and infinitives usage helps fine-tune one's language.
13	Punctuations	Improper punctuations in written scripts convey meanings different than the intended one. Writing ability is greatly enhanced by proper usage of punctuations.

Semester II

BELCSE 2201

Skill Enhancement Course

Credits: 1 (1-0-2)

Course: Fundamental of Programming

COURSE OUTCOMES: On completion of the course a student will be able to:

- Demonstrate basic input and output operations using formatted printing and user input methods.
- Apply various operators to perform arithmetic, relational, logical, and bitwise operations in programs.
- Implement conditional logic using if-else, nested conditions, and switch-case constructs.
- Develop iterative solutions using loops such as for, while, and do-while, along with loop control statements.
- Generate mathematical sequences like Fibonacci, arithmetic, and geometric series using programming logic.

S. No.	Topic	Sub-Topics
1	Input & Output	<p>System.out.println(): Used to display output on the console. Allows formatted output with printf() or format().</p> <p>Practical Exercise: Write a program to print a personalized greeting message using System.out.println().</p> <p>Scanner class: Reads user input from the console. Supports methods like nextInt(), nextDouble(), nextLine() for different data types.</p> <p>Practical Exercise: Write a program to take two numbers as input from the user and display their sum.</p>
2	Operators	<p>Arithmetic operators: Perform basic mathematical operations like addition, subtraction, multiplication, division, modulus, exponentiation, and floor division.</p> <p>Relational operators: Compare values and return Boolean results like greater than, less than, equal to, or not equal.</p> <p>Logical operators: Combine multiple conditions using logical connectors like AND, OR, and NOT.</p> <p>Assignment operators: Assign values to variables and combine them with arithmetic or logical operations.</p> <p>Bitwise operators: Perform operations at the binary level, manipulating individual bits in integers.</p> <p>Practical Exercise: Create a program to find to all the operators</p>
3	Operators	<p>Arithmetic operators: Perform basic mathematical operations like addition, subtraction, multiplication, division, modulus, exponentiation, and floor division.</p> <p>Relational operators: Compare values and return Boolean results like greater than, less than, equal to, or not equal.</p> <p>Logical operators: Combine multiple conditions using logical connectors like AND, OR, and NOT.</p> <p>Assignment operators: Assign values to variables and combine them with arithmetic or logical operations.</p> <p>Bitwise operators: Perform operations at the binary level, manipulating individual bits in integers.</p> <p>Practical Exercise: Create a program to find to all the operators</p>
4	Decision Making	<p>if, elif, else statements: Control the program flow based on conditions. Execute specific blocks of code depending on whether conditions are met.</p> <p>Practical Exercise: Write a program to determine if a number is positive, negative, or zero.</p> <p>Nested conditions: Allow the inclusion of an if statement inside another if to test complex logic.</p> <p>Practical Exercise: Create a program to check if a number is divisible by both 2 and 3.</p> <p>switch-case: Selects among multiple options based on the value of an expression.</p> <p>Practical Exercise: Create a program that accepts a number (1-7) and prints the corresponding day of the week.</p>

5	Decision Making	<p>if, elif, else statements: Control the program flow based on conditions. Execute specific blocks of code depending on whether conditions are met.</p> <p>Practical Exercise: Write a program to determine if a number is positive, negative, or zero.</p> <p>Nested conditions: Allow the inclusion of an if statement inside another if to test complex logic.</p> <p>Practical Exercise: Create a program to check if a number is divisible by both 2 and 3.</p> <p>switch-case: Selects among multiple options based on the value of an expression.</p> <p>Practical Exercise: Create a program that accepts a number (1-7) and prints the corresponding day of the week.</p>
6	Decision Making	<p>if, elif, else statements: Control the program flow based on conditions. Execute specific blocks of code depending on whether conditions are met.</p> <p>Practical Exercise: Write a program to determine if a number is positive, negative, or zero.</p> <p>Nested conditions: Allow the inclusion of an if statement inside another if to test complex logic.</p> <p>Practical Exercise: Create a program to check if a number is divisible by both 2 and 3.</p> <p>switch-case: Selects among multiple options based on the value of an expression.</p> <p>Practical Exercise: Create a program that accepts a number (1-7) and prints the corresponding day of the week.</p>
7	Looping	<p>for loop: Used to iterate over sequences like ranges, lists, or strings, executing a block of code for each element.</p> <p>Practical Exercise: Write a program to print the squares of numbers from 1 to 10.</p> <p>while loop: Executes a block of code as long as the condition is true, often used when the number of iterations is unknown.</p> <p>Practical Exercise: Write a program to find the sum of natural numbers up to a given limit using a while loop.</p> <p>do-while loop: Similar to while, but guarantees at least one iteration.</p> <p>Practical Exercise: Create a program to repeatedly ask the user for input until a valid number is provided.</p> <p>Loop control statements: break stops the loop, continue skips the current iteration, and pass is a placeholder for future code without affecting execution.</p> <p>Practical Exercise: Demonstrate the use of break to exit a loop when a condition is met.</p>
8	Looping	<p>for loop: Used to iterate over sequences like ranges, lists, or strings, executing a block of code for each element.</p> <p>Practical Exercise: Write a program to print the squares of numbers from 1 to 10.</p> <p>while loop: Executes a block of code as long as the condition is true, often used when the number of iterations is unknown.</p> <p>Practical Exercise: Write a program to find the sum of natural numbers up to a given limit using a while loop.</p> <p>do-while loop: Similar to while, but guarantees at least one iteration.</p> <p>Practical Exercise: Create a program to repeatedly ask the user for input until a valid number is provided.</p> <p>Loop control statements: break stops the loop, continue skips the current iteration, and pass is a placeholder for future code without affecting execution.</p> <p>Practical Exercise: Demonstrate the use of break to exit a loop when a condition is met.</p>
9	Looping	<p>for loop: Used to iterate over sequences like ranges, lists, or strings, executing a block of code for each element.</p> <p>Practical Exercise: Write a program to print the squares of numbers from 1 to 10.</p> <p>while loop: Executes a block of code as long as the condition is true, often used when the number of iterations is unknown.</p> <p>Practical Exercise: Write a program to find the sum of natural numbers up to a given limit using a while loop.</p> <p>do-while loop: Similar to while, but guarantees at least one iteration.</p> <p>Practical Exercise: Create a program to repeatedly ask the user for input until a valid number is provided.</p> <p>Loop control statements: break stops the loop, continue skips the current iteration, and pass is a placeholder for future code without affecting execution.</p> <p>Practical Exercise: Demonstrate the use of break to exit a loop when a condition is met.</p>

10	<p style="text-align: center;">Series Programming</p>	<p>Series Programming: It involves generating various types of sequences like arithmetic, geometric, Fibonacci, etc. These series are useful in mathematics and algorithm design.</p> <p>Practical Exercise: Write a program to generate the Fibonacci series up to n terms.</p> <p>Arithmetic and Geometric Series: The arithmetic series involves generating numbers by adding a constant difference to the previous term. The nth term is given by $T_n = a + (n-1) * d$. A geometric series is a sequence where each term is found by multiplying the previous term by a constant ratio r. The nth term is $T_n = a * r^{(n-1)}$, where a is the first term and r is the common ratio. The sum of the first n terms is $S = a * (1 - r^n) / (1 - r)$. This series often appears in financial calculations such as compound interest.</p> <p>Practical Exercise: Write a program to generate the first n terms of an arithmetic and geometric series.</p>
11	<p style="text-align: center;">Series Programming</p>	<p>Series Programming: It involves generating various types of sequences like arithmetic, geometric, Fibonacci, etc. These series are useful in mathematics and algorithm design.</p> <p>Practical Exercise: Write a program to generate the Fibonacci series up to n terms.</p> <p>Arithmetic and Geometric Series: The arithmetic series involves generating numbers by adding a constant difference to the previous term. The nth term is given by $T_n = a + (n-1) * d$. A geometric series is a sequence where each term is found by multiplying the previous term by a constant ratio r. The nth term is $T_n = a * r^{(n-1)}$, where a is the first term and r is the common ratio. The sum of the first n terms is $S = a * (1 - r^n) / (1 - r)$. This series often appears in financial calculations such as compound interest.</p> <p>Practical Exercise: Write a program to generate the first n terms of an arithmetic and geometric series.</p>
12	<p style="text-align: center;">Pattern Programming</p>	<p>Star Pattern: Pattern programming involves printing specific patterns (e.g., stars, numbers) arranged in different shapes like triangles, squares, pyramids, etc. These patterns help practice loops and conditional statements.</p> <p>Practical Exercise: Write a program to print the following pyramid of stars:</p> <pre style="margin-left: 20px;">* *** *****</pre> <p>Number and Alphabet Pattern: In number patterns, numbers are arranged in specific sequences, often following simple rules. Examples include printing numbers in ascending or descending order in different shapes.</p> <p>Practical Exercise: Write a program to print a number triangle pattern like:</p> <pre style="margin-left: 20px;">1 1 2 1 2 3</pre>

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B. Tech. Civil Engineering			Duration: 4 Years			Total Credits: 171		
Teaching Scheme for Batch 2025-29								
Semester-III								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCSA3101	Engineering Mathematics - II	3	0	0	40	60	100	3
BCVCCV3102	Fluid Mechanics	3	0	0	40	60	100	3
BCVCCV3103	Strength of Material	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV3201	Fluid Mechanics Lab	0	0	2	60	40	100	1
BCVCCV3202	Material Testing Lab	0	0	2	60	40	100	1
BCVCCV3203	Industrial application of CADD Lab	0	0	2	60	40	100	1
BCVCCV3204	Structural Drawing Lab	0	0	2	60	40	100	1
BCVCCV3205	Technical Seminar	0	0	2	60	40	100	1
B.		Minor Stream Courses / Department Electives						
B.1	Theory (Any one)							
BCVECV3111	Building Material & Construction	3	0	0	40	60	100	3
BCVECV3112	Sustainable Construction	3	0	0	40	60	100	
BCVECV3113	Building Regulations Bylaws	3	0	0	40	60	100	
B.2	Practical							
	-							
C		Multidisciplinary Courses						
	MOOC Course-II	2	0	0				2
D		Ability Enhancement Courses (AEC)						
BUACHM3215	Professional Skills-I	0	0	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BULCSE3201	Skill Enhancement Generic Course-III	0	0	2	60	40	100	1
F		Value Added Courses (VAC)						
BUVCVE3104	Green Built Environment	2	0	0	40	60	100	2
G		Summer Internship / Research Project / Dissertation						
	Total	16		14				23
Total Teaching Hours		30/30						

COURSE OUTCOMES: After Successful completion of the course students will be able to:

Course Outcomes (COs):	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Apply solution methods for second-order exact linear and non-linear differential equations, analyze equations without direct dependence on XX or YY, and recall key concepts for problem-solving.	L3
CO – 02	Describe Laplace Transform and its properties, recall techniques for inverse Laplace Transform including partial fractions, apply these methods to solve ordinary differential equations with constant coefficients, and analyze the advantages and limitations of Laplace Transform.	L2
CO – 03	Apply Fourier Transforms and their variants, remember Fourier Integral theorem, apply these transforms to solve Partial Differential Equations, and analyze their effectiveness in various problem-solving scenarios.	L3
CO – 04	Apply Bessel's functions, recall their properties including recurrence relations and orthogonality, apply them to problem-solving, and analyze their significance in mathematical modeling.	L3
CO – 05	Understand the basic concept of varices technique for solving Statistics and probability	L2

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Ordinary Differential Equations	8
2.	Laplace Transform	6
3.	Fourier Transform	7
4.	Special Functions	8
5.	Statistics and Probability	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Ordinary Differential Equations
	<ul style="list-style-type: none"> • Introduction of Unit. • Exact Linear Differential Equations of 2nd order • Non-linear differential equation of particular form: Equation of the form $d^n y dx^n = f(x)$ (Introduction Only) • Equations that do not contain x directly. • Equation that does not contain y directly. • Conclusion and Summary of Unit.
2.	Laplace Transform
	<ul style="list-style-type: none"> • Introduction of Unit. • Laplace Transform: Advantage and sufficient conditions for the existence of Laplace Transform, General Properties of Laplace Transform. • Inverse Laplace Transform, General Properties of Inverse Laplace Transform, Use of partial fractions to find Inverse Laplace Transform. • Solution of Ordinary differential equation with constant coefficients. • Conclusion and Summary of Unit.

3.	Fourier Transform
	<ul style="list-style-type: none"> • Introduction of Unit • Fourier Integral theorem, Fourier Sine & Cosine Integrals. • Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse. • Application of Fourier Transform in solving Partial Differential Equations • Conclusion and Summary of Unit.
4.	Special Functions
	<ul style="list-style-type: none"> • Introduction of Unit. • Bessel's function of first kind and second kind, simple recurrence relations, orthogonal property. • Legendre's function of first kind (definition only) • Conclusion and Summary of Unit.
5.	Statistics and Probability
	<ul style="list-style-type: none"> • Introduction of Unit • Statistics, Introduction to Mean, Median, Mode, Standard deviation, Variance, Coefficient of variation • Probability, Probability distribution functions, Binomial, Poisson, Normal Distribution • Conclusion and Summary of Unit.

A. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publications
1.	Numerical Methods and Statistical Techniques using 'C'	Manish Goyal	Latest	Laxmi Publications
2.	Numerical Methods for Engineers and Scientists	Jain- Iyenger- Jain	Latest	New Age Publications
3.	Advanced Engineering Mathematics	B S Grewal	Latest	Khanna Publications
4.	Numerical Methods with programming in C	T Veerarajan	Latest	(TMH)

Websites

<https://nptel.ac.in/courses/122107036/>

<https://nptel.ac.in/courses/122104017/>

<https://nptel.ac.in/courses/111107127/>

<https://nptel.ac.in/courses/111107119/>

<https://nptel.ac.in/courses/111105035/>

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	-	-	-	-	-	-	-	-	-	-
CO – 02	2	3	-	-	-	-	-	-	-	-	-	-
CO – 03	3	2	1	-	-	-	-	-	-	-	-	-
CO – 04	2	2	-	-	-	-	-	-	-	-	-	-
CO – 05	2	3	-	-	-	-	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	3	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOME: After Successful completion of the course students will be able to:

Course Outcomes (COs):	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand fluid concepts, remember definitions and units, apply knowledge of fluid types, and analyze fluid properties and behaviors.	L2
CO – 02	Apply force calculations on immersed surfaces, and analyze equilibrium conditions for floating bodies including metacentric height determination.	L3
CO – 03	Understand fluid mass behavior under acceleration and rotation, types of flows, principles of conservation of mass, Euler's equations, Bernoulli's equation, and fluid flow patterns.	L2
CO – 04	Apply momentum equation and correction factors to various flow situations, and analyze applications such as Borda's mouthpieces and sudden enlargements in flow. Understand principles of fluid measurement devices like Pitot tube and Venturi meter, remember formulas and concepts related to orifices and weirs	L3
CO – 05	Understand laminar and turbulent flow principles, remember experimental setups like Reynolds' experiment, apply laws of fluid friction and hydraulic formulas to calculate losses and gradients, and analyze power transmission and water hammer effects in pipe flow.	L2

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit(Hours)
1.	Fluids & Its Properties	7
2.	Hydrostatics & Buoyancy	11
3.	Hydro – Kinematics	11
4.	Bernoulli's Theorem, Momentum Equation & its Application	10
5.	Flow through Pipes	9

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Fluids & Its Properties
	<ul style="list-style-type: none"> • Introduction • Definition • Ideal fluids, real fluids • Newtonian and non-Newtonian fluids • Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.
2.	Hydrostatics & Buoyancy
	<ul style="list-style-type: none"> • Introduction • Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure • Manometers Bourdon pressure gauge. • Forces acting on immersed plane surface. • Centre of pressure, forces on curved surfaces. • Conditions of equilibrium for floating bodies, meta-center and metacentric height experimental and analytical determination of metacentric height.
3.	Hydro – Kinematics

	<ul style="list-style-type: none"> • Introduction • Fluid mass subjected to horizontal and vertical acceleration and uniform rotation. • Types of Flows : Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes • Principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective. • Rotational and irrotational motions, free and forced vortex, circulation and vorticity velocity potential and stream function, elementary treatment of flow net. • Euler's equations of motion and integration of Euler's equations • Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.
4.	Bernoulli's Theorem, Momentum Equation & its Application
	<ul style="list-style-type: none"> • Introduction • Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches • Francis formula. Velocity of approach. • End contractions Cippoletti Weir, time of emptying reservoirs by weirs. • Development of momentum equation by control volume concept, • Momentum correction factor, applications – Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.
5.	Flow through Pipes
	<ul style="list-style-type: none"> • Introduction • Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. • Turbulent Flow: Laws of fluid friction, friction factor Moody's diagram, loss of head due to friction and other causes. • Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes. • Flow along a by-pass • Power transmission through pipe, condition for maximum power. • Elementary water hammer concept.

c. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1.	Fluid Mechanics	Modi & Seth	22nd	STANDARD BOOK HOUSE;
2.	Fluid Mechanics	D.S. Kumar	Latest	S.K. Kataria & Sons;
3.	Fluid Mechanics	R.K. Bansal	Latest	Laxmi Publications; (2018)
4.	Fluid Mechanics	Frank M White	Latest	McGraw Hill Education India Private Limited; Eighth edition
5.	Fluid Mechanics	R.K. Rajput	Latest	S Chand & Company

Websites

<https://nptel.ac.in/courses/112104118/> <https://nptel.ac.in/courses/112105171/>
<https://nptel.ac.in/courses/103104043/>
https://swayam.gov.in/nd1_noc19_ce28/preview
<https://nptel.ac.in/courses/105103192/> <https://nptel.ac.in/courses/105101082/>
<https://nptel.ac.in/courses/105103095/> <https://nptel.ac.in/courses/112105269/>
<https://nptel.ac.in/courses/112105183/>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	1	2	1	-	-	-	-	-	-	-	-
CO – 02	3	3	1	3	-	-	-	-	-	-	-	-
CO – 03	3	2	2	2	-	-	-	-	-	-	-	-
CO – 04	3	3	2	3	-	-	-	-	-	-	-	-
CO – 05	3	3	3	3	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able to-

Course Outcomes (COs):	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understanding the concept of stress and strain in three dimensions	L2
CO-02	Apply Mohr's circle to analyze stress states and determine maximum shear stress.	L3
CO-03	Analyze structural sections using centroid and moment of inertia concepts.	L4
CO-04	Apply methods to calculate bending moments, shear forces, and axial thrusts in beams.	L3
CO-05	Understand the distribution of bending and shear stresses in beams.	L2

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Simple Stresses & Strains	8
2.	Compound Stress & Columns	6
3.	Centroid & Moment of Inertia	6
4.	Bending of Beams and Plane Trusses	8
5.	Theory of Simple Bending	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Simple Stresses & Strains <ul style="list-style-type: none"> Introduction, Concept of stress and strain in three dimensions and generalized Hooke's law, Direct stress and strain: free body diagrams, Hooke's law, Young's modulus, Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress, Stresses in prismatic & non-prismatic members and composite members Thermal stresses, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress, Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Strain energy for gradually applied, suddenly applied, and impact loads.
2.	Compound Stress & Columns <ul style="list-style-type: none"> Introduction, Two-dimensional stress systems: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & its application. Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads Euler's theory and its limitation, concept of effective length of columns; Rankine's & Secant formulae.
3.	Centroid & Moment of Inertia <ul style="list-style-type: none"> Introduction, First moment of area, Centroid and moment of inertia of symmetrical & unsymmetrical sections, radius of gyration, polar moment of inertia, product moment of inertia, parallel axis theorem, principal axes and principal moment of inertia.
4.	Bending of Beams and Plane Trusses <ul style="list-style-type: none"> Introduction, Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures; Bending moment, Shear force and Axial thrust diagrams for statically

	determinate beams subjected to various types of loads and moments. Simple pin jointed trusses and their analysis: method of joints, method of section.
5.	Theory of Simple Bending
	<ul style="list-style-type: none"> • Introduction, Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections. • Introduction to unsymmetrical bending.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Edition
1.	Strength of Materials: Mechanics of Solids	R.S. Khurmi	Latest	S.Chand
2.	A Text book of Strength of Materials: Mechanics of Solids	R.K Bansal	Latest	Laxmi Publications
3.	Elements of Strength of Materials	Timoshenko & Young	Latest	CBS publishers
4.	Mechanics of Materials	B.C.Punmia, A.K.Jain	Latest	Laxmi Publications
5.	Strength of Materials	S Ramamurtham	Latest	DhanpatRai Publishing Company (P) Ltd

