Shivaji University
Kolhapur

Revised Syllabus
as per
National Education Policy-2020
(NEP-2.0)

S. Y. B. Tech.
Civil Engineering

To be Implemented from
Academic Year 2025-26

CIVIL ENGINEERING

First Year Exit Course

Bucket List of NPTEL course and Virtual Lab course

Choose any Two as F. Y. Exit Course after completion of Semester II from given below list. Corresponding lab need to be chosen based on NPTEL course selected as MOOC course. Exit course covers total 08 credits which include NPTEL Courses cover 06 credits (03 credit of each) and virtual lab cover 02 credits (01 credit of each).

Bucket list cum correlative course and lab Table		
Sr. No.	**NPTEL Course Title**	**Vitrual Lab Title**
1	Digital Land Surveying and Mapping	Surveying Lab
2	Strength of Material	Basic Engineering Mechanism and Strength of Material Lab
		Strength of Material Lab
3	Concrete Technology	Marine Structure Lab
4	Geology and Soil Mechanics	Engineering Geology Lab
5	Rock Engineering	Engineering Geology Lab

Note:

1. There is an uncertainty of the availability of the NPTEL courses mentioned above as there is constant updation of the courses. The students can choose equivalent subjective course of the required duration with permission from the concerned institute.

2. To fulfill the required credit score of 03 credits and taking the courses available in consideration students can go for 1 course of 12 week or 2 course of 8 week or 3 courses of 4 weeks.

3. For NPTEL course visit to website https://swayam.gov.in and register and create your account. Log in the account and join the required course and follow the instructions to compete the course. Similarly, for Virual Lab visit to website https://www.vlab.co.in and (sometimes need register and create your account, also log in the account and) join the required lab and follow the instructions to compete the course (need to do all listed experiment under that Lab).

Details of NPTEL Course (https://swayam.gov.in)			
Sr. No.	**NPTEL Course Title**	**Duration**	**Credit**
1	Digital Land Surveying and Mapping	8 Week	02
2	Strength of Material	12 Week	03
3	Concrete Technology	12 Week	03
4	Geology and Soil Mechanics	12 Week	03