Websites

<https://nptel.ac.in/courses/112107146/> <https://nptel.ac.in/courses/105105108/>
https://nptel.ac.in/content/syllabus_pdf/105105108.pdf
<https://nptel.ac.in/courses/112101095/>
https://swayam.gov.in/nd1_noc19_ce18/preview
<http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	1	-	-	-	-	-	-	-	-	-
CO – 02	2	3	1	-	-	-	-	-	-	-	-	-
CO – 03	2	2		-	-	-	-	-	-	-	-	-
CO – 04	3	2		-	-	-	-	-	-	-	-	-
CO – 05	2	2	1	-	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	1	-	-
CO – 02	2	-	-
CO – 03	1	-	-
CO – 04	1	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

D. COs AND PSOs MAPPING

CO's & PSO's	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	3	-	-
CO – 03	2	-	-
CO – 04	3	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

LAB OUTCOMES: After Successful completion of the lab students will be able to-

LO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Students will determine the tensile strength of Mild Steel & HYSD Bars, find the compressive strength of Bricks and Wooden Blocks, and learn about Rockwell and Brinell hardness tests.	L3
CO – 02	They will apply their knowledge to conduct impact strength tests (IZOD and Charpy), fatigue testing, torsional strength testing, and analysis of the characteristics of a given spring.	L3
CO – 03	Students will analyze the results obtained from these tests to conclude material properties, structural integrity, and suitability for different applications.	L4
CO – 04	They will evaluate the compressive strength of Precast Tile blocks and perform material cost analysis, assessing the economic implications of material selection and usage.	L4
CO – 05	Estimate the cost of materials by performing a detailed material cost analysis considering market rates, durability, and mechanical behavior.	L5

A. LIST OF EXPERIMENTS:

1.	To determine tensile strength of Mild Steel & HYSD Bars.
2.	To find out compressive strength of Bricks and Wooden Blocks
3.	To determine the hardness of given specimen using Rockwell Hardness Test
4.	To determine the hardness of given specimen using Brinell Hardness Test
5.	To find out impact strength by IZOD test and Charpy Test
6.	To find out fatigue strength by Fatigue Test
7.	To determine the characteristics of a given Spring
8.	To determine the torsional strength of the given specimen
9.	To determine compressive strength for Precast Tile blocks
10.	Material cost analysis in detail.

B. VIRTUAL LABS

<http://sm-nitk.vlabs.ac.in/#>

<http://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering>

C. COs AND POs MAPPING

LOs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	-	1	-	3	-	-	-	-	-	-
CO – 02	2	3	-	3	2	2	-	-	-	-	-	-
CO – 03	2	3	-	3	2	2	-	-	-	-	-	1
CO – 04	2	2	2	2	-	2	-	-	-	-	-	2
CO – 05	2	3	3	1	-	2	-	-	-	-	-	2

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	-	-
CO – 02	3	-	-
CO – 03	2	-	-
CO – 04	1	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

CO – 03	2	2	3	–	2	–	–	–	–	–	–	–
CO – 04	2	2	3	1	2	–	–	–	–	–	–	1
CO – 05	2	2	3	1	3	–	1	1	–	–	–	2

D. COs AND PSOs MAPPING

Course Outcomes (COs)	PSO1	PSO2	PSO3
CO – 01	2	–	–
CO – 02	2	–	–
CO – 03	1	–	–
CO – 04	1	–	–
CO – 05	3	–	–

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Identify various types of structural drawings for buildings and civil structures.	L1
CO – 02	Interpret key structural elements and their placement in the drawing sheets.	L2
CO – 03	Apply knowledge of IS codes to understand detailing in RCC elements.	L3
CO – 04	Analyze complete structural sets and cross-check for completeness and clarity.	L4
CO – 05	Evaluate drawing accuracy and link drawings with construction and estimation practices.	L5

A. LIST OF EXPERIMENTS:

1.	Introduction to types of structural drawings (plan, section, elevation).
2.	Reading foundation layout and footing details.
3.	Interpreting column layout and column reinforcement schedule.
4.	Reading slab detailing with main and distribution steel.
5.	Beam detailing and preparation of bar bending schedule (BBS).
6.	Study of stair reinforcement details.
7.	Understanding notes, general specifications, and legends on drawings.
8.	Interpreting structural drawings for a small G+1 residential building.
9.	Linking drawing information to estimation and site layout.
10.	Mini project: Interpreting a full set of structural drawings of a real building

B. VIRTUAL LABS

<https://www.youtube.com/watch?v=LXPJWKT3R0>

C. COs AND POs MAPPING

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	1	1	-	-	-	-	-	-	-	-
CO – 02	2	3	2	1	-	-	-	-	-	-	-	-
CO – 03	2	1	3	2	-	-	1	-	-	-	-	-
CO – 04	3	2	2	1	-	-	1	-	-	-	-	-
CO – 05	3	1	2	1	1	-	-	-	-	3	-	-

D. COs AND PSOs MAPPING

Course Outcomes (COs)	PSO1	PSO2	PSO3
CO – 01	2	2	–
CO – 02	2	2	1
CO – 03	2	2	–
CO – 04	3	2	–
CO – 05	2	2	2

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

1. For the seminar every student will individually study a topic assigned to him/her and submit a report and shall deliver a short lecture / Seminar on the topic at the end of term.
2. Selection of topic should be done by students in consultation with the concerned guide
 - a). The topic should be related to the branch but it should be an extended part of the branch (latest and advanced topic).
 - b). The topic should be such that the student can gain the latest knowledge. Students should preferably refer to at least one research paper
3. Seminar topics should not be repeated in the department and registration of the same should be done on a first come first served basis.
4. Seminar report should be submitted in paper-bound copy prepared with computer typing
 - a). The size of the report depends on the advancement of the topic.
 - b). Students should preferably refer minimum of 5 reference books/magazines.
 - c). Format of content i. Introduction. ii. Literature survey. iii. Theory 1) Implementation 2) Methodology 3) Application 4) Advantages, Disadvantages. iv. Future scope. v. Conclusion.

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Defining the qualities, applications, and preservation methods of building stones and bricks for selection.	L1
CO – 02	Apply knowledge of brick constituents and types of cement to perform field tests and assess suitability for construction.	L3
CO – 03	Analyze the functions and types of building components, such as foundation types and classifications of buildings as per the National Building Code.	L4
CO – 04	Apply knowledge of stone and brick masonry terms and bonds to construct various types of masonry structures.	L3
CO – 05	Analyze different types of scaffolding, shoring, and vertical communication methods in construction projects.	L4

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Natural Construction Materials	8
2.	Artificial Construction Materials	6
3.	Overview of Building Components	6
4.	Construction of Superstructure	8
5.	Construction Technology	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Natural Construction Materials
	<ul style="list-style-type: none"> • Stones: General, Requirements of good building stone, general characteristics of stone, common building stones of India & their Uses, Quarrying and dressing methods and tools for stone, Artificial stones. • Timber: Structure of timber, General properties and uses of good timber, Different methods of seasoning for preservation of timber, Defects in timber, Use of bamboo in construction • Asphalt, bitumen and tar used in construction, their properties and uses • Properties of lime, its types and uses
2.	Artificial Construction Materials
	<ul style="list-style-type: none"> • Bricks: Constituents of brick earth, Conventional / Traditional bricks Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, • Flooring tiles – types and uses • Cement: Manufacturing process of Cement - dry and wet (only flow chart), Types of cement and its uses, Field tests on cement • Precast concrete blocks- hollow, solid, pavement blocks, and their uses • Plywood, Particle board, Veneers, laminated board and their uses • Types of glass: Soda lime glass, lead glass and borosilicate glass and their uses • Ferrous and non-ferrous metals and their uses
3.	Overview of Building Components

	<ul style="list-style-type: none"> • Classification of Buildings- As per National Building Code Group A to I, As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure 1 • Building Components - Functions of Building Components, Substructure – Foundation, Plinth • Superstructure: Walls, Partition wall, Cavity wall, Sill and Lintel, Doors and Windows, Floors, Roof, Columns, Beams, Parapet, Balcony • Foundation- Function and types of foundation
4.	Construction of Superstructure
	<ul style="list-style-type: none"> • Stone Masonry: Terms used in stone masonry- facing, backing, hearting, Through stone, corner stone, cornice, Types of stone masonry: Rubble masonry, Ashlar Masonry and their types, Precautions to be taken in Stone Masonry Construction • Brick masonry: Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb, Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond, Requirements of good brick masonry, Precautions to be observed in Brick Masonry Construction Comparison between stone and Brick Masonry, Hollow concrete block masonry and composite masonry • Doors & Window- Their function, location and types. • Vertical Communication: Stairs- Their parts, types, requirements, Lift and Ramps
5.	Construction Technology
	<ul style="list-style-type: none"> • Scaffolding and Shoring: Purpose Types of Scaffolding Process of Erection and Dismantling Purpose and Types of Shoring, Underpinning • Plastering, Painting and Pointing- Necessity, types and methods of application • Floors- Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. • Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets • Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs.

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Edition
1.	Building Materials	P. C. Varghese	Latest	Prentice Hall India Learning Private Limited
2.	Building Construction and Materials	Rangwala	Latest	Charotar Publishing House Pvt. Ltd.
3.	Building Construction and Materials	Gurcharan Singh	Latest	Standard Book House
4.	Building Construction	Sushil Kumar	Latest	Standard Publisher Dist.
5.	Building Construction	B. C. Punamia	Latest	Laxmi Publications
6.	Building Construction	S.P. Bindra, S.P. Arora	Latest	DhanpatRai Publications

Websites:

<http://www.nptelvideos.in/2012/11/building-materials-and-construction.html>

https://nptel.ac.in/content/syllabus_pdf/105102088.pdf

<https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330>

<https://nptel.ac.in/courses/105102088/>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	2		1	-	-	-	-	-	-	-
CO – 02	2	3	2	1	1	-	-	-	-	-	-	-
CO – 03	3	3	2		2	-	-	-	-	-	-	-
CO – 04	2	2	3		2	-	-	-	-	-	-	-
CO – 05	2	2	3		2	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	1	-	-
CO – 03	2	-	-
CO – 04	2	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Remembering the concepts of sustainability, recognizing the interconnectedness of social, environmental, and economic aspects, along with the challenges and multilateral environmental agreements.	L1
CO – 02	Understand knowledge of environmental management standards, including the ISO 14000 series, Life Cycle Analysis (LCA), Bio-mimicking, and Environment Impact Assessment (EIA) procedures in India.	L2
CO – 03	Apply the sources and impacts of air pollution, water pollution, and solid waste, embracing the principles of sustainable wastewater treatment, the Zero Waste concept, and the 3R concept.	L3
CO – 04	Analyze the principles of green buildings, incorporating green materials, sustainable design, and energy-efficient methods, along with understanding sustainable cities, sustainable transport, and various energy sources.	L4
CO – 05	Analyze key concepts such as vortex, circulation, and Bernoulli's equation.	L4

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Sustainability	6
2.	Pollution	6
3.	Environmental management standards	6
4.	Green buildings	6
5.	Green Engineering	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Sustainability
	Sustainability - Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.
2.	Pollution
	Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print.
3.	Environmental management standards
	Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India.
4.	Green buildings

	Basic concepts of sustainable habitat, Green buildings, green materials for building construction, materialselection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and non- conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy
5.	Green Engineering
	Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication/Edition
1.	Introduction to Sustainable Engineering	R. L. Rag	2 nd Edition	S.K. Kataria& Sons
2.	Sustainable Engineering:Concept Design and case study	Allen	Latest	CBS Publishers
3.	Sustainable Engineering	Krishna R. Reddy	Latest	Standard Publishers Distributors
Websites				
https://nptel.ac.in/content/syllabus_pdf/105105106.pdf https://nptel.ac.in/courses/105105106/ https://nptel.ac.in/courses/105106055/ https://nptel.ac.in/content/syllabus_pdf/105106055.pdf https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2				-	-	-	-	-	-	-
CO – 02	2	3	2	2	2	-	-	-	-	-	-	-
CO – 03	3	3	3	3	2	-	-	-	-	-	-	-
CO – 04	3	3	2	3	3	-	-	-	-	-	-	-
CO – 05	3	3	3	2	2	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and POs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	1	-	-
CO – 04	-	-	-
CO – 05	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Memorize the basic principles of Vastu Shastra and their application in modern building planning.	L1
CO – 02	Understand the significance of building orientation and its impact on energy efficiency and comfort.	L2
CO – 03	Apply knowledge of climatic factors to determine appropriate building orientation criteria for different climatic zones.	L3
CO – 04	Analyze accommodation requirements and spatial planning for residential and non-residential buildings.	L4
CO – 05	Analyze the effectiveness of different building services such as lighting, ventilation, acoustics, and noise control in creating comfortable and functional spaces.	L4

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Site Selection	6
2.	Orientation of Building & Building Bye – Laws	8
3.	Vastushastra & principles of planning	8
4.	Functional Design of Buildings	6
5.	Services in Buildings	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Site Selection
	<ul style="list-style-type: none"> Introduction, Types of buildings as per NBC, criteria for location and site selection, site plan and its detail. Sun shading devices, brief introduction to sun path and method to draw sun chart, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.
2.	Orientation of Building & Building Bye – Laws
	<ul style="list-style-type: none"> Introduction, Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, climate modulating devices. Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate. Building Bye Laws and NBC Regulations : Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.
3.	Vastu Shastra & Principles of Planning
	<ul style="list-style-type: none"> Introduction, Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc. VastuShastra in Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.

4. **Functional Design of Buildings**

	<ul style="list-style-type: none"> • Introduction, Functional design and Accommodation requirements • Residential Buildings : Anthropometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing sequence of arrangement of area, plan, elevation, sectional elevation. <p>Non Residential Buildings: viz-school buildings, rest house, primary health centers, post office, bank, college library, cinema theatres etc.</p>
5.	Services in Buildings
	<ul style="list-style-type: none"> • Introduction, Services in Buildings, Lighting and ventilation, doors and windows. Acoustics, sound insulation and noise control.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publisher
1.	Building Material & Construction	Gurcharan Singh	Latest	Charotar Publishing House Pvt. Ltd.
2.	Building Material & Construction	Bindra & Arora	Latest	Dhanpat Rai Publications
3.	Building construction	SC Rangawala	Latest	Standard Book House
Websites				
https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107006/lec21.pdf				
http://www.nptelvideos.in/2012/11/building-materials-and-construction.html				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	1	2	-	1	-	-	-	-	-	-	-
CO – 02	1	1	2	-	1	-	-	-	-	-	-	-
CO – 03	1	-	3	-	1	-	-	-	-	-	-	-
CO – 04	2	-	3	-	1	-	-	-	-	-	-	-
CO – 05	2	1	2	-	1	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	2	-	-
CO – 04	3	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Compare the professional and personal approach towards any task and demonstrate their understanding by displaying professional attitude in the assigned tasks.	L4
CO – 02	Recognize, explain, and use the formal elements of specific genres of organizational written communication: reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents etc...	L3
CO – 03	Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.	L4
CO – 04	Demonstrate preparedness for any type of interview from classic one-on-one interview to panel interviews, Phone/Skype interviews, Behavioral/Situational etc. along with sharpening the ability to critically analyze a given piece of information and collectively work in a group to arrive at a solution or develop a perspective.	L5
CO – 05	Understand negotiation and time management to identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain and move negotiations from bargaining to closing.	L2

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Professional Attitude & Approach	6
2.	Professional Writing-I	8
3.	Presentation Skills: Structure Study	2
4.	Interview Skills & Group Discussion	4
5.	Negotiation Skills & Time Management	4

B. DETAILED SYLLABUS

LIST OF LABS

1.	Professional & Ethical Approaches: Degree of adherence, Business world & meeting deadlines
2.	Job Hunting and Networking: Skill Branding & Usage of Online Platforms
3.	Trust Building & Cultural Etiquettes
4.	Professional Writing-I: Direct-Indirect approaches to Business Writing-Five main stages of writing Business Messages.
5.	Professional Email Writing
6.	Resume Building-I: Difference between C.V. & Resume, formats, points to cover, practice sessions
7.	E-Learning & E-Content Development-I
8.	Presentation Skills: format & structure of presentations, using tools & techniques
9.	Job Interviews I: Preparation and Presentation
10.	Advanced Group Discussion – I
11.	Negotiation Skills & and Conflict Resolution-I
12.	Professional Code of Ethics & Effective Time Management

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	2	–	–	–	–	–	3	2	2	–	2
CO – 02	2	–	–	–	–	–	–	–	–	3	2	2
CO – 03	–	–	–	–	–	–	–	–	2	3	1	3
CO – 04	2	3	–	2	–	–	–	2	3	3	2	2
CO – 05	–	2	–	–	–	–	–	2	3	3	3	2

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	2	3
CO – 02	1	3	2
CO – 03	–	3	2
CO – 04	2	2	3
CO – 05	1	2	3

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Recall key factors influencing microclimates.	L1
CO – 02	Explain the principles of efficient irrigation practices.	L2
CO – 03	Design lighting controls to meet energy efficiency standards.	L3
CO – 04	Evaluate the environmental impact of different construction materials.	L4
CO – 05	Recall codes and standards related to indoor air quality.	L1

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Sustainable Architecture & Sites	6
2.	Water Management	8
3.	Energy Management	10
4.	Sustainable Building Materials	6
5.	Indoor Environmental Quality	10

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Sustainable Architecture & Sites
	<ul style="list-style-type: none"> • Introduction of Unit • Integrated Approach for Green Building design: Factors for Site selection, Understanding Site Ecology & Site Analysis • Soil erosion & Pollution control measures: Types of Soil Erosion, Strategies to Mitigate Land Degradation, Design Techniques & Challenges • Microclimate: Factors affecting microclimate & Heat Islands, Strategies to handle heat island in built environment, Designing Green Spaces and Enhancing Biodiversity in built environment • Universal Design: Key accessibility issues and Design guidelines
2.	Water Management
	<ul style="list-style-type: none"> • Introduction of Unit • Water Balance and approach for water efficiency: 3R Approach for water efficiency – Reduce, Reuse/ Recycle and Recharge • Water efficient plumbing fixtures, Standards & Codes • Efficient irrigation practices – Hydrozoning, Control devices for water supply, Irrigation systems – Drip & Sprinklers • Wastewater treatment & reuse, wastewater treatment technologies: Physical, Biological and Natural • Rainwater harvesting and Utilization, Groundwater recharge techniques: Design consideration.
3.	Energy Management

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	3	-	-
CO – 03	1	-	-
CO – 04	3	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

POORNIMA UNIVERSITY, JAIPUR

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171

Teaching Scheme for Batch 2025-29

Semester-IV

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCCV4101	Structure Analysis-I	3	0	0	40	60	100	3
BCVCCV4102	Surveying	3	0	0	40	60	100	3
BCVCCV4103	Concrete and Construction Technology	3	0	0	40	60	100	3
BCVCCV4104	Energy Efficiency in Buildings	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV4201	Surveying Lab	0	0	2	60	40	100	1
BCVCCV4202	Concrete Lab	0	0	2	60	40	100	1
BCVCCV4203	3-D Structural planning Lab	0	0	2	60	40	100	1
		Minor Stream Courses / Department Electives						
B.1	Theory							
BCVECV4111	Sustainability in Building Design and Construction	3	0	0	40	60	100	3
BCVECV4112	Admixture & Special Concrete	3	0	0	40	60	100	
BCVECV4113	Green Building Design	3	0	0	40	60	100	
B.2	Practical							
C		Multidisciplinary Courses (MC)						
	MOOC Course-III	2	0	0	40	60	100	2
D		Ability Enhancement Courses (AEC)						
BUACHM4224	Human Values and Professional Ethics	0	0	2	60	40	100	1
E		Skill Enhancement Courses (SEC)						
BCVCSE4202	SETC-I	0	0	2	60	40	100	2
F		Value Added Courses (VAC)						
	-	-	-	-				
G		Summer Internship / Research Project / Dissertation						
Total		17	0	10				23
Total Teaching Hours			27					

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the Indeterminate and Determinate Structure	L2
CO – 02	Apply the three-moment theorem and area moment method to analyze fixed and continuous beams.	L3
CO – 03	Apply the concepts of torsion, shear stress, angle of twist, and membrane analysis to solve engineering problems.	L3
CO – 04	Understand the concept of strain energy due to bending, shear, and torsion.	L2
CO – 05	Analyze the behavior of different damping types and evaluate the solutions for various damping scenarios in structural vibrations.	L4

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction to Indeterminate Structures	9
2.	Deflection of Beams	10
3.	Fixed & Continuous Beams	9
4.	Introduction to Energy Methods	12
5.	Vibrations	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction to Indeterminate structures
	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem. Analysis of prop cantilever structures.
2.	Deflection of Beams
	Introduction, Differential relation between load, shear force, bending moment, slope & deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.
3	Fixed & Continuous Beams
	Introduction, Analysis of fixed beams & continuous beams by three moment theorem and area moment method.
4.	Introduction to Energy Methods
	Introduction, Strain energy due to bending, shear and torsion; Castigliano's theorems, unit load method & their applications in analysis of redundant frames up to two degree of redundancy and deflection of determinate beams, frames and trussed beams, Stresses due to temperature & lack of fit in redundant frames.

5.	Vibrations
	Introduction, Stress tensor and failure criterion, Elementary concepts of structural vibration, degree of freedom, free vibration of un damped single degree of freedom systems. Newton's law of motion, D'Alembert's principle, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping, analysis of viscously damped, under-damped, over-damped & critically-damped systems, logarithmic decrement.

C. RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publisher
1.	Structural Analysis	B.C.Punmia	Latest	Laxmi Publications
2.	Structural Analysis	CS Reddy	Latest	McGraw Hill Education
3.	Structural Analysis	SS Bhavakitti	Latest	Vikas Publishing House
4.	Structural Analysis	S Ramamurtham	Latest	DhanpatRai Publishing Company Private Limited-New Delhi
5.	Structural Analysis	RC Hibbeler	Latest	Pearson Education
Websites				
https://nptel.ac.in/content/syllabus_pdf/105105166.pdf				
https://nptel.ac.in/courses/105105166/ https://nptel.ac.in/courses/105101085/				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	2		-	-	-	-	-	-	-	-
CO – 02	2	3	2	2	-	-	-	-	-	-	-	-
CO – 03	2	2	3	2	-	-	-	-	-	-	-	-
CO – 04	2	2	2	3	-	-	-	-	-	-	-	-
CO – 05	2	2	2	2	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	-	-
CO – 02	2	-	-
CO – 03	2	-	-
CO – 04	2	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand methods of linear and angular measurements, demonstrating proficiency in ranging survey lines and conducting angular measurements with compass and theodolite.	L2
CO – 02	Apply precise levelling techniques, including direct, indirect, and trigonometrical methods, while utilizing digital and auto levels, and apply corrections to measured elevations.	L3
CO – 03	Analyze and execute curve surveying, understanding and setting out simple, circular, transition, and reverse curves, along with determining tangent corrections and characteristics of vertical curves.	L4
CO – 04	Develop proficiency in applying tacheometry principles, including the Stadia system, for distance and elevation measurements, and introduce basic concepts of photogrammetry and its applications in surveying.	L2
CO – 05	Create solutions for setting out works for building and infrastructure projects, and apply modern field survey systems, including Electronic Distance Measurement (EDM) and Total Station technology.	L5

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Introduction: Linear and Angular Measurements	10
2.	Levelling, Contouring, Plane table Surveying	8
3.	Curve Surveying	7
4.	Tachometry and Photogrammetry Surveying	5
5.	Modern Field Survey Systems	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction: Linear and Angular Measurements
	<p>Introductions: - Principles of surveying, Classification of survey, scales and errors.</p> <p>Linear Measurements: - Direct instrument, Instrument used for chaining, Ranging out of survey line, Tape corrections, Field book, Instrument for setting out right angles.</p> <p>Angular measurement:- Bearings and angles, Designation of bearings, Fore and back bearing, Prismatic and surveyor compass, Magnetic declination, Local attraction, Traversing: Traverse computation, Balancing the traverse</p>
2.	Levelling, Contouring, Plane table Surveying
	<p>Levelling: - Definitions of levelling, Levelling instruments: Dumpy level and Wye level, Temporary adjustment of a level, spirit leveling, Booking, and reducing level, Curvature and refraction, Reciprocal levelling.</p> <p>Contouring: - Contour, Contour interval, Characteristics of contours, Methods of locating contours.</p> <p>Plane table Surveying: - Instrument used, Working operations, Methods of plane tabling, Three and two-point problems.</p>
3.	Curve Surveying

	Curve Surveying: - Simple Curves: Elements and setting out of simple curves, Rankine's method, Compound and Reverse curve: Elements and setting out of compound and reverse curve, Transition curve.
4.	Tacheometry and Photogrammetry Surveying
	Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning.
5.	Modern Field Survey Systems
	Introduction to Modern Surveying Techniques - Need, advantages, and applications over conventional methods, Total Geodetic Method (TGM) – Geodetic principles, triangulation, and high-precision control networks. Differential Global Positioning System (DGPS– Working, components, and applications. Total Station (TS) Surveying – Instrument setup, angle and distance measurement, data recording, and field applications. \ Drone (UAV) Surveying– Drone types, flight planning, image acquisition, photogrammetry, and real-world applications. Integration and Comparison– TS vs DGPS vs Drone; data integration with GIS; limitations and future scope.

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Advanced Surveying: Total Station, GIS and Remote Sensing,	Madhu, N, Sathikumar, R and Satheesh Gobi	Latest	Pearson India, 2006
2.	Geomatics Engineering	Manoj, K. Arora and Badjatia	Latest	Nem Chand & Bros, 2011
2.	Surveying and Levelling, Vol. I and II	Bhavikatti, S.S.	Latest	I.K. International, 2010
3.	Higher Surveying, Third Edition	Chandra, A.M.	First	New Age International (P) Limited, 2002
4.	Remote sensing and Geographical information system	Anji Reddy, M	First	B.S. Publications, 2001
5.	Surveying, Vol-I, II and III	Arora, K.R.	Latest	Standard Book House, 2015
Websites:				
http://www.nptelvideos.in/2012/11/surveying.html				
https://nptel.ac.in/courses/105107122/ https://nptel.ac.in/courses/105108077/				
https://nptel.ac.in/courses/105102015/				

D. CO-PO Mapping

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	2			-	-	-	-	-	-	-
CO – 02	2	3	2	2		-	-	-	-	-	-	-
CO – 03	2	2	3	2	2	-	-	-	-	-	-	-
CO – 04	2	2	2	3	2	-	-	-	-	-	-	-
CO – 05	2	2	2	2	3	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Remembering the physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength.	L1
CO – 02	Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer.	L2
CO – 03	Apply the testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results	L3
CO – 04	Analyze concreting Operations: Batching, Mixing, Transportation, placing, Compaction, Curing and Finishing of concrete.	L4
CO – 05	Understanding the admixtures in concrete: Purpose, properties, and application for different types of admixtures such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures, and super plasticizers.	L2

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Cement, Aggregates and Water	8
2.	Concrete	6
3.	Concrete Mix Design and Testing of Concrete	6
4.	Quality Control of Concrete	8
5.	Chemical Admixture, Special Concrete and Extreme Weather concreting	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Cement, Aggregates and Water
	<ul style="list-style-type: none"> Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength Storage of cement and effect of storage on properties of cement BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement Aggregates: Requirements of good aggregate, Classification according to size and shape Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness,

	<p>specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specifications.</p> <ul style="list-style-type: none"> Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.
2.	Concrete
	<ul style="list-style-type: none"> Concrete: Different grades of concrete, provisions of IS 456. Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456. Properties of fresh concrete, Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works Segregation, bleeding and preventive measures Properties of Hardened concrete: Strength, Durability, Impermeability
3.	Concrete Mix Design and Testing of Concrete
	<ul style="list-style-type: none"> Concrete mix design: Objectives, methods of mix design, Study of mix design as per IS 10262 (only procedural steps). Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results. Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests
4.	Quality Control of Concrete
	<ul style="list-style-type: none"> Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete Formwork for concreting: Different types of formwork for beams, slabs, columns, materials used for form work, Requirement of good formwork Stripping time for removal of formworks per IS 456. Waterproofing: Importance and need of waterproofing Methods of waterproofing and materials used for waterproofing Joints in concrete construction: Types of joints, methods for joining old and new concrete Introduction to water bars Materials used for filling joints
5.	Chemical Admixture, Special Concrete and Extreme Weather concreting
	<ul style="list-style-type: none"> Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix concrete, Fibre Reinforced concrete, High performance concrete, Self-compacting concrete, Light weight concrete Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Concrete Technology	M. S. Shetty	Latest	S Chand Publishing
2.	Concrete Technology	M. L. Gambhir	Latest	McGraw Hill Education
3.	Building Construction and Materials	Rangwala	Latest	Charotar Publishing House Pvt. Ltd.
4.	Building Construction	Sushil Kumar	Latest	Standard Publisher Dist.
5.	Building Construction	B. C. Punamia	Latest	Laxmi Publications
6.	Building Construction	S.P. Bindra, S.P.Arora	Latest	DhanpatRai Publications
Websites:				
https://nptel.ac.in/courses/105/102/105102012/				
https://nptel.ac.in/courses/105106176/				
https://nptel.ac.in/courses/105104030/				

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2				-	-	-	-	-	-	-
CO-02	1	3	2			-	-	-	-	-	-	-
CO-03	2	2	3	2	2	-	-	-	-	-	-	-
CO-04	2	2	2	3	2	-	-	-	-	-	-	-
CO-05	2	2	2	2	3	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	3	-	-
CO-05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Recall the key aspects of green building design, including sustainable site selection, water management, energy efficiency, materials selection, and indoor air quality considerations.	L1
CO – 02	Understand the principles of energy-efficient landscape design, including microclimate modification, shading techniques, and the use of thermal properties of building materials for improving comfort.	L2
CO – 03	Apply knowledge of passive heating and cooling techniques to design buildings that utilize solar radiation for heating and natural ventilation for cooling.	L3
CO – 04	Analyze the processes of heat exchange between buildings and the environment, considering factors such as solar radiation, thermal lag, and insulation.	L4
CO – 05	Analyze the effectiveness of passive heating and cooling strategies in reducing energy consumption and improving thermal comfort in buildings.	L4

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Introduction	8
2.	Landscape and Building Envelopes	6
3.	Passive Heating and Cooling	6
4.	Thermal Performance of Buildings	8
5.	Renewable Energy in Buildings	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction
	Climate and Building, Historical perspective, Aspects of green building design – Sustainable Site, Water, Energy, Materials and Indoor Air Quality and Energy Conservation Building Code Standards for Buildings.
2.	Landscape and Building Envelopes
	Energy efficient Landscape design – Microclimate, Shading, Arbors, Windbreaks, Xeriscaping, Building envelope – Thermal comfort, Psychrometry, Comfort indices, Thermal Properties of Building Materials – Thermal Resistance, Thermal Time Constant (TTC), Diurnal Heat Capacity(DHC),ThermalLag.
3.	Passive Heating and Cooling
	HVAC introduction, Passive Heating – Solar radiation basics, Sun Path Diagram, Direct Heating, Indirect Heating and Isolated heating, Concept of Day lighting, Passive Cooling–Natural Ventilation (Stack and Wind),Evaporative Cooling and Radiative Cooling.
4.	Renewable Energy in Buildings

	Introduction of renewable sources in buildings, BIPV, Solar water heating, small wind turbines, stand- alone PV systems, Hybrid system–Economics.
5.	Thermal Performance of Building
	Heat transfer due to fenestration / infiltration, Calculation of Overall Thermal Transmittance, Estimation of building loads: Steady state method, network method, numerical method, correlations, Thermal Storage integration in buildings.

C. RECOMMENDED STUDY MATERIAL:

S. No.	Reference Book	Author	Edition	Publisher
1.	Energy-efficient buildings in India	Mili Majumdar	Latest	TERI Press
2.	Climate considerations in building and Urban Design	Baruch Givoni	Latest	John Wiley & Sons, 1998
3	Solar Engineering of Thermal Processes	JA Duffie and WA Beckman	Latest	John Wiley & Sons, 2006.
4.	Passive Low Energy Cooling of Buildings	Baruch Givoni	Latest	John Wiley & Sons
5.	Heating and cooling of buildings: Design for Efficiency	Jan F. Kreider, Peter S. Curtiss, Ari Rab	Latest	CRC Press, 28-Dec-2009

Websites:

- <https://www.grihaindia.org/grihasummit/presentations/10tgs/R-Suresh.pdf>
- <https://hareda.gov.in/brief-summary-of-ecbc/>
- [https://beeindia.gov.in/en/energy-conservation-building-code-ecbc#:~:text=The%20Energy%20Conservation%20Building%20Code%20\(ECBC\)%20sets%20minimum%20energy%20standards,design%20strategies%20%26%20day%20light%20Integration](https://beeindia.gov.in/en/energy-conservation-building-code-ecbc#:~:text=The%20Energy%20Conservation%20Building%20Code%20(ECBC)%20sets%20minimum%20energy%20standards,design%20strategies%20%26%20day%20light%20Integration)
- [https://www.sciencedirect.com/book/9780128128176/handbook-of-energy-efficiency-in-buildings.](https://www.sciencedirect.com/book/9780128128176/handbook-of-energy-efficiency-in-buildings)
- <https://archive.nptel.ac.in/courses/105/102/105102175/>

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	1	2	-	1	-	1	-	-	-	-	-
CO – 02	1	1	2	-	1	-	-	-	-	-	-	-
CO – 03	1	-	3	-	1	-	-	-	-	-	-	-
CO – 04	2	-	3	-	1	-	-	-	-	-	-	-
CO – 05	2	1	2	-	1	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	1	-	-
CO – 02	3	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development.

COURSE OUTCOMES: After completion of the course, student will be able to:

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand the principles behind measuring and adjusting included angles of a closed traverse using a prismatic compass.	L1
CO-02	Apply the methods learned to measure horizontal angles by Theodolite using Repetition & Reiteration method.	L2
CO-03	Analyze horizontal and vertical angles measured by Theodolite for accuracy and consistency.	L3
CO-04	Evaluate the results obtained from EDM & Total Station measurements to determine angles and assess their reliability.	L4
CO-05	Create detailed survey reports and maps based on the data collected during surveying activities.	L4

A. LIST OF EXPERIMENTS:

1.	Ranging & fixing of Survey Stations using chain surveying.
2.	Determine Magnetic Bearing of a Line using Surveyor's Compass and Prismatic Compass.
3.	To measure and adjust the included angles of a closed traverse using prismatic compass.
4.	Determine the reduced levels using Tilting level.
5.	Measurement of horizontal angle by Theodolite using Repetition & Reiteration method.
6.	Prepare a plan and contour map for a given area using Plane Table Surveying.
7.	To measure the horizontal and vertical angles by Theodolite.
8.	To determine the Height of an object by trigonometrical levelling.
9.	To determine angles and elevation using EDM, Total station, DGPS and Drone Surveying
10.	Survey camp for 4 days.

B. VIRTUAL LABS

<http://sl-iitr.vlabs.ac.in/index.php?section=List%20of%20experiments>

C. COs AND POs MAPPING

COs and PO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	-	-	-	-	-	-	-	-	1
CO-02	3	3	2	-	2	-	-	-	-	-	-	1
CO-03	2	3	2	2	2	-	-	-	-	-	-	2
CO-04	2	3	2	3	3	-	-	-	-	-	-	2
CO-05	1	2	3	3	3	-	-	-	3	3	2	2

D. COs AND POs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	1	-	-
CO-04	2	-	-
CO-05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability

COURSE OUTCOMES: After completion of the course, student will be able to:

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Determine the fineness, specific gravity, standard consistency, and setting times of cement.	Understand (Level 2)
CO-02	Evaluate compressive strength of cement and concrete at different curing stages.	Evaluate (Level 5)
CO-03	Analyze properties of fine and coarse aggregates including silt content, bulking, water absorption, and bulk density.	Analyze (Level 4)
CO-04	Determine the fineness modulus, flakiness index, and elongation index of aggregates using sieve analysis.	Apply (Level 3)
CO-05	Assess concrete workability and non-destructive testing of hardened concrete using slump, compaction factor, and rebound hammer tests.	Evaluate (Level 5)

A. LIST OF EXPERIMENTS:

1.	Determine fineness of cement by sieving.
2.	Determine specific gravity, standard consistency, initial and final setting times of cement.
3.	Determine compressive strength of cement.
4.	Determine silt content and bulking in sand.
5.	Determine bulk density and water absorption of fine and coarse aggregates.
6.	Determine Fineness modulus of fine aggregate by sieve analysis.
7.	Determine elongation and flakiness index of coarse aggregates
8.	Determine workability of concrete by slump cone test and compaction factor test.
9.	To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and
10.	To determine the strength of column using Rebound Hammer Test.

B. VIRTUAL LABS

<http://civ02.vlabs.ac.in/index.html#>

c. COs AND POs MAPPING

COs and LOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	2	3	1	1	1	1	-	-	1
CO-02	2	3	3	3	3	1	1	1	2	2	2	2
CO-03	3	2	3	2	2	2	1	1	2	1	-	2
CO-04	2	2	2	2	3	1	-	-	1	1	-	1
CO-05	2	2	3	2	3	2	2	2	2	2	2	2

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	2	-
CO-02	3	3	2
CO-03	3	2	-
CO-04	2	2	-
CO-05	3	3	2

Note: On the basis of mapping of COs with POs, this course is related to Employability

COURSE OUTCOMES: After completion of the course, students will be able to:

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Identify tools and features in 3D Max interface and recall basic geometric Shape creation processes.	L1
CO-02	Describe object manipulation techniques and evaluate lighting and rendering settings	L2
CO-03	Apply modifiers effectively and integrate CAD/BIM data into 3D Max projects.	L3
CO-04	Create animations using keyframe techniques and assess advanced modeling techniques and plugins.	L4
CO-05	Develop realistic scenes and execute hands-on projects integrating modeling, texturing, and animation.	L5

A. LIST OF EXPERIMENTS:

1.	Introduction to 3D Max <ul style="list-style-type: none"> Overview of 3D Max interface and tools Understanding the workspace: viewports, menus, and panels
2.	Modeling Basics <ul style="list-style-type: none"> Creating basic geometric shapes: boxes, spheres, cylinders Editing and manipulating objects: move, rotate, scale Working with modifiers to modify object properties
3.	Advanced Modeling Techniques <ul style="list-style-type: none"> Using splines for creating complex shapes like roads, bridges, and curves Lofting and extruding to create 3D structures Boolean operations for combining or subtracting objects
4.	Material and Texturing <ul style="list-style-type: none"> Applying materials to objects: concrete, glass, metal, etc. Understanding UV mapping and texture coordinates Working with material libraries and custom textures
5.	Lighting and Rendering <ul style="list-style-type: none"> Types of lights in 3D Max: standard, photometric, and IES lights Adjusting light properties: intensity, color, shadows Rendering settings and output options
6.	Animation Basics <ul style="list-style-type: none"> Keyframe animation: creating movement and transformations Animating cameras for walkthroughs and flyovers Introduction to character animation and rigging
7.	Scene Composition and Environment <ul style="list-style-type: none"> Creating realistic environments with backgrounds and sky effects Adding foliage, trees, and landscaping elements Using environmental effects like fog, rain, and sunlight
8.	Integration with CAD and BIM <ul style="list-style-type: none"> Importing CAD drawings into 3D Max Working with BIM data for architectural visualization Collaborating between 3D Max and other design software
9.	Project Work <ul style="list-style-type: none"> Hands-on projects integrating modeling, texturing, lighting, and animation Designing and visualizing civil engineering projects: buildings, bridges, infrastructure

	<ul style="list-style-type: none"> Presenting projects with rendered images and animations
10.	Advanced Topics and Plugins <ul style="list-style-type: none"> Exploring advanced modeling techniques: parametric modeling, particle systems Utilizing plugins for specialized tasks: terrain generation, advanced rendering, physics simulations Industry applications and workflows for civil engineering projects

B. VIRTUAL LABS:

- <https://www.youtube.com/watch?v=e02uvDixrgQ&list=PLhK2D1lopoveO1qF>
- <https://www.youtube.com/watch?v=nKlFp03DmcM>

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	1	-	3	-	-	-	-	-	-	-
CO – 02	2	3	2	2	3	-	-	-	-	-	-	-
CO – 03	2	3	3	2	3	-	-	-	-	-	-	-
CO – 04	2	2	3	3	3	-	-	-	-	-	-	-
CO – 05	2	2	3	3	3	1	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	3	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Entrepreneur

COURSE OUTCOMES: After completion of the course, student will be able to:

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the structural systems used in building design, including assumptions related to integrity, aspect ratios, and overturning resistance.	L2
CO – 02	Apply knowledge of lateral loads to calculate wind loads on structures according to IS: 875-Part 3.	L3
CO – 03	Apply the structural behavior of various building systems under lateral loads, including shear walls, framed tubes, and multistory configurations.	L3
CO – 04	Analyze the suitability of prefabricated construction techniques for mass housing projects.	L4
CO – 05	Analyze innovative solutions for special roofs, including folded plates, cylindrical shells, and grid and ribbed floors, considering structural performance and architectural aesthetics.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Design Loads	8
2	Lateral loads	6
3	Earthquake load	8
4	Masonry and Framed Buildings	6
5	Mass Housing	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Design Loads
	Introduction, Design loads for different types of buildings, (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components. Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.
2	Lateral loads
	Introduction, Wind loads & calculation of wind load on structures (IS: 875-Part 3).
3	Earthquake load
	Introduction, Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures, (IS: 1893 – Part 1).
4	Masonry and Framed Buildings
	Introduction Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings Various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.
5	Mass Housing
	Introduction Mass Housing: Prefabricated construction for mass housing Special Roofs: Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication/Edition
1.	Introduction to Sustainable Engineering	R. L. Rag	2 nd Edition	S.K. Kataria & Sons
2.	Sustainable Engineering: Concept Design and case Study	Allen	Latest	CBS Publishers
3.	Sustainable Engineering	Krishna R. Reddy	Latest	Standard Publishers Distributors

Websites

https://nptel.ac.in/content/syllabus_pdf/105105106.pdf

<https://nptel.ac.in/courses/105105106/> <https://nptel.ac.in/courses/105106055/>

https://nptel.ac.in/content/syllabus_pdf/105106055.pdf

<https://nptel.ac.in/content/storage2/courses/105106055/Mod1/Lecture1.pdf>

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	3	2	2	1	1	1	2	2	-	2
CO – 02	3	3	2	2	3	1	1	1	-	-	-	2
CO – 03	3	3	3	2	3	1	1	1	1	-	-	2
CO – 04	2	3	3	3	2	3	2	1	2	2	2	3
CO – 05	2	2	3	3	2	2	2	1	2	2	1	3

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	1	-	-
CO – 02	3	-	-
CO – 03	3	-	-
CO – 04	3	-	-
CO – 05	2	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

COURSE OUTCOMES: After Successful completion of the course students will be able-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamental principles of cement hydration and the role of chemical admixtures in modifying fresh and hardened properties of concrete.	L2
CO – 02	Analyze the effects of mineral admixtures like fly ash, silica fume, GGBFS, and metakaolin on the performance and durability of concrete.	L4
CO – 03	Apply mix design principles to develop self-compacting concrete and other special concrete types to meet specific performance requirements.	L3
CO – 04	Evaluate the properties of special concretes (e.g., high strength, fiber-reinforced, lightweight) for suitability in different structural and environmental conditions.	L5
CO – 05	Assess durability parameters such as permeability, sulfate resistance, and shrinkage, and relate them to long-	L5

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Cement Chemistry & Admixture Fundamentals	6
2.	Mineral Admixtures & Binder Systems	6
3.	Mix Design & Special Concrete Properties (Fresh State)	6
4.	Hardened State & Performance of Special Concretes	6
5.	Durability, Rheology & Emerging Applications	6

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Cement Chemistry & Admixture Fundamentals Overview of cement chemistry, hydration, and performance. Role and types of chemical admixtures: water reducers (plasticizers, superplasticizers), set modulators, air entrainers, viscosity modifiers, shrinkage reducers, corrosion inhibitors, specialty. Standards and quality considerations for chemical admixtures.
2.	Mineral Admixtures & Binder Systems Classification and pozzolanic chemistry of mineral admixtures. In-depth coverage: fly ash, silica fume, GGBFS, metakaolin, LC3, agricultural ashes, limestone. Ternary binder systems, characterization techniques, life-cycle impact.
3.	Mix Design & Special Concrete Properties (Fresh State) Advanced mixture proportioning methods and performance specifications. Fresh properties and rheology of concrete; pumping and flow control. Self-compacting concrete (SCC): design, fresh-state behavior, plastic shrinkage.
4.	Hardened State & Performance of Special Concretes

	Properties of hardened concrete: high-strength, ultra-high-performance, fiber-reinforced, lightweight, high-density Mass concrete behavior; concrete for low temperature, 3D printing, sprayed and underwater applications, recycled and grout materials.
5.	Durability, Rheology & Emerging Applications
	Time-dependent deformation: creep, shrinkage, volumetric stability. Transport properties: permeability, chloride diffusion, carbonation, sulfate attack, freeze–thaw cycles. Link between microstructure and durability; new testing approaches; emerging trends.

C. RECOMMENDED STUDY MATERIAL:

S.No	Reference Book	Author	Edition	Publication/Edition
1.	Concrete: Microstructure, Properties, and Materials	P. Kumar Mehta, Paulo J. M. Monteiro	4th Edition	McGraw-Hill Education / 2014
2.	Properties of Concrete	A. M. Neville	5th Edition	Pearson Education / 2012
3.	Supplementary Cementing Materials for Sustainable Development	V. M. Malhotra, P. K. Mehta	1st Edition	CRC Press / 2005
Websites				
https://nptel.ac.in/courses/105106225				
https://www.youtube.com/watch?v=W6tfzpZNyv0				
https://www.classcentral.com/course/swayam-admixtures-and-special-concretes-184100				

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	3	2	1	-	2	-	-	-	-	-	-	-
CO – 02	3	1	2	-	1	-	2	-	-	-	-	-
CO – 03	3	3	3	2	1	-	-	-	-	-	-	-
CO – 04	1	3	3	3	-	-	-	-	-	-	-	-
CO – 05	3	-	3	-	-	2	3	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	3	-	-
CO – 05	3	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / SkillDevelopment

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Analyze the impact of sustainable design strategies on local building regulations.	L4
CO – 02	Evaluate the effectiveness of tree preservation measures in site selection.	L4
CO – 03	Apply water metering systems and irrigation management techniques.	L3
CO – 04	Understand the integration of renewable energy sources in building design.	L2
CO – 05	Remember sustainable building materials and waste management practices.	L1

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Sustainable Architecture and Design	8
2	Site Selection and Planning	9
3	Water Conservation	8
4	Energy Efficiency	8
5	Building Materials and Resources	9

B. DETAILED SYLLABUS

Unit	Unit Details
1	Sustainable Architecture and Design
	Approaches to Integrated Design, Preservation of Site Environment, Passive Design Strategies, Compliance with Local Building Regulations, Provision of Basic Amenities, Accessibility to Public Transportation.
2	Site Selection and Planning
	Use of Low-emitting Vehicles, Consideration of Natural Topography and Vegetation, Tree Preservation or Transplantation Measures, Strategies for Heat Island Reduction (Roof and Non-roof), Outdoor Light Pollution Reduction Techniques, Universal Design Principles, Provision of Basic Facilities for Construction Workers.
3	Water Conservation
	Implementation of Rainwater Harvesting (Roof & Non-roof), Adoption of Water-Efficient Plumbing Fixtures, Sustainable Landscape Design Practices, Management of Irrigation Systems, Waste Water Treatment and Reuse Strategies, Installation of Water Metering Systems.
4	Energy Efficiency
	Use of Eco-friendly Refrigerants, Enhancement of Energy Efficiency Measures, Integration of On-site and Off-site Renewable Energy Sources, Implementation of Energy Metering and Management Systems

5	Building Materials and Resources
	Segregation and Management of Waste Materials, Utilization of Sustainable Building Materials Organic Waste Management Practices, Proper Handling of Waste During Construction, Incorporation of Certified Green Building Materials, Post-occupancy Assessment and Management of Resources.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Introduction to Green Buildings & Built Environment	IGBC	2022	BS Publications / BSP Books
2	Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination	Karthik Karuppu; NVICO	2019	Repro Books-On-Demand

D. CO-PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	3	3	2	1	3	3	1	-	2	-	1
CO – 02	1	2	3	2	-	3	3	2	-	-	-	1
CO – 03	2	2	3	3	3	1	3	1	-	-	-	1
CO – 04	2	2	3	2	3	3	3	1	-	-	-	1
CO – 05	1	1	2	1	2	1	3	1	-	1	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	3	-	-
CO – 02	2	-	-
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	1	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability / SkillDevelopment

COURSE OUTCOMES: After Successful completion of the course students will be able

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Learn how to update and manage the experience, education, and skills & expertise sections on social media & formulate appropriate updates as a means to promote business activities.	L3
CO – 02	Understand how to leverage grammar and formatting in formal documents & demonstrate how to follow the stages of the writing process.	L3
CO – 03	Evaluate presentation's weak spots and areas for improvement & learn, practice and acquire the skills necessary to deliver effective presentation with clarity and impact.	L5
CO – 04	Evaluate basic factors such as personal skills & abilities, career fields, willingness to learn and strengthen the chances to get desirable jobs.	L5
CO – 05	Understand negotiation and team skills dynamics and how to prepare for uncertainty & learn to craft agile strategy and be quick on your feet in changing circumstances.	L3

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Personal Branding	2
2.	Professional Writing-II	8
3.	Presentation Skills: Professional Setting	2
4.	Job Interview & Group Discussion: Preparation by Mock Practice	4
5.	Negotiation Skills, Team Management & Professional Awareness	8

B. DETAILED SYLLABUS

LIST OF LABS	
1.	Definition of communication, communication process, informal communication, non-verbal, speakers vs communicators
2.	How leaders communicate, skills of a good communicator,
3.	40 question self-assessment, making sure your message matters, choosing your words, improving your skills
4.	Definition of defensive/non-defensive communication & 5 skills for communicating non- defensively.
5.	Definition of feedback, giving feedback, 10 common feedback mistakes, 5 tips on receiving feedback, 10 tips for dealing with difficult people.
6.	Barriers to listening, what is listening, listening vs hearing, bad listening habits, active listening
7.	Advanced Group Discussion-II: Analysis of professional GD Videos and Practices on Topics/Video/Article based topics
8.	When to use/not use e-mail, e-mail etiquette, when to use/not use telephone and video conferencing, 7-tips on telephone etiquette
9.	Planning your presentation, building, audio-visual aids, giving presentation, audience rapport overcoming stage fright.
10	Team Building Strategies: Project Management

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	2	-	-	3	2	1	2	3	3	-	2
CO – 02	3	3	-	2	-	1	-	1	2	3	-	1
CO – 03	2	2	1	2	2	2	-	2	3	3	1	2
CO – 04	2	2	2	2	-	3	2	1	2	2	2	3
CO – 05	2	2	2	3	3	3	3	3	3	3	3	3

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	3	2
CO – 02	3	2	1
CO – 03	2	3	2
CO – 04	2	2	3
CO – 05	3	3	3

Note: On the basis of mapping of COs with POs, this course is related to Employability / Skill Development

	POORNIMA UNIVERSITY, JAIPUR								
	Faculty of Engineering and Technology								
	Name of Program: B.Tech. in Civil Engineering Duration: 4 years Total Credits: 171								
	Teaching Scheme for Batch 2025-29								
	Semester-V								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits	
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total		
A.	Major (Core Courses)								
A.1	Theory								
BCVCCV5101	Structural Analysis-II	3	0	0	40	60	100	3	
BCVCCV5102	Design of Concrete Structures-I	3	0	0	40	60	100	3	
BCVCCV5103	Design of Steel Structures-I	3	0	0	40	60	100	3	
BCVCCV5104	Estimation and Costing	3	0	0	40	60	100	3	
A.2	Practical								
BCVCCV5201	Design of Concrete Structures-I Lab	0	0	2	60	40	100	1	
BCVCCV5202	Design of Steel Structures-I Lab	0	0	2	60	40	100	1	
BCVCCV5203	Cost Estimation lab	0	0	2	60	40	100	1	
BCVCCV5204	Industrial Technical Seminar-I	0	0	2	60	40	100	1	
B.	Minor Stream Courses / Department Electives								
B.1	Theory (Any One)								
BCVECV5111	Environmental Engineering	3	0	0	40	60	100	3	
BCVECV5112	Solid Waste Management	3	0	0	40	60	100		
BCVECV5113	Water Resource Engineering	3	0	0	40	60	100		
B.2	Practical								
C	Multidisciplinary Courses								
	MOOC Course-IV	2	0	0				2	
D	Ability Enhancement Courses (AEC)								
BUACHM5228	Professional Skills II	0	0	2	60	40	100	1	
E	Skill Enhancement Courses (SEC)								
BULCSE5201	Skill Enhancement Generic Course-IV	0	0	2	60	40	100	1	
F	Value Added Courses (VAC)								
		-	-	-					
	Summer Internship / Research Project / Dissertation								
Total		17	0	12				23	
Total Teaching Hours			29/29						

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Recall the definition and key concepts of determinate structures.	L1
CO – 02	Analyze the forces in cables considering temperature effects and suspension bridge configurations.	L4
CO – 03	Apply the slope-deflection method to analyze statically indeterminate structures.	L3
CO – 04	Use Kani's method to analyze beams and frames with and without sway.	L4
CO – 05	Evaluate the impact of different load types on influence lines and structural responses.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Analysis of Beams and Frame	6
2	Analysis of structures	8
3	Analysis of forces	8
4	Column Analogy method	8
5	Moving loads and influence lines	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Analysis of Beams and Frame
	Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.
2	Analysis of structures
	Analysis of structures using Moment distribution method applied to continuous beams and portal frames with and without inclined members.
3	Analysis of forces
	Introduction, Cables, suspension bridges and arches. Analysis of forces in cables-temperature effects-suspension bridges with three hinged and two hinged stiffening girders-theory of arches-Eddy's theorem-analysis of three hinged and two hinged arches -settlement and temperature effects.
4	Column Analogy method
	Introduction, Column Analogy method for indeterminate structures, determination of carry over factor for Non-prismatic section. Kani's Method: Analysis of beams and frames with & without sway by Kani's method.
5	Moving loads and influence lines
	Introduction to moving loads-concept of influence lines-influence lines for reaction, shear force and bending moment in simply supported beams and over hanging beams, Muller Breslau principle and its application to propped cantilevers, Influence lines for forces in beams and trusses analysis for different types of moving loads, Single concentrated load-several concentrated loads uniformly distributed load shorter and longer than the span.

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Mechanics of Structures Vol. I & II	S.B. Junarkar & Shah,	Charotar Publishing House.
2	Theory of Structures	B.C. Purnmia,	Laxmi Publication (P) Ltd.
3	Theory of Structures	Timoshenko,	McGraw Hill Book Co.
4	Structural Analysis	Ghali & Neville	E&FN Spon.
5	Structural Analysis	Hibbler R.C.,	PearsonS
Websites			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/1051010/			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/105105109/			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	-	-	-	-	1	-	2
CO-02	2	3	2	3	1	-	-	-	-	-	-	1
CO-03	2	3	3	2	1	-	-	-	-	1	-	2
CO-04	2	3	3	3	1	-	-	-	-	1	-	1
CO-05	2	3	2	3	1	-	1	-	-	1	-	2

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	3	-	-
CO-03	2	-	-
CO-04	3	-	-
CO-05	3	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamental concepts of design of RC members, including types and functions of reinforcement, and the different design philosophies.	L2
CO – 02	Apply the limit state method to analyze and design singly reinforced, flanged beams, and doubly reinforced rectangular beams for flexure.	L3
CO – 03	Analyze and design prismatic sections for shear using the limit state method (LSM) and understand the concept of collapse in shear.	L4
CO – 04	Apply the limit state method and direct design method to analyze and design one-way and two-way slabs and flat slabs, including detailing of reinforcement.	L3
CO – 05	Analyze the structural behavior of short and long columns, and design axially loaded short columns using the limit state method.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Analysis of Singly & Doubly Reinforced Beam	8
3	Shear, Bond and Development Length	8
4	Slab Design	8
5	Columns & Footing Design	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction
	Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method and Limit State Method.
2	Analysis of Singly & Doubly Reinforced Beam
	Analysis and design of singly reinforced, flanged beams and doubly reinforced rectangular beams for flexure using Limit State Method. Limit state of serviceability for deflection, control of deflection as per codal provisions of empirical coefficients.
3	Shear, Bond and Development Length
	Limit state of collapse in shear: analysis and design of prismatic sections for shear using LSM. Limit state of collapse in bond: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.
4	Slab Design
	Analysis and design of one way and two way slabs using LSM and Flat slab using direct design method as per code, Detailing of reinforcement.

5	Columns & Footing Design
	Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of uniaxially eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns. Design of Column Footings: Analysis and design of Isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Reinforced Concrete: Limit State Design	Jain, A.K	NEM CHAND & BROTHERS-ROORKEE
2	Reinforced Concrete Design	Sinha,	McGraw Hill Education
3	Design of R.C.C. Structures,	Karve & Shah,	Assorted Editorial.
4	, Design of reinforced concrete & Pre-stressed concrete Structures	Kong & Evans	CRC Press
Websites			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/1051010/			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/105105109/			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	-	1	-	-	-	-	-	-	1
CO-02	2	3	3	2	-	-	1	-	-	-	-	1
CO-03	3	1	2	3	1	-	1	-	-	-	-	2
CO-04	3	2	3	1	-	-	-	-	-	-	-	1
CO-05	2	1	3	2	-	-	-	-	-	-	-	2

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	3	-	-
CO-03	1	-	-
CO-04	2	-	-
CO-05	1	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamentals of plastic analysis in steel structures, including the static and mechanism methods of analysis and the concept of shape factor.	L2
CO – 02	Apply knowledge of bolt types, load transfer mechanisms, and prying action to design bolted and welded connections under various loadings.	L3
CO – 03	Apply knowledge of buckling curves and imperfection factors to design compression members under axial loads, including angle sections and built-up columns.	L3
CO – 04	Apply beam design principles to design simple and compound sections, main and subsidiary beams, considering lateral support conditions and potential failure modes (web buckling, web crippling, lateral torsional buckling).	L3
CO – 05	Analyze and design column bases for various loading conditions, including axial and eccentric compressive loads, using slab bases, gusseted bases, and grillage foundation design.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Connections	8
3	Compression Member	8
4	Beams	8
5	Member design under combined forces	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction
	Introduction: Types of steels and their broad specifications. Plastic Analysis: Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including momentrotation.
2	Connections
	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings. Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.
3	Compression Member
	Compression Member: Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member; Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens
4	BEAMS
	Beams: Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.

5	Member design under combined forces
	Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment Column Bases: Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Design of Steel Structures	N. Subramanian	Latest	Oxford University Press.
2	Limit state Design of Steel Structures	S K Duggal	Latest	TMH publication
3	Design of Steel Structures	S. Bhavikatti	Latest	I.K. International Pvt. Ltd.
4	Design of Steel Structures	V.L. Shah	Latest	Structures Publications.

Websites

<https://nptel.ac.in/courses/105105162/>

<https://nptel.ac.in/courses/105105132/>

<https://nptel.ac.in/courses/105106113/>

https://nptel.ac.in/content/syllabus_pdf/105105162.pdf

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	1	1	-	-	-	-	-	-	1
CO-02	3	2	2	1	-	-	-	-	1	-	-	2
CO-03	3	3	3	2	1	-	-	-	1	-	-	2
CO-04	3	2	3	2	1	-	-	-	-	-	-	2
CO-05	3	3	2	2	1	-	-	-	1	-	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	1	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	2	-	-
CO-05	3	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Explain the purpose and importance of estimates, identify the principles of estimating, and describe methods for taking out quantities of items of work, including the mode of measurement, measurement sheet, abstract sheet, and bill of quantities.	L2
CO – 02	Describe the factors affecting the cost of work, overhead charges, contingencies, and work charge establishment, and explain the various percentages for different services in building.	L2
CO – 03	Prepare detailed estimates for various types of buildings, RCC works, earthwork calculations for roads, and estimates of culverts, including services for buildings such as water supply, drainage, and electrification.	L3
CO – 04	Analyze the task for average artisans and various factors involved in the rate of an item, including material and labor requirements for various trades.	L4
CO – 05	Identify the space requirements and norms for the minimum dimensions of different units in residential and public buildings as per IS 962.	L1

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	8
2	Types of estimate & cost of works	9
3	Estimates	9
4	Rate Analysis and valuation	8
5	Building Bye-Laws	9

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction
	Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities.
2	Types of estimate & cost of works
	Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects. Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.
3	Estimates
	Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification

4	Rate Analysis and valuation
	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.), Basic schedule of rates.(B.S.R.), Valuation: Purposes, depreciation
5	Building Bye-Laws
	Space requirement and norms for minimum dimension of different units in the residential and public buildings as per IS 962, Rules and Bye-laws of sanctioning authorities for construction work, Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio).

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Publication
1	Estimating & Costing in Civil Engineering	B.N. Dutta and S. Dutta	CBS Publishers
2	Estimating & Costing (Civil)	D.D. Kohli,	S. Chand Publishing, 2012
Websites			
<ul style="list-style-type: none"> • https://theconstructor.org/practical-guide/quality-control/ • https://en.wikipedia.org/wiki/Estimation 			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	1	1	2	-	-	-	-	-	-	-	-
CO-02	3	2	1	2	-	1	-	-	-	-	-	-
CO-03	2	3	1	1	-	-	-	-	-	-	-	-
CO-04	3	1	2	1	-	1	-	-	-	-	-	-
CO-05	3	2	1	2	-	1	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	1	-	-
CO-05	2	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand the fundamental concepts of design of RC members, including types and functions of reinforcement, and the different design philosophies.	L2
CO-02	Apply the limit state method to analyze and design singly reinforced, flanged beams, and doubly reinforced rectangular beams for flexure.	L3
CO-03	Analyze and design prismatic sections for shear using the limit state method (LSM) and understand the concept of collapse in shear.	L4
CO-04	Apply the limit state method and direct design method to analyze and design one-way and two-way slabs and flat slabs, including detailing of reinforcement.	L3
CO-05	Analyze the structural behavior of short and long columns, and design axially loaded short columns using the limit state method.	L4

LIST OF EXPERIMENTS

Design as per syllabus of theory.

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	-	1	-	-	-	-	-	-	1
CO-02	2	3	3	2	-	-	1	-	-	-	-	1
CO-03	3	1	2	3	1	-	1	-	-	-	-	2
CO-04	3	2	3	1	-	-	-	-	-	-	-	1
CO-05	2	1	3	2	-	-	-	-	-	-	-	2

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	3	-	-
CO-03	1	-	-
CO-04	2	-	-
CO-05	1	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand the fundamentals of plastic analysis in steel structures, including the static and mechanism methods of analysis and the concept of shape factor.	L2
CO-02	Apply knowledge of bolt types, load transfer mechanisms, and prying action to design bolted and welded connections under various loadings.	L3
CO-03	Apply knowledge of buckling curves and imperfection factors to design compression members under axial loads, including angle sections and built-up columns.	L3
CO-04	Apply beam design principles to design simple and compound sections, main and subsidiary beams, considering lateral support conditions and potential failure modes (web buckling, web crippling, lateral torsional buckling).	L3
CO-05	Analyze and design column bases for various loading conditions, including axial and eccentric compressive loads, using slab bases, gusseted bases, and grillage foundation design.	L4

A. LIST OF EXPERIMENTS

Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	1	1	-	-	-	-	-	-	1
CO-02	3	2	2	1	-	-	-	-	1	-	-	2
CO-03	3	3	3	2	1	-	-	-	1	-	-	2
CO-04	3	2	3	2	1	-	-	-	-	-	-	2
CO-05	3	3	2	2	1	-	-	-	1	-	-	1

C.LOs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	1	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	2	-	-
CO-05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Explain the significance and functionalities of quantity takeoff software in construction project planning and estimation.	L2
CO-02	Demonstrate the ability to create and manage projects using quantity takeoff software, including data import and interface navigation.	L3
CO-03	Apply appropriate measurement techniques for various construction materials and elements using manual, digital, or BIM-integrated methods.	L3
CO-04	Analyze calculated quantities and cost estimates to ensure accuracy and consistency across different project elements.	L4
CO-05	Create customized reports and collaborate effectively with project stakeholders using the software's advanced tools and integration capabilities.	L5

A. LIST OF EXPERIMENTS

1. **Introduction to Quantity Takeoff Software**
 - Overview of quantity takeoff software and its importance in construction projects.
 - Understanding the interface, tools, and functionalities of the software.
2. **Creating a Project**
 - Setting up a new project and defining project parameters.
 - Importing project data such as drawings, specifications, and material lists.
3. **Quantity Measurement Techniques**
 - Learning various methods for quantifying materials: manual input, digitization, and BIM integration.
 - Applying measurement techniques to different construction elements: concrete, steel, masonry, etc.
4. **Quantity Calculation and Analysis**
 - Performing quantity calculations based on input data and measurement techniques.
 - Analyzing quantities for accuracy, consistency, and completeness.
5. **Cost Estimation**
 - Utilizing quantity data to estimate material costs for project elements.
 - Incorporating labor and equipment costs for comprehensive cost estimation.
6. **Advanced Features and Customization**
 - Exploring advanced features like formula-based calculations and custom quantity templates.
 - Customizing reports and outputs to meet project-specific requirements.
7. **Integration with Other Tools**
 - Importing data from design software (CAD, BIM) for seamless quantity takeoff.
 - Exporting quantity data to project management and accounting software for cost tracking.

8. Collaboration and Teamwork

- Collaborating with project teams to share quantity data and updates.
- Managing multiple users and permissions within the software.

9. Quality Assurance and Verification

- Implementing quality checks to verify quantity measurements against project specifications.
- Addressing discrepancies and ensuring accuracy in quantity takeoff.

10. Project Documentation and Reporting

- Generating detailed quantity takeoff reports including itemized lists, quantities, and costs.
- Presenting findings and analysis to stakeholders through professional documentation.

B. VIRTUAL LAB

<https://www.youtube.com/watch?v=85rR29t0Vc0&list=PLxof9bXgW41Tj3NX7jhGKhH0ZVIFJIRVX>

https://www.youtube.com/watch?v=FhZxi1RAoNc&list=PLgOlyL_cmYwEbWOCUiHz0D_wCzcl68y_NX

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	2	1		-	2	-	-	-	-	-	-	-
CO-02	1	2	3	-	2	-	-	-	-	-	-	-
CO-03	2	2	3	2	3	-	-	-	-	-	-	-
CO-04	1	2	3	3	3	-	-	-	-	-	-	-
CO-05	-	1	2	-	2	-	-	-	3	2	-	1

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	1	-
CO-02	2	3	-
CO-03	3	3	-
CO-04	3	2	1
CO-05	2	3	2

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Recall and comprehend the principles of effective presentation skills, technical content delivery, and audience engagement.	L1
CO-02	Apply research methodologies to select seminar topics and structure seminar content effectively.	L3
CO-03	Create and deliver a final seminar presentation incorporating learned skills and feedback for continuous improvement.	L5
CO-04	Analyze and address time management and technical issues during seminar presentations for smooth delivery.	L4
CO-05	Evaluate peer presentations and implement feedback to improve one's own presentation quality and content clarity.	L5

A. LIST OF EXPERIMENTS

1. Topic selection and research techniques for engaging seminar topics.
2. Structuring seminar content with clear introductions and conclusions.
3. Developing effective presentation skills including voice modulation and body language.
4. Utilizing visual aids like slides and charts to enhance presentations.
5. Implementing strategies to capture and maintain audience engagement.
6. Delivering technical content clearly and concisely.
7. Handling technical issues and managing time during presentations.
8. Participating in peer feedback sessions for constructive criticism.
9. Applying feedback to improve presentation skills and content clarity.
10. Delivering a final seminar presentation incorporating learned skills and receiving evaluation for further enhancement.

B. VIRTUAL LAB

- <https://www.youtube.com/watch?v=BPdzkfkFnvw>
- <https://www.youtube.com/watch?v=hqXFPq676iM>
- https://www.youtube.com/watch?v=_0OUwEDorYg

C. LOs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	-	2	-	-	-	-	-	-	2	3	-	-
CO-02	2	3	2	-	2	-	-	-		2	-	-
CO-03	-	2	3	-	2	-	-	-	2	3	-	1
CO-04	1	1	2	2	-	-	-	-		2	-	1
CO-05	-	2	2	-	-	-	-	-	3	3	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	1	-	3
CO-02	2	3	2
CO-03	2	3	3
CO-04	2	2	3
CO-05	1	2	3

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the components of the environment, the importance of water, the role of an Environmental Engineer, and historical developments in environmental engineering.	L2
CO – 02	Apply knowledge of alternative water sources (rain, surface, ground water) to assess yield, develop water sources, and understand water quality parameters and Indian Standards.	L3
CO – 03	Apply hydraulics principles to conduits, selection of pipe materials, pipe joints, pumps, and pump stations in water transmission.	L3
CO – 04	Analyze preparation of hydraulic profiles and the design of treatment processes for water supply.	L4
CO – 05	Apply methods for distributing water, design distribution systems, and analyze hydraulic requirements for distribution systems.	L3

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	General	8
2	Source of water and collection works	8
3	Transmission of water	6
4	Advanced Treatment of Water	6
5	Distribution of water	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	General
	Introduction, Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview. Water Demand: Design flow, design periods, and design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.
2	Source of water and collection works
	Introduction, Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source. Quality of water: The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.
3	Transmission of water
	Introduction, Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station. Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening.
4	Advanced Treatment of Water

	Introduction, filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.
5	Distribution of water
	Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system. Plumbing of Building for water supply: Service connections, fixture units, simultaneous flow, design of plumbing system.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Water Supply	S.K. Garg,	Latest	Khanna Publishing Co.
2	Environmental Engineering	Peavy, H.S., Rowe D.R. and Techobanoglous	Latest	McGraw Hill, Book Company
3	Manual of Water Supply and Water Treatment			Ministry of Urban Development, Govt. of India.
Website				
https://nptel.ac.in/courses/1051061/ https://nptel.ac.in/courses/1051071/ https://nptel.ac.in/courses/1271050/ https://nptel.ac.in/courses/1051030/ https://nptel.ac.in/courses/105102160/				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	2	3	1	1	-	-	-	-	-	-	-	1
CO-02	3	2	1	2	-	-	-	-	-	-	-	-
CO-03	3	1	3	2	-	1	-	-	-	-	-	-
CO-04	2	3	3	1	-	-	-	-	1	-	-	-
CO-05	3	2	2	2	-	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	1	-	-
CO-03	3	-	-
CO-04	3	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the composition, sources, types, and properties of municipal solid waste (MSW), including physical, chemical, and biological properties.	L2
CO – 02	Understand methods to measure solid waste quantities, factors affecting waste generation rates, and quantities of materials recovered from MSW.	L2
CO – 03	Analyze the effectiveness of different separation and processing techniques for MSW.	L4
CO – 04	Evaluate the advantages and disadvantages of different disposal methods (e.g., landfill vs. incineration) and their effects on waste management.	L4
CO – 05	Understand the definition, identification, classification, and characteristics of hazardous solid waste.	L2

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Composition and Properties of Municipal Solid Waste	8
2	Solid Waste Generation and Collection	6
3	Separation and Processing of Solid Waste	8
4	Disposal of Municipal Solid Waste	6
5	Hazardous Solid Waste	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Composition and Properties of Municipal Solid Waste
	Introduction, Sources of solid waste, Types of solid waste. Composition of solid waste and its determination. Types of materials recovered from Municipal solid waste (MSW). Physical, Chemical and Biological and properties of Municipal Solid Waste, Transformation of Municipal Solid Waste.
2.	Solid Waste Generation and Collection
	Introduction, Measurements, and methods to measure solid waste quantities. Solid waste generation and collection. Factors affecting solid waste generation rate. Quantities of materials recovered from MSW.
3.	Separation and Processing of Solid Waste
	Introduction, Handling and separation of solid waste At site. Material separation by pick in, screens, float and separator magnets and electromechanical separator and other latest devices for material separation. Processing of solid waste at residence e.g. Storage, conveying, compacting, Shredding, pulping, granulating etc. Processing of solid waste at Commercial and industrial site.
4.	Disposal of Municipal Solid Waste

	Introduction, Combustion and energy recovery of municipal solid waste, Effects of combustion, undesirable effects of Combustion. Landfill: Classification, planning, siting, permitting, landfill processes, landfill design, landfill operation, use Of old landfill. Differentiate sanitary land fill and incineration as final disposal system for solid waste Biochemical processes: Methane generation by anaerobic digestion, composting and other biochemical Processes.
5.	Hazardous Solid Waste
	Introduction, Definition, identification and classification of hazardous solid waste. Characteristics Hazardous waste toxicity, reactivity, infectiousness, flammability, radioactivity, corrosiveness, irritation, bio-concentration, genetic activity, explosiveness. Bio-medical waste, its sources, generation, storage, transportation and Disposal.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Integrated Solid Waste Management	George Tchobanoglous and Hillary theisen, Samuel Vigil	Latest	McGraw Hill
2.	Disposal and recovery of municipal solid waste	Michael E Henstock	Latest	Butterworth-Heinemann Ltd (January 1983)
3.	Solid Waste Management	P Aarne Vesilig	Latest	Cengage Learning Custom Publishing
4.	Environmental Engineering	Mackenzie L Davis, David A Cornwell	Latest	McGraw-Hill Inc.
Websites				
https://nptel.ac.in/courses/120108005/ https://nptel.ac.in/courses/105/106/105106056/ https://nptel.ac.in/courses/105105160/				

D.CO's AND PO's MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	1	-	-	-	-	-	-	-	1
CO-02	2	1	3	2	-	-	-	-	-	-	-	-
CO-03	3	3	2	1	-	-	-	-	-	-	-	-
CO-04	3	2	1	2	-	-	-	-	-	-	-	1
CO-05	3	2	3	2	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	1	-	-
CO-04	1	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand water distribution efficiency and crop water requirements.	L2
CO – 02	Apply design principles and theories like Kennedy's Theory and Lacey's Theory to design canals and control silt in them.	L3
CO – 03	Apply knowledge of canal regulation techniques and cross drainage designs to ensure efficient water flow in irrigation systems.	L3
CO – 04	Understand the principles of embankment dams and gravity dams, including stability requirements and design considerations.	L2
CO – 05	Analyze the factors influencing hydrological processes and evaluate the effects of rainfall on water availability and runoff.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Irrigation	8
2	Design of Canal	6
3	Canal regulation & Cross Drainage works	8
4	Well Hydraulics and Dam	6
5	Hydrology	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Irrigation
	Introductions: Definition, Types of irrigation, Irrigation water qualities, Readily available moisture, Consumptive use of water, Water distribution efficiency, Water irrigation requirement, Duty and Delta, Gross commanded area and Culturable commanded area, Rabi and kharif crops.
2.	Design of Canal
	Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirement, Estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.
3.	Canal regulation & Cross Drainage works
	Canal Cross section elements, Canal regulation works: canal regulators, canal falls, canal escape, outlet, Criteria for judging performance of outlet. Cross drainage work: Aqueduct, Syphon aqueduct, Super passage, Syphon.
4.	Well Hydraulics and Dam
	Well Hydraulics: Coefficient of permeability and transmissibility, Specific yield, Specific retention, Specific capacity, Specific coefficient, Exit gradient. Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flow net, principles of design of earth dams.

	Gravity Dams: Force acting on a gravity dam, stability requirements.
5.	Hydrology
	Hydrology: Definition, Hydrologic cycle, measurement of rainfall, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination.

C. RECOMMENDED STUDY MATERIAL:

S. No.	Book	Author	Edition	Publication
1	Irrigation Water Power and Water Resource Engineering	KR Arora	Second	Standard Publishers and Distributers, Delhi.
2	Water Resource Engineering	Modi	Latest	Standard Publishers.
3	Irrigation and Water Power Engineering	BC Punmia & B BLal	Sixteenth edition	Laxmi Publication (P) Ltd.
4	Irrigation Engineering	G.L.Asawa	First	New Age International Publishers, New Delhi.
5.	Irrigation & Water Power Engineering	Das & Saikia	Latest	PHI
Websites				
<ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105110/ • https://nptel.ac.in/courses/105108081/ • https://nptel.ac.in/courses/105108130/ • https://agupubs.onlinelibrary.wiley.com/journal/19447973 				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 03	2	3	3	1	-	-	-	-	-	-	-	-
CO – 04	3	2	1	2	-	-	-	-	-	-	-	-
CO – 05	3	3	2	1	-	1	-	-	-	-	-	-
CO – 03	3	2	2	3	-	1	-	-	-	-	-	-
CO – 04	3	2	3	1	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 03	3	-	-
CO – 04	2	-	-
CO – 05	1	-	-
CO – 03	3	-	-
CO – 04	1	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Learn how to update and manage the experience, education, and skills & expertise sections on social media & formulate appropriate updates as a means to promote business activities.	L3
CO – 02	Understand how to leverage grammar and formatting in formal documents & demonstrate how to follow the stages of the writing process.	L2
CO – 03	Evaluate presentation's weak spots and areas for improvement & learn, practice and acquire the skills necessary to deliver effective presentation with clarity and impact.	L5
CO – 04	Evaluate basic factors such as personal skills & abilities, career fields, willingness to learn and strengthen the chances to get desirable jobs.	L5
CO – 05	Understand negotiation and team skills dynamics and how to prepare for uncertainty & learn to craft agile strategy and be quick on your feet in changing circumstances.	L2

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Personal Branding	2
2	Professional Writing-II	8
3	Presentation Skills: Professional Setting	2
4	Job Interview & Group Discussion: Preparation by Mock Practice	4
5	Negotiation Skills, Team Management & Professional Awareness	8

B. DETAILED SYLLABUS

LIST OF LABS	
1.	Personal Branding: Its best practices
2.	Professional Writing II: Abstract Writing, Statement of purpose and other formal documents
3.	Expanding Professional Vocabulary
4.	Resume Building-II: Revising & Updating
5.	E-Learning & E-Content Development-II
6.	Presentation Skills in Professional Setting
7.	Job Interviews II: Preparation and Presentation for Mock Interviews
8.	Advanced Group Discussion-II: Analysis of professional GD Videos and Practices on Topics/Video/Article based topics
9.	Negotiation Skills & and Conflict Resolution-II
10.	Change and Transition Management

11.	Team Building Strategies: Project Management
12.	Career Awareness & Productive Mindset

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO – 01	2	2	-	-	3	2	1	2	3	3	-	2
CO – 02	3	3	-	2	-	1	-	1	2	3	-	1
CO – 03	2	2	1	2	2	2	-	2	3	3	1	2
CO – 04	2	2	2	2	-	3	2	1	2	2	2	3
CO – 05	2	2	2	3	3	3	3	3	3	3	3	3

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	3	2
CO – 02	3	2	1
CO – 03	2	3	2
CO – 04	2	2	3
CO – 05	3	3	3

Note: On the basis of mapping of LOs with POs, this course is related to Employability / Skill Development

POORNIMA UNIVERSITY, JAIPUR

Faculty of Engineering and Technology

Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171

Teaching Scheme for Batch 2025-29

Semester-VI

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
BCVCCV6101	Geotechnical Engineering-I	3	0	0	40	60	100	3
BCVCCV6102	Design of Concrete Structures II	3	0	0	40	60	100	3
BCVCCV6103	Design of Steel Structures II	3	0	0	40	60	100	3
BCVCCV6104	Transportation Engineering	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV6201	Geotechnical Engineering Lab-I	0	0	2	60	40	100	1
BCVCCV6202	Design of Concrete Structures-II Lab	0	0	2	60	40	100	1
BCVCCV6203	Design of Steel Structures II Lab	0	0	2	60	40	100	1
BCVCCV6204	Road Material Testing lab	0	0	2	60	40	100	1
BCVCCV6205	Academic Research Paper Writing and IPR	0	0	2	60	40	100	1
B.		Minor Stream Courses/ Department Electives						
B.1	Theory (Any One)							
BCVECV6111	Ground Improvement Techniques	3	0	0	40	60	100	3
BCVECV6112	Non-Destructive Testing	3	0	0	40	60	100	
BCVCBX6113	Indian Knowledge System In Architecture And Town	3	0	0	40	60	100	
B.2	Practical							
	-							
C		Multidisciplinary Courses						
	MOOC - V	2	0	0				2
D		Ability Enhancement Courses (AEC)						
		-	-	-				
E		Skill Enhancement Courses (SEC)						
BULCSE6201	Skill Enhancement Generic Course-VI	0	0	2	60	40	100	1
F		Value Added Courses (VAC)						
		-	-	-				
G		Summer Internship / Research Project / Dissertation						
BCVCCV6301	Minor Project	0	0	4	60	40	100	2
Total		17	0	16				
Total Teaching Hours		33 / 33						25

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand soil constituents, index properties, and classification systems.	L2
CO – 02	Analyze factors affecting soil permeability and conduct laboratory tests to determine permeability	L4
CO – 03	Apply knowledge of different stresses in soil masses to calculate stresses and understand their influence on engineering structures.	L3
CO – 04	Apply knowledge of shear strength parameters and perform laboratory tests to determine shear parameters.	L3
CO – 05	Analyze factors affecting soil compaction and evaluate compaction methods and equipment.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction to Soil	6
2	Clay mineralogy	6
3	Stresses in soil	8
4	Shear in soil	8
5	Compaction of soil	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to soil
	Introduction: Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, Degree of saturation, air void and air content, unit weights, density index etc., Inter-relationships of the above . Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, Consistency limits, void ratio and density index, Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.
2	Clay mineralogy
	Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, Clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics, Soil water absorbed, capillary and free water Darcy's law of permeability of soil and its determination in laboratory, Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.
3	Stresses in soil
	Stresses in soil mass: total, effective and neutral pressure, Calculation of stresses, influence of water table on effective stress, Quicksand phenomenon, Seepage and Seepage Pressure , Laplace's equation for seepage. Flow net and its construction, Uplift pressure, piping, principle of drainage by electro Osmosis, Phreatic line, Flow net through earth dam.
4	Shear in soil

	Introduction, Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box, Triaxial and unconfined compression test apparatuses, Typical stress-strain curves for soils, Typical failure envelopes for cohesion less soils and normally consolidated clay soils.
5	Compaction of soil
	Introduction, Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, compaction equipment, Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Basic and applied Civil Mechanics	Rajan&Rao,	Latest	New Age International Publishers.
2	Soil Mechanics & Foundation Engineering	Arora K.R,	Latest	Standard Publishers and Distributers, Delhi.
3	Soil Engineering in Theory & Practice	Alam Singh,	Latest	CBS Publishers and Distributers, Delhi.
4	Geotechnical Engineering—Principles and Practices		Latest	Coduto PHI Publishers.
Website				
<ul style="list-style-type: none"> • https://nptel.ac.in/courses/105101201/ • https://nptel.ac.in/courses/105105168/ • https://nptel.ac.in/courses/105106142/ • https://nptel.ac.in/courses/105101001/ • https://nptel.ac.in/courses/105105185/ 				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	2	-	-	-	-	-	-	-	-
CO-02	3	1	2	1	-	-	-	-	-	-	-	-
CO-03	3	2	2	1	-	1	-	-	-	-	-	-
CO-04	2	1	3	2	-	1	-	-	-	-	-	-
CO-05	3	3	2	1	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	-	-	-
CO-03	2	-	-
CO-04	2	-	-
CO-05	-	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Analyze and design pre-stressed concrete sections for flexure and shear, considering material properties, losses of pre-stress, and IS specifications.	L4
CO – 02	Apply codal methods to analyze and design beams for torsion. Apply coefficients and moment redistribution concepts to analyze and design continuous beams and curved beams.	L3
CO – 03	Apply analysis and design principles to circular domes with various loading conditions and design water tanks and towers considering different types and loading conditions.	L3
CO – 04	Analyze slabs using yield line theory and apply it to simple support conditions. Analyze and design cantilever retaining walls, counterfort, and buttress type retaining walls considering structural behavior and stability analysis.	L4
CO – 05	Apply analysis and design principles to superstructures of slab culverts and T-bridges for IRC loading.	L3

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Elements of Pre-stressed Concrete	6
2	Torsion and Continuous and Curved Beams:	8
3	Circular Domes and Water Tanks and Towers	8
4	Yield Line Theory and Retaining walls	8
5	Culverts and Bridges	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Elements of Pre-stressed Concrete
	Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of rectangular and T sections for flexure and shear
2	Torsion and Continuous and Curved Beams:
	Torsion: Analysis and Design of beams for torsion as per codal method. Continuous and Curved Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.
3	Circular Domes and Water Tanks and Towers
	Circular Domes: Analysis and design of Circular domes with u.d.l. & concentrated load at crown. Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.
4	Yield Line Theory and Retaining walls

	Yield Line Theory: Introduction to Yield line concept, Application of Y.L.T. to slabs with simple support conditions. Retaining walls: Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis
5	Culverts and Bridges
	Culverts and Bridges: Analysis and Design of super structure of slab culverts and T-bridge for I.R.C. loading

C. RECOMMENDED STUDY MATERIAL

Sr. No.	Book	Author	Publication
1	Reinforced Concrete: Limit State Design	Jain, A.K	NEM CHAND & BROTHERS-ROORKEE
2	Reinforced Concrete Design	Sinha,	McGraw Hill Education
3	Design of R.C.C. Structures,	Karve & Shah,	Assorted Editorial.
4	, Design of reinforced concrete & Pre-stressed concrete Structures	Kong & Evans	CRC Press
Websites			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/1051010/			
https://nptel.ac.in/courses/1051051/			
https://nptel.ac.in/courses/105105109/			

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	2	1	3	2	-	-	-	-	-	-	-	-
CO-02	3	2	1	1	-	-	-	-	-	-	-	2
CO-03	2	3	2	1	-	1	-	-	-	-	-	1
CO-04	3	2	2	1	-	1	-	-	-	-	-	1
CO-05	3	3	1	1	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	1	-	-
CO-05	3	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Analyze and design gantry girders, roof trusses, and purlins considering wind loading, connections, and the use of tubular sections in Pre Engineered Buildings.	L4
CO – 02	Apply design principles to plate girders, welded and bolted connections, splicing, stiffeners, curtailment, and shear strength determination using various methods.	L3
CO – 03	Apply bridge design principles to different types of bridges, including deck type plate-girder bridges, bracings, and frames, considering standard loadings and IS 800 procedures.	L3
CO – 04	Apply design principles to foot over bridges, through type truss girder bridges, including stringer and cross girder design, main truss members, and bracings.	L3
CO – 05	Analyze and design water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, and staging considering structural and functional requirements	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Gantry Girder	6
2	Plate Girder	8
3	Bridges	8
4	Truss Member	8
5	Design of tanks	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Gantry Girder
	Design of gantry girder. Design of roof trusses including wind loading and purlin design, Introduction to Pre Engineered Buildings and tubular sections and their applications.
2	Plate Girder
	Design of plate girder: Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800.
3	Bridges
	Bridges: Types of bridges, Loadings, Standard loading for railway bridges, Design of Deck type plate-girder bridges, design of its bracings and frames.
4	Truss Member
	Design aspects of foot over bridges. Design of through type truss girder bridges including stringer design, cross girder design, main truss members, portal and sway bracings etc.
5	Design of tanks
	Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Design of Steel Structures	N. Subramanian	Latest	Oxford University Press.
2	Limit state Design of Steel Structures	S K Duggal	Latest	TMH publication
3	Design of Steel Structures	S. Bhavikatti	Latest	I.K. International Pvt. Ltd.
4	Design of Steel Structures	V.L. Shah	Latest	Structures Publications.

Websites

<https://nptel.ac.in/courses/105105162/> <https://nptel.ac.in/courses/105105132/>

<https://nptel.ac.in/courses/105106113/>

https://nptel.ac.in/content/syllabus_pdf/105105162.pdf

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	-	-	-	-	-	-	1
CO-02	3	1	2	2	-	-	-	-	-	-	-	1
CO-03	3	2	1	2	1	-	-	-	-	-	-	1
CO-04	2	3	1	1	2	-	-	-	-	-	-	1
CO-05	3	3	1	2	-	-	-	-	-	-	-	1

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	3	-	-
CO-03	2	-	-
CO-04	2	-	-
CO-05	3	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamentals of plastic analysis in steel structures, including the static and mechanism methods of analysis and the concept of shape factor.	L2
CO – 02	Apply knowledge of bolt types, load transfer mechanisms, and prying action to design bolted and welded connections under various loadings.	L3
CO – 03	Apply knowledge of buckling curves and imperfection factors to design compression members under axial loads, including angle sections and built-up columns.	L3
CO – 04	Apply beam design principles to design simple and compound sections, main and subsidiary beams, considering lateral support conditions and potential failure modes (web buckling, web crippling, lateral torsional buckling).	L3
CO – 05	Analyze and design column bases for various loading conditions, including axial and eccentric compressive loads, using slab bases, gusseted bases, and grillage foundation design.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Highway Materials and Construction	8
3	Highway Geometric Design	8
4	Elementary Traffic Engineering	6
5	Structural design of Highway Pavements	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Historical Development and Geometric Design of Highway
	Historical development: Ancient road, Highway development in India, Highway planning in India, Highway Geometric design: Cross Sectional Elements, camber, Sight Distances-definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, and transition curves. Design of Vertical Alignment – Gradients, Vertical curves.
2	Highway Materials and Construction
	Highway Materials: Soil Testing:- Plate bearing test, California bearing ratio test; Stone Aggregate test:- Crushing test, Impact test, Abrasion test, Soundness test, Shape test, Water absorption test, Bitumen adhesion test; Bitumen and Tar and different test of bitumen test. Highway Construction: Methods of constructing different types of roads viz. Stabilized roads, WBM & WMM, Bituminous roads and Concrete roads. Specific features of rural roads.
3	Elementary Traffic Engineering
	Introduction, Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study, analysis and application of different traffic survey data, Importance and types of Traffic Signs, Signals and 2 phase signal design, Road Markings and Road

	Intersections
4	Structural design of Highway Pavements
	Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergad's and modified methods. (As per guidelines of IRC), Joint in rigid pavement. Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of hill roads.
5	Geometric Design of Highway using MX Road
	Software basics, DTM creation, road design, Cross-section analysis, Pavement design, Safety considerations, project work, Integration, and Advanced features in transportation engineering.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Highway Engineering	Khanna, S.K. and Justo, C.E.G.	Latest	Nem Chand & Bros. 2004
2	Highway Material Testing Manual	Khanna, S.K. and Justo, C.E.G.	Latest	Nem Chand & Bros. 2004
3	Traffic Engineering and Transportation Planning	Kadiyali, L.R.	Latest	Khanna Publishers. 2002
4	Principles and Design of Highway Engineering	Sharma, S.K.	Latest	S. Chand & Co. 1995

Websites

<https://nptel.ac.in/courses/1051010/>
<https://nptel.ac.in/courses/1051051/>
<https://nptel.ac.in/courses/1051071/>
<https://nptel.ac.in/courses/1051040/>
<https://nptel.ac.in/courses/1051010/>
<https://www.journals.elsevier.com/transportation-engineering/>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	3	1	1	-	-	-	-	-	-	-
CO-02	2	2	3	1	2	-	-	-	-	-	-	1
CO-03	2	1	3	2	1	-	1	-	-	-	-	-
CO-04	3	2	1	1	2	-	-	-	-	-	-	-
CO-05	2	3	2	1	1	-	-	-	-	-	-	-

E. COs and PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	3	-	-
CO-03	3	-	-
CO-04	1	-	-
CO-05	2	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Recall procedures for soil tests.	L1
CO-02	Grasp principles and theories.	L2
CO-03	Execute experiments using appropriate techniques and apparatus for soil Characterization.	L5
CO-04	Interpret and draw conclusions about soil properties.	L2
CO-05	Evaluate the suitability of soils for construction purposes based on test data and relate it to real-world geotechnical applications.	L5

A. LIST OF EXPERIMENTS

1. Determination of Grain size distribution by sieving.
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.or cone penetrometer
5. Determination of plastic limit
6. Determination of shrinkage limit
7. Determination of field density by core-cutter and sand replacement method
8. Determination of compaction properties by standard Proctor Test Apparatus
9. Determination of C- ϕ values by Direct Shear Test Apparatus
10. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

B. VIRTUAL LABS

<http://smfe-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering>

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	-	-	-	-	-	-	-	-	-	-	-
CO-02	3	2	2	-	-	-	-	-	-	2	-	-
CO-03	3	3	3	-	2	-	-	-	-	2	-	-
CO-04	3	3	3	2	2	-	-	-	-	2	-	-
CO-05	3	2	3	2	3	-	-	-	1	2	-	1

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	1	-	-
CO-03	2	-	-
CO-04	1	-	-
CO-05	1	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Analyze and design pre-stressed concrete sections for flexure and shear, considering material properties, losses of pre-stress, and IS specifications.	L4
CO-02	Apply codal methods to analyze and design beams for torsion. Apply coefficients and moment redistribution concepts to analyze and design continuous beams and curved beams.	L3
CO-03	Apply analysis and design principles to circular domes with various loading conditions and design water tanks and towers considering different types and loading conditions.	L3
CO-04	Analyze slabs using yield line theory and apply it to simple support conditions.	L4
CO-05	Apply analysis and design principles to superstructures of slab culverts and T-bridges for IRC loading.	L3

A. LIST OF EXPERIMENTS

Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	2	1	3	2	-	-	-	-	-	-	-	-
CO-02	3	2	1	1	-	-	-	-	-	-	-	2
CO-03	2	3	2	1	-	1	-	-	-	-	-	1
CO-04	3	2	2	1	-	1	-	-	-	-	-	1
CO-05	3	3	1	1	-	-	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	1	-	-
CO-05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Analyze and design gantry girders, roof trusses, and purlins considering wind loading, connections, and the use of tubular sections in Pre Engineered Buildings.	L4
CO-02	Apply design principles to plate girders, welded and bolted connections, splicing, stiffeners, curtailment, and shear strength determination using various methods.	L3
CO-03	Apply bridge design principles to different types of bridges, including deck type plate-girder bridges, bracings, and frames, considering standard loadings and IS 800 procedures.	L3
CO-04	Apply design principles to foot over bridges, through type truss girder bridges, including stringer and cross girder design, main truss members, and bracings.	L3
CO-05	Analyze and design water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, and staging considering structural and functional requirements	L4

A. LIST OF EXPERIMENTS

Design as per syllabus of theory.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	-	-	-	-	-	-	1
CO-02	3	1	2	2	-	-	-	-	-	-	-	1
CO-03	3	2	1	2	1	-	-	-	-	-	-	1
CO-04	2	3	1	1	2	-	-	-	-	-	-	1
CO-05	3	3	1	2	-	-	-	-	-	-	-	1

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	3	-	-
CO-03	2	-	-
CO-04	2	-	-
CO-05	3	-	-

CO – 03	3	3	3	2	-	-	-	-	-	-	-	-
CO – 04	2	3	3	-	2	-	-	-	-	-	-	-
CO – 05	3	2	3	2	3	-	-	-	-	-	-	1

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	-	-
CO – 02	3	-	-
CO – 03	2	-	-
CO – 04	2	-	-
CO – 05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Introduction to lab objectives and expectations.	L1
CO-02	Grasping principles of well-designed vs. poorly designed visual aids.	L2
CO-03	Delivering presentations with and without engaging elements.	L3
CO-04	Assessing audience engagement with presentations.	L4
CO-05	Discussing strategies for improvement in self-evaluation.	L5

A. LIST OF EXPERIMENTS:

1. Introduction to lab objectives and expectations.
2. Correcting common grammar and style errors in a given passage.
3. Analyzing the strength of arguments in an argumentative paper.
4. Delivering presentations with and without engaging elements to evaluate audience engagement.
5. Creating two sets of presentation slides to compare the effectiveness of well- designed vs. poorly designed visual aids.
6. Delivering presentations with and without audience interaction to assess its impact on engagement.
7. Exchanging papers or presentations for peer review and providing feedback.
8. Revising and improving papers or presentations based on received feedback.
9. Delivering impromptu presentations to evaluate quick thinking and organization skills.
10. Self-evaluation of papers or presentations before receiving external feedback and discussing strategies for improvement.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	-	-	-	-	-	-	-
CO-02	3	1	2	1	-	1	-	-	-	-	-	-
CO-03	3	2	1	1	-	-	-	-	-	-	-	-
CO-04	2	3	1	1	-	-	-	-	-	-	-	-
CO-05	3	1	2	1	-	-	-	1	1	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	2	-	-
CO-04	1	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the formation of soil, major soil types, ground improvements, and general principles of compaction.	L2
CO – 02	Apply ground improvement techniques such as vibro floatation, compaction piles, dynamic compaction, and blasting in granular soils.	L3
CO – 03	Apply ground improvement techniques like preloading with vertical drains, compressibility, consolidation, and stone column construction in cohesive soils.	L3
CO – 04	Analyze grouting methods, soil reinforcement mechanisms, and their applications beneath roads, foundations, and retaining walls.	L4
CO – 05	Apply principles of lime stabilization, cement stabilization, fly ash-lime stabilization, and soil-bitumen stabilization, including design considerations and application methods.	L3

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	6
2	Ground Improvement in Granular soil	8
3	Ground improvement in Cohesive soil	8
4	Ground Improvement by Grouting & Soil Reinforcement	8
5	Soil Stabilization	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction
	Introduction: Formation of soil, major soil types, Collapsible soil, expansive soil, reclaimed soil, sanitary land fill, Ground improvements; objective, potential General principles of compaction: Mechanics, field procedure, quality control in field.
2	Ground Improvement in Granular soil
	Ground Improvement in Granular soil: In-place densification by Vibro floatation, Compaction piles in sand, Vibro compaction piles, Dynamic compaction, Blasting.
3	Ground improvement in Cohesive soil
	Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques, Stone column: Function, Design principles, load carrying capacity, construction techniques, Settlement of stone column foundation.
4	Ground Improvement by Grouting & Soil Reinforcement
	Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods , Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforced soil application beneath roads, foundation and retaining wall.

5	Soil Stabilization
	<p>Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime-soil interaction, lime columns, Design of foundation on lime column.</p> <p>Cement stabilization-Mechanism, amount, Age and curing, Fly ash-Lime stabilization, Soil bitumen stabilization.</p>

Websites

- https://nptel.ac.in/content/syllabus_pdf/105108075.pdf
- https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105108075/lec3.pdf
- http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course_home36.1.html
- http://www.cdeep.iitb.ac.in/webpage_data/nptel/Civil%20Engineering/Foundation_Engineering/Course_home36.1.html

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	1	-	-	-	-	-	-	-	-
CO-02	3	1	2	1	1	-	-	-	-	-	-	-
CO-03	3	3	2	1	-	-	-	-	-	-	-	-
CO-04	2	3	1	1	-	-	-	-	-	-	-	-
CO-05	3	2	2	1	1	-	-	-	-	-	-	-

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	3	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamentals, objectives, and scope of Non-Destructive Testing and differentiate it from destructive methods.	L2
CO – 02	Identify and explain various NDT techniques including visual, surface, and subsurface testing methods.	L3
CO – 03	Analyze the working principles, advantages, and limitations of specific NDT methods like LPT, MPT, ET, UT, AE, and RT.	L3
CO – 04	Evaluate the suitability of different NDT methods for specific engineering applications based on material properties and defect types.	L4
CO – 05	Apply advanced NDT techniques such as Phased Array UT, ToFD, and Digital Radiography to interpret real-time industrial case studies.	L5

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction to Non-Destructive Testing (NDT)	6
2	Surface NDE Methods	8
3	Advanced Surface and Subsurface Inspection Techniques	8
4	Ultrasonic and Acoustic Emission Testing	8
5	Radiographic Testing & Special Techniques	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to Non-Destructive Testing (NDT) Introduction to NDT, Comparison: NDT vs Mechanical Testing, Overview of NDT methods, Detection of manufacturing defects and material characterization, Merits and limitations of NDT techniques, Physical characteristics of materials relevant to NDT, Visual Inspection Techniques: Unaided and Aided
2	Surface NDE Methods Liquid Penetrant Testing (LPT), Principles and working mechanism, Types and properties of liquid penetrants, Role and types of developers, Testing procedures, Advantages and limitations, Magnetic Particle Testing (MPT), Theory of magnetism and magnetic domains, Magnetization methods (longitudinal, circular, etc.), Inspection materials and techniques, Demagnetization principles and methods
3	Advanced Surface and Subsurface Inspection Techniques Thermography, Principles: contact and non-contact inspection, Instrumentation and method of inspection, Advantages, limitations, and typical applications, Eddy Current Testing (ET), Generation and properties of eddy currents, Sensing elements and configurations, Test arrangements and instrumentation, Applications and limitations, Data interpretation and evaluation
4	Ultrasonic and Acoustic Emission Testing Ultrasonic Testing (UT), Principle and wave propagation, Transducers and coupling agents, Techniques: Pulse-echo, straight beam, angle beam, Data representation: A-Scan, B-Scan, C-Scan, Instrumentation and calibration, Acoustic Emission (AE), Principle of acoustic emissions, AE parameters and instrumentation, Applications and case scenarios
5	Radiographic Testing & Special Techniques

Radiography (RT), Principles of X-ray interaction with matter, Imaging: film and filmless techniques, Filters, screens, geometric factors (inverse square law), Types and characteristics of radiographic films, Evaluation techniques: Fluoroscopy, Xeroradiography, Digital advancements: Computed Radiography (CR), Computed Tomography (CT), Special NDT Techniques & Applications, Phased array ultrasonics and Time of Flight Diffraction (ToFD), Automated & remote ultrasonic testing, Acoustic pulse reflectometry, Alternative current field method, Case studies: NDT in aircraft industry.

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	-	-	-	-	-	-	-	-	-	1
CO-02	3	3	2	-	-	-	-	-	-	-	-	2
CO-03	3	2	3	2	2	-	-	-	-	-	-	2
CO-04	3	2	3	3	3	-	-	-	1	1	-	2
CO-05	2	1	3	3	3	-	1	-	2	2	1	3

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	1
CO-02	3	2	2
CO-03	3	3	3
CO-04	2	3	3
CO-05	2	3	3

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand the philosophical and spatial concepts in Indian art and architecture with respect to Vastu Shastra.	L2
CO-02	Identify and compare different styles of Indian temple architecture and describe their historical development.	L4
CO-03	Interpret the iconographic elements and sacred symbolism used in temple design.	L3
CO-04	Examine ancient Indian water management techniques and evaluate their relevance to sustainable architecture today.	L5
CO-05	Analyze ancient Indian town planning principles and apply them in contemporary urban design contexts.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Foundations of Indian Knowledge Systems in Architecture	6
2	Evolution of Temple Architecture in India	8
3	Iconography and Sacred Symbolism	8
4	Traditional Water Management and Sustainability	8
5	Ancient Indian Town Planning Principles	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Foundations of Indian Knowledge Systems in Architecture
	Introduction to Indian Knowledge Systems in context of Architecture and Town Planning Understanding the concept of space in Indian Art and Architecture Philosophy and worldview underlying traditional Indian architectural thought Role of Vastu Vidya and Vastu Shastra
2.	Evolution of Temple Architecture in India
	Historical timeline and dynasty-wise architectural contributions Transition: Rock-cut → Isolated → Structural Temples Temple construction principles and materials Study of three major styles: a) Nagara b) Vesara c) Dravida Overview of ancient Indian treatises on temple architecture
3.	Iconography and Sacred Symbolism
	Iconography in Indian Temples Role of deities and their representations in architecture Iconometry and proportions in temple sculpture Symbolism in temple design and decorative elements
4.	Traditional Water Management and Sustainability
	Indigenous irrigation techniques Water management systems in ancient Indian architecture Design of stepwells, tanks, and canals Integration of water systems in planning (temple towns, palaces, urban settlements)

5.	Ancient Indian Town Planning Principles
	Town planning during the Indus Valley Civilization Manasara's town classification and spatial planning guidelines Cosmic orientation and cardinal principles in town layouts Sacred geometry in the planning of temple towns Urbanism in harmony with nature and spiritual ideals

S. No	Book	Author(s)	Edition	Publication
1	<i>Mayamatam: Treatise of Housing Architecture and Iconography</i>	Bruno Dagens	Reprint Edition	Indira Gandhi National Centre for the Arts (IGNCA)
2	<i>Architecture of Manasara</i>	Prasanna Kumar Acharya	Revised Edition	Oriental Books Reprint Corporation / Motilal Banarsidass
3	<i>Encyclopaedia of Indian Temple Architecture</i>	Michael W. Meister, M. A. Dhaky (Editors)	Multiple Volumes	American Institute of Indian Studies
4	<i>Theory and Practice of Temple Architecture in Medieval India</i>	Adam Hardy	1st Edition	IGNCA / Dev Publishers

C. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	-	-	-	2	-	-	-	-	-	-
CO-02	2	2	1	-	-	-	-	-	-	-	-	-
CO-03	2	2	2	-	-	-	-	-	-	-	-	-
CO-04	2	2	2	-	1	3	3	-	-	-	-	2
CO-05	2	2	3	2	-	2	2	-	-	-	-	3

D. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	1	3	2
CO-02	2	3	2
CO-03	1	3	3
CO-04	3	2	2
CO-05	3	2	3

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	Course Outcomes	Bloom Level
CO-01	Understand the theoretical foundations and practical applications related to the chosen topic within civil engineering.	L2
CO-02	Apply theoretical concepts and engineering principles to develop solutions or designs for real-world civil engineering problems	L3
CO-03	Evaluate the feasibility, sustainability, and effectiveness of the proposed solutions, identifying strengths, weaknesses, and potential improvements	L4
CO-04	Solve complex engineering problems within the project's scope by applying creative and innovative approaches	L5
CO-05	Implement the proposed solutions or designs in a practical context, considering real-world constraints, sustainability, and ethical considerations	L5

A. GUIDE LINES:

1. The Project group in seventh term will continue the project work in eighth term and complete projecting all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in eighth term on or before the last day of the seventh term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.
7. The guide should be internal examiner for oral examination.
8. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	1	2	-	-	-	-	-	-	-
CO-02	3	2	2	1	1	-	-	-	-	-	-	-
CO-03	3	3	1	1	2	-	-	-	-	-	-	-
CO-04	3	1	2	2	1	-	-	-	-	-	-	-
CO-05	2	3	1	2	1	-	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	2	-	-
CO-05	1	-	-

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-VII								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.		Major (Core Courses)						
A.1	Theory							
	MOOC Course	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV7201	Industrial Technical Seminar-II	0	0	4	60	40	100	2
B.		Minor Stream Courses / Department Electives						
B.1	Theory							
	-							
B.2	Practical							
	-							
C		Multidisciplinary Courses						
	-	-	-	-				
D		Ability Enhancement Courses (AEC)						
	-	-	-	-				
E		Skill Enhancement Courses (SEC)						
	-	-	-	-				
F		Value Added Courses (VAC)						
	-	-	-	-				
G		Summer Internship / Research Project / Dissertation						
BCVCCV7401	Internship	0	0	12	40	60	100	6
Total		3	0	16				
Total Teaching Hours		19						11

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO No.	Course Outcome Statement	Bloom's Level
CO-01	Identify and select an advanced and relevant seminar topic in consultation with the guide.	L2 – Understand
CO-02	Analyze current research literature and extract meaningful information from various academic sources.	L4 – Analyze
CO-03	Apply acquired knowledge to prepare a structured and technically sound seminar report with proper formatting and references.	L3 – Apply
CO-04	Evaluate the technological advancements, applications, and future scope of the selected topic.	L5 – Evaluate
CO-05	Deliver an effective oral presentation and defend the seminar topic with confidence and clarity before an academic audience.	L6 – Create

Guidelines

<p>1. Individual Study and Presentation: Each student must individually study an assigned topic, submit a typed, paper-bound report, and deliver a short seminar presentation at the end of the term.</p>
<p>2. Topic Selection with Guide: Topics must be selected by students in consultation with their assigned faculty guide.</p>
<p>3. Relevance and Advancement: The chosen topic should be related to the student's branch of study but must reflect an extended, latest, or advanced area within the field.</p>
<p>4. Research-Based Learning: Students should preferably refer to at least one research paper to ensure the topic includes recent developments and innovations.</p>
<p>5. Uniqueness of Topic: Seminar topics must not be repeated within the department. Registration will be handled on a first-come, first-served basis.</p>
<p>6. Report Submission: A paper-bound, computer-typed report must be submitted before the seminar presentation.</p>
<p>7. Report Length: The report length should correspond to the technical depth and advancement of the chosen topic.</p>
<p>8. References Required: Students should refer to a minimum of 5 sources, such as reference books, journals, or magazines.</p>
<p>9. Report Format:</p>
<p>i. Introduction</p>
<p>ii. Literature Survey</p>
<p>iii. Theory (including Implementation, Methodology, Application, Advantages/Disadvantages)</p>
<p>iv. Future Scope</p>
<p>v. Conclusion</p>
<p>10. Evaluation: Students will be evaluated on the depth of study, quality of report, and effectiveness of the seminar presentation.</p>

A. LOs AND POs MAPPING

LOs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	1	-	-	-	-	-	-	-	-
CO-02	2	3	2	1	-	-	-	-	-	-	-	-
CO-03	2	1	3	2	-	-	1	-	-	-	-	-
CO-04	3	2	2	1	-	-	1	-	-	-	-	-
CO-05	3	1	2	1	1	-	-	-	-	3	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	3	-	-
CO-03	1	-	-
CO-04	2	-	-
CO-05	1	-	-

POORNIMA UNIVERSITY, JAIPUR								
Faculty of Engineering and Technology								
Name of Program: B.Tech. in Civil Engineering Duration: 4 Years Total Credits: 171								
Teaching Scheme for Batch 2025-29								
Semester-VIII								
Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.	Major (Core Courses)							
A.1	Theory							
BCVCCV8101	Construction Planning & Management	3	0	0	40	60	100	3
BCVCCV8102	Geotechnical Engineering -II	3	0	0	40	60	100	3
A.2	Practical							
BCVCCV8201	Project Management lab	0	0	2	60	40	100	1
BCVCCV8202	Geotechnical Engineering Lab II	0	0	2	60	40	100	1
BCVCCV8203	Water and Waste Water	0	0	2	60	40	100	1
B.	Minor Stream Courses/Department Electives							
B.1	Theory							
BCVECV8111	Water and Waste Water Engineering lab	3	0	0	40	60	100	3
BCVECV8112	Tenders & Contracts	3	0	0	40	60	100	
BCVECV8113	Repair & Rehabilitation of Structures	3	0	0	40	60	100	
C	Multidisciplinary Courses							
		-	-	-				
D	Ability Enhancement Courses (AEC)							
		-	-	-				
E	Skill Enhancement Courses (SEC)							
		-	-	-				
F	Value Added Courses (VAC)							
		-	-	-				
G	Summer Internship / Research Project / Dissertation							
BCVCCV8301	Major Project			15	60	40	100	10
Total		9		21				22
Hours	Total Teaching				30			

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Classify the different types of construction equipment and explain their advantages and disadvantages.	L2
CO – 02	Analyze project management techniques such as CPM and PERT networks and understand the concept of precedence network analysis.	L4
CO – 03	Apply the time-cost trade-off process, including direct and indirect project costs, cost slope, and the process of crashing activities, to determine the optimum duration of a project.	L3
CO – 04	Identify the elements of tender operation, different types of tenders and contracts, contract documents, and recall the legal aspects of contracts.	L1
CO – 05	Understand the causes and prevention of accidents at construction sites and explain the safety measures for various construction works such as excavation, demolition of structures, explosive handling, and hot bitumen work.	L2

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Construction Equipment	8
2	Project planning and scheduling	8
3	Project cost and time control	8
4	Contract management	6
5	Safety and other aspects of construction management	6

B. DETAILED SYLLABUS

Unit	Unit Details
1	Construction Equipment
	Construction Equipment: Unique features of construction equipment Need of construction Equipment, Classification of construction equipment, their advantages and disadvantages. Crawler and wheel tractors-their functions, types and specifications; grade-ability, bull dozers and their use; Power shovels - functions, Hauling Equipment & Compaction Equipment Piling Equipment & Pumping Equipment
2	Project planning and scheduling
	Project planning: Main causes of project failure, Categories of construction projects. Objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process & objectives of construction project management. Project scheduling: Importance of project scheduling, project work breakdown process determining activities involved, work breakdown structure, Assessing activity duration, duration estimate procedure, Project work scheduling. Project management techniques – CPM and PERT networks analysis, Concept of precedence network analysis.
3	Project cost and time control

	Project cost and time control: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, Determination of the optimum duration of a project, Updating of project networks, resources allocation.
4	Contract management
	Introduction, Contract management: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, Determination of a contract, arbitration.

5	Safety and other aspects of construction management
	Introduction, Safety and other aspects of construction management: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, Demolition of structures & explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system, Environmental and social aspects of various types of construction projects.

C. RECOMMENDED STUDY MATERIAL

S. No	Title of Book	Author	Edition	Publication
1	Construction equipment and Job planning	Dr. S.V. Deodhar	Latest	Khanna Publishers
2	Construction Project Management	K KChitkara	Third	McGraw Hill Publishers
3	Construction planning and Management	U.K. Shrivastava	Latest	Galgotia Publications
4	Construction cost & Management	Keith Potts	Second	Taylor & Francis
5	Construction Planning & Management	Gehlot and Dhir	First	New Age International (P) Ltd
6	Construction Engineering & Management	S. Seetharaman	Latest	Umesh Publications

D. CO and PO MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	1	2	2	1	-	-	-	-	-	-	-
CO-02	2	3	1	1	2	-	-	-	-	-	-	-
CO-03	3	2	1	1	2	-	-	-	-	-	-	-
CO-04	3	3	2	1	1	-	-	-	-	-	-	-
CO-05	2	1	3	2	1	-	-	-	-	-	-	-

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	1	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Analyze stresses in soil under surface loading, different methods of stress analysis, pressure distribution, and influence diagrams in soil mechanics.	L4
CO – 02	Apply Terzaghi's one-dimensional consolidation theory, conduct consolidation tests, determine compressibility parameters, and compute settlement rates for different soil conditions.	L3
CO – 03	Analyze stability classifications of slopes, conduct stability analyses using various methods such as Swedish, Friction circle, Taylor's stability number, and Bishop's method for different slope conditions.	L4
CO – 04	Apply Rankine's and Coulomb's theories of earth pressure, conduct stability analyses for retaining walls using graphical methods, and analyze earth pressure on cantilever sheet piles.	L3
CO – 05	Analyze terminology related to bearing capacity, apply Terzaghi and Meyerhof's theories for bearing capacity, evaluate the effects of eccentricity and water table on bearing capacity, and discuss methods for determining bearing capacity through tests like plate load and penetration tests.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Stresses in Soil under surface loading	7
2	Compressibility and Consolidation	8
3	Stability of Slopes	7
4	Earth Pressure	7
5	Bearing Capacity of Soils	7

B. DETAILED SYLLABUS

Unit	Unit Details
1	Introduction to Scope of Subject
	Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram. Vertical stresses at point under line load and strip load. Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart, Fensk's Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations.
2	Compressibility and Consolidation:

	Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghi's one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.
3	Stability of Slopes
	Classifications of slopes, Stability analysis of infinite slopes. Stability analysis of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number, Taylor stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop's method of stability analysis.
4	Earth Pressure:
	Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill. Earth pressure on cantilever sheet piles Stability analysis of retaining walls.
5	Bearing Capacity of Soils
	Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations.

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Edition	Publication
1	Engineering in Theory & Practice Vol. I	Alam Singh,	Second	CBS Publishers & Distributers, Delhi.
2	Geotechnical Engineering	Purushottam Raj,	First	Tata McGraw Hills, Delhi.
3	Soil Mechanics in Engineering Practices	Terzaghi & Peck,	Latest	John Wiley & Co.
4	Soil Mech. & Foundation Engg	K.R. Arora,	Latest	Standard Publishers & Distributers, Delhi.
5	Theory & Practice Of Foundation Design	Som & Das,	Latest	PRENTICE Hall of India Delhi (PHI).
6	Soil Mechanics in Engineering and Practice	Terzaghi,	Latest	CBS Publishers and Distributers.
List of Weblinks /Journals/Periodicals/Magazines/Newspapers				
Indian Geotech Journal /Indian Geotechnical Society.				
<ul style="list-style-type: none"> • www.igs.org.in • https://nptel.ac.in/courses/105105168/ • https://nptel.ac.in/courses/105101201/ 				

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	1	-	-	-	-	-	-
CO-02	3	1	2	1	-	-	-	-	-	-	-	-
CO-03	2	1	3	1	-	-	-	-	-	-	-	-
CO-04	3	2	1	1	1	-	-	-	-	-	-	-
CO-05	3	3	2	1	1	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO – 01	2	-	-
CO – 02	3	-	-
CO – 03	2	-	-
CO – 04	2	-	-
CO – 05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Learn Primavera's role and navigation in project management.	L1
CO-02	Create and manage project schedules, activities, and resources.	L2
CO-03	Apply Primavera skills to real civil engineering projects through analysis and integration with other tools.	L3
CO-04	Analyze project schedules using critical path method, baseline comparisons, and progress tracking features.	L4
CO-05	Evaluate project performance using reports and apply Primavera in real-world civil engineering project case studies.	L5

LIST OF EXPERIMENTS

1. Introduction to Primavera and its role in project management.
2. Navigating the Primavera user interface.
3. Creating a new project and defining project details & creating a Work Breakdown Structure (WBS).
4. Adding activities, assigning durations, and establishing dependencies.
5. Managing project resources such as labor, equipment, and materials.
6. Scheduling project activities and identifying the critical path.
7. Establishing baseline schedules and tracking progress.
8. Generating project reports and analyzing performance.
9. Integrating Primavera with other software tools.
10. Applying Primavera to real-world civil engineering projects through case studies and practical exercises.

VIRTUAL LABS

<https://www.youtube.com/watch?v=IS6hKZkbfRs>

<https://www.youtube.com/watch?v=qK4iuX08yzQ>

<https://www.youtube.com/watch?v=70f1Sz4VQo>

COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	1	-	-	-	-	-	-	-	-
CO-02	2	3	2	2	-	-	-	-	-	-	-	-
CO-03	2	1	3	2	1	-	1	-	-	2	-	-
CO-04	3	2	2	2	1	-	1	-	-	-	-	1
CO-05	1	1	1	1	-	-	-	-	2	3	-	2

COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	3	-	-
CO-03	2	-	-
CO-04	2	-	-
CO-05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand soil behavior and its implications for engineering.	L2
CO-02	Analyze soil properties for settlement, stability, and drainage.	L4
CO-03	Evaluate soil suitability for construction projects.	L4
CO-04	Apply geotechnical testing techniques accurately.	L3
CO-05	Interpret test data for informed engineering decisions.	L2

LIST OF EXPERIMENTS

1. To determine the differential free swell index of soil.
2. To determine the compressibility parameters of soil by consolidation test.
3. To determine the swelling pressure of soil.
4. To determine the shear strength parameters of soil by tri-axial test.
5. To determine the permeability of soil by constant and falling head methods.
6. To determine the CBR of soil.
7. To determine the grain size distribution of fine grained soil by Hydrometer.
8. Classify soil samples from a construction site and assess the suitability of the site for foundation construction.
9. Analyze the stability of a slope using different methods and propose stabilization measures.
10. Determine the bearing capacity of soil at a construction site to ensure the safe design of foundations.

VIRTUAL LABS

- <https://www.youtube.com/watch?v=XHpJa0GI9a8>
- <https://www.youtube.com/watch?v=fCmMW73rP64>
- <https://www.youtube.com/watch?v=bmpn5oNDvOs>

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	1	2	-	-	-	-	-	-	-	1
CO-02	3	3	2	1	-	-	-	-	-	-	-	1
CO-03	2	3	1	1	-	-	-	1	-	-	-	1
CO-04	3	2	2	1	-	-	-	-	-	-	-	1
CO-05	2	1	3	1	1	-	-	-	-	-	-	1

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	2	-	-
CO-03	3	-	-
CO-04	2	-	-
CO-05	2	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO-01	Understand the fundamental principles and techniques for measuring water quality parameters such as pH, turbidity, total dissolved solids (TDS), dissolved oxygen (DO), and alkalinity.	L2
CO-02	Apply methods to determine chemical oxygen demand (COD), biological oxygen demand (BOD), and hardness in water and wastewater samples using standard laboratory procedures.	L3
CO-03	Evaluate the effectiveness of coagulation and flocculation through jar tests to determine the optimum coagulant dose for water treatment.	L4
CO-04	Analyze the chloride content and other chemical parameters in water samples to assess compliance with environmental standards.	L4
CO-05	Develop practical skills in using laboratory equipment and interpreting experimental results to ensure water and wastewater quality.	L5

LIST OF EXPERIMENTS

- 1 Measure the pH of water and wastewater samples using a pH meter.
- 2 Measure the turbidity of water samples using a turbidity meter.
- 3 Measure the TDS in water samples using a TDS meter.
- 4 Measure the COD of wastewater samples using a COD digester and titration method.
- 5 Measure the BOD of wastewater samples over a 5-day incubation period.
- 6 Measure the DO in water samples using the Winkler method or a DO meter.
- 7 Determine the optimum coagulant dose for water treatment using a jar test apparatus.
- 8 Measure the hardness of water samples by titration with EDTA.
- 9 Measure the chloride concentration in water samples using argentometric titration.
- 10 Measure the alkalinity of water samples by titration with a standard acid.

VIRTUAL LABS

<https://www.labster.com/simulations/wastewater-treatment>

<https://ee1-nitk.vlabs.ac.in/exp/determination-of-biological-oxygen/simulation.html> <https://virtuallabs.nmsu.edu/wateractivity/>

A. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	2	2	1	-	-	-	-	-	-	-	1
CO-02	2	1	3	2	1	-	-	-	-	-	-	1
CO-03	3	1	2	1	1	-	-	-	-	-	-	1
CO-04	3	2	1	2	-	-	-	-	-	-	-	1
CO-05	2	3	1	2	1	-	-	-	-	-	-	1

B. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	3	-	-
CO-03	3	-	-
CO-04	2	-	-
CO-05	3	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to-

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand water demand, sources of water, population forecasting, and water quality parameters.	L2
CO – 02	Apply principles of water treatment to select treatment units, design treatment processes, and ensure water quality.	L3
CO – 03	Analyze flow diagrams of wastewater treatment plants and evaluate the efficiency of preliminary, primary, and biological treatment processes.	L4
CO – 04	Apply knowledge of solid waste management methods, including combustion, landfilling, and biochemical processes, to assess their environmental impact.	L3
CO – 05	Understand atmospheric composition, pollutants, and contaminants, as well as standards and control measures for air and noise pollution.	L2

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	General	8
2	Collection of Sewage	8
3	Sewage Treatment	6
4	Wastewater Disposal and Reuse	6
5	Air and Noise Pollution	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction
	Water Demand, Sources of water, Population forecasting, Water and waste water quality parameters: physical, chemical and biological, Pipe, Appurtenances & distribution system.
2.	Water treatment Process
	Collection and conveyance of water, Selection of water treatment units, Treatment plant site selection, Aeration, Plain Sedimentation, Theory and Design of Mixing devises, Coagulation, Sedimentation, Filtration, Disinfection.
3.	Waste water Treatment Process
	Collection and conveyance of wastewater, Variation in wastewater flow, Measurement of wastewater flow, Flow diagram of wastewater treatment plant, Preliminary, Primary and Biological treatment processes: Concept and design, Treatment and disposal of sludge.
4.	Solid Waste Management
	Introduction, Combustion and energy recovery of municipal solid waste, Effects of combustion, undesirable effects of Combustion. Landfill: Classification, planning, sitting, permitting, landfill processes, landfill design, landfilloperation, use of old landfill. Differentiate sanitary land fill and incineration as final disposal system for solid waste

	Biochemical processes: Methane generation by anaerobic digestion, composting and other biochemical Processes.
5.	Sewer & Sewerage system, Air and Noise pollution
	Sewer & Sewerage system: - Definition, Sewerage System, Sewage discharge variation, Sewer design parameters, manhole, Traps. Air and Noise pollution :- Atmospheric Composition, Lapse rate, Atmospheric dispersion, Definition of pollutants and contaminants, Standards and control measures.

C. RECOMMENDED STUDY MATERIAL

S. No	Book	Author	Edition	Publication
1	Environmental Engineering II	B.C. Punmia	Latest	Arihant Publishers, Jodhpur.
2	Sanitary Engineering	SK Garg,	Latest	Khanna Publishing Co.
3	Manual on Sewage and Sewage		Latest	Treatment Ministry of Urban Development Govt. of India.

Websites

- <https://nptel.ac.in/courses/103107084/>
- <https://nptel.ac.in/courses/103107085/>
- <https://nptel.ac.in/courses/105104102/>
- <https://nptel.ac.in/courses/105103025/>
- <https://nptel.ac.in/courses/105102160/>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	1	-	-	-	-	-	-	-	-
CO-02	3	2	1	1	1	-	-	-	-	-	-	-
CO-03	2	3	1	2	-	-	-	-	-	-	-	-
CO-04	3	2	3	1	1	-	-	-	-	-	-	-
CO-05	3	1	2	2	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	2	-	-
CO-03	2	-	-
CO-04	2	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Understand the fundamental principles and elements of Indian contract law.	L2
CO – 02	Analyze and interpret the legal framework governing special types of contracts.	L4
CO – 03	Apply the legal provisions of the Sale of Goods Act and Partnership Laws in real-life scenarios.	L3
CO – 04	Evaluate public procurement procedures, legal requirements, and ethical practices in tendering.	L5
CO – 05	Critically assess judicial decisions and statutory frameworks regulating government contracts.	L5

A. DETAILED SYLLABUS

Unit	Unit Details
1.	Fundamentals of Contract Law
	Definition and Nature of Contracts Essentials of a Valid Contract – Offer, Acceptance, Consideration, Capacity, Free Consent, Lawful Object Types of Contracts – Valid, Void, Voidable, Illegal, and Unenforceable Contracts Contingent and Quasi Contracts Performance of Contracts – Actual and Attempted Performance Discharge of Contracts – By Performance, Agreement, Impossibility, Operation of Law, Breach Remedies for Breach of Contract – Damages, Quantum Meruit, Injunction, Specific Performance
2.	Special Contracts – I
	Contract of Indemnity – Definition, Essentials, Rights of Indemnity Holder and Indemnifier Contract of Guarantee – Definition, Essentials, Types, Rights and Liabilities of Surety Bailment and Pledge – Definition, Essentials, Duties and Rights of Bailor and Bailee, Pledger and Pledgee Agency – Modes of Creation, Rights and Duties of Agent and Principal, Termination of Agency
3.	Special Contracts – II
	Sale of Goods Act, 1930 – Contract of Sale, Conditions and Warranties Transfer of Property in Goods – Passing of Property, Delivery of Goods Rights of Unpaid Seller – Lien, Stoppage in Transit, Right to Resale Partnership – Definition, Types of Partners, Rights and Duties of Partners, Registration and Dissolution Limited Liability Partnership (LLP) – Nature and Scope, Difference between LLP and Partnership
4.	Law on Public Procurement and Tendering – I
	Introduction to Public Procurement – Objectives, Principles (Transparency, Accountability, Value for Money) Institutional and Regulatory Framework – Role of Central Vigilance Commission (CVC), Comptroller and Auditor General (CAG), and other authorities. Tendering Process – Notice Inviting Tenders (NIT), Request for Proposal (RFP), Bid Evaluation Criteria Methods of Procurement – Open Tender, Limited Tender, Single Source Procurement, E-Procurement Legal Aspects of Tender Documents – Terms and Conditions, Bid Submission, Validity and Security
5.	Law on Public Procurement and Tendering – II
	Contract Formation in Government Procurement – Letter of Award, Signing of Contract Performance Security and Contract Execution – Monitoring and Evaluation Disputes in Public Contracts – Arbitration, Litigation, Blacklisting and Debarment Common Irregularities and Best Practices in Tendering Recent Developments and Judicial Decisions in Procurement Law Ethical and Sustainable Procurement Practices

A. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Masters of Business Laws – Part 1: Contract Law Module	National Law School of India University (NLSIU)	Latest	NLSIU, Bengaluru
2.	Law of Business Contracts in India	Sairam Bhat	2009	SAGE Publications India Pvt. Ltd.
3.	Contracts, Agreements and Public Policy in India	Sairam Bhat	2015	NLSIU / Self-published
4.	Law of Contract and Specific Relief	Avtar Singh	Latest	Eastern Book Company

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	1	2	2	-	-	-	-	-	-	-	-
CO-02	2	3	1	2	-	-	-	-	-	-	-	-
CO-03	3	3	2	1	1	-	-	-	-	-	-	-
CO-04	3	2	1	1	-	1	-	-	-	-	-	-
CO-05	3	2	2	2	1	-	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	1	-	-
CO-03	2	-	-
CO-04	1	-	-
CO-05	2	-	-

COURSE OUTCOMES: After Successful completion of the course students will be able to

CO	At the end of this course, learners will be able to:	Bloom Level
CO – 01	Identify the causes and types of distress and damages in concrete and masonry structures and explain the need for repair, rehabilitation, and maintenance.	L1
CO – 02	Select appropriate repair materials and protective systems based on structural requirements, environmental exposure, and safety considerations.	L2
CO – 03	Evaluate structural damages using visual inspection, non-destructive and semi-destructive testing techniques to assess the condition and performance of the structure.	L3
CO – 04	Apply appropriate crack repair, corrosion mitigation, jacketing, and strengthening techniques for distressed structural components.	L4
CO – 05	Demonstrate understanding of seismic retrofitting concepts, interpret structural guidelines, and assess real-life case studies with focus on sustainable repair practices.	L4

A. OUTLINE OF THE COURSE

Unit	Title of the unit	Time Required for the Unit (Hours)
1	Introduction	8
2	Repair Materials	6
3	Damage Diagnosis and Assessment	8
4	Crack Repair and Corrosion	6
5	Seismic Retrofitting	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	Introduction
	<ul style="list-style-type: none"> Maintenance, rehabilitation, repair, retrofit and strengthening Need for rehabilitation of structures Cracks in R.C. buildings: Types, causes, and effects Maintenance: Importance, routine and preventive maintenance Damages to masonry structures: Types and causes
2.	Repair Materials
	<ul style="list-style-type: none"> Various types of repair materials Criteria and methodology for material selection Health and safety precautions in handling repair materials Special mortars and concretes: Polymer concrete/mortar, quick setting compounds Grouting materials: Gas forming grouts, polymer grouts, acrylate and urethane grouts Bonding agents: Latex emulsions, epoxy bonding agents Protective coatings: For concrete and steel
3.	Damage Diagnosis and Assessment

	<ul style="list-style-type: none"> • Inspection methods: <ul style="list-style-type: none"> ○ Visual inspection ○ Non-destructive testing: Rebound hammer, ultrasonic pulse velocity ○ Semi-destructive testing: Probe test, pull-out test • Chloride penetration test, carbonation and carbonation depth testing • Corrosion activity measurement • Substrate preparation: <ul style="list-style-type: none"> ○ Importance of surface preparation ○ Methods and procedures ○ Reinforcing steel cleaning
4.	Crack Repair and Corrosion
	<ul style="list-style-type: none"> • Crack repair methods: <ul style="list-style-type: none"> ○ Grouting, routing and sealing, stitching, dry packing ○ Autogenous healing, overlays ○ Repair of active and dormant cracks • Corrosion of embedded steel: <ul style="list-style-type: none"> ○ Mechanism and stages of corrosion damage ○ Repair methods for slabs, beams, columns • Jacketing: <ul style="list-style-type: none"> ○ Column, beam, and beam-column joint jacketing ○ Reinforced concrete, steel, and FRP jacketing • Strengthening: <ul style="list-style-type: none"> ○ Beam shear strengthening ○ Flexural strengthening
5.	Seismic Retrofitting
	<ul style="list-style-type: none"> • Seismic Retrofitting Need for seismic retrofitting, Evaluation of seismic vulnerability, Techniques for seismic strengthening, Retrofitting strategies for structural elements (slabs, beams, columns, joints), Use of base isolators and energy dissipation devices • Standards and Guidelines Overview of IS 13935 and IS 15988, Guidelines from CPWD and BIS for seismic retrofitting, International practices in retrofit design. • Post-repair Monitoring and Maintenance Structural Health Monitoring (SHM), Instrumentation for SHM, Periodic inspection and maintenance after repair, Long-term performance tracking.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author	Edition	Publisher
1.	Repair and Protection of Concrete Structures	Noel P. Mailvaganam	1st Edition, 1991	CRC Press
2.	Concrete Repair and Maintenance Illustrated	Peter H. Emmons	1st Edition, 2001	Galgotia Publications Pvt. Ltd.
3.	Earthquake Resistant Design of Structures	Pankaj Agarwal, Manish Shrikhande	2nd Edition, 2006	PHI Learning Pvt. Ltd.
4.	Diagnosis and Treatment of Structures in Distress	R. N. Raikar	Reprint Edition	R&D Centre of Structural Designers, Mumbai

Websites

<https://cpwd.gov.in>
<https://www.bis.gov.in>
<https://www.nicee.org>

D. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	1	2	-	-	-	-	-	-	-	-
CO-02	3	2	1	2	1	-	-	-	-	-	-	-
CO-03	2	3	2	1	-	-	-	-	-	-	-	-
CO-04	3	2	2	1	-	-	-	-	-	-	-	-
CO-05	3	3	2	2	-	-	-	-	-	-	-	-

E. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	2	-	-
CO-02	1	-	-
CO-03	3	-	-
CO-04	3	-	-
CO-05	3	-	-

LAB OUTCOMES: After Successful completion of the lab students will be able to-

CO	Course Outcomes	Bloom Level
CO-01	Understand the theoretical foundations and practical applications related to the chosen topic within civil engineering.	L2
CO-02	Apply theoretical concepts and engineering principles to develop solutions or designs for real-world civil engineering problems	L3
CO-03	Evaluate the feasibility, sustainability, and effectiveness of the proposed solutions, identifying strengths, weaknesses, and potential improvements	L4
CO-04	Solve complex engineering problems within the project's scope by applying creative and innovative approaches	L5
CO-05	Implement the proposed solutions or designs in a practical context, considering real-world constraints, sustainability, and ethical considerations	L5

A. GUIDELINES:

1. The Project group in seventh term will continue the project work in eighth term and complete projecting all respect (assembly, testing, fabrication, tabulation, test result etc.)
2. The group should maintain a log book of activities. It should have entries related to the worked one, problems faced, solution evolved etc., duly signed by guide.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in eighth term on or before the last day of the eighth term.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
6. Assessment of the project forward of marks shall be done by the guide and a departmental committee.
7. The guide should be internal examiner for oral examination.
8. The external examiner should be from the related area of the concerned project. He should have experience at degree level / industry.

The evaluation at final oral examination should be done jointly by the internal and external examiner.

B. COs AND POs MAPPING

COs and POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-01	3	3	2	2	1	-	-	-	-	-	-	-
CO-02	2	2	3	1	-	-	-	-	-	-	-	-
CO-03	3	2	2	1	-	-	-	-	-	-	-	-
CO-04	3	1	2	2	1	-	-	-	-	-	-	-
CO-05	3	2	1	2	-	-	-	-	-	-	-	-

C. COs AND PSOs MAPPING

COs and PSOs	PSO1	PSO2	PSO3
CO-01	3	-	-
CO-02	3	-	-
CO-03	3	-	-
CO-04	3	-	-
CO-05	2	-	-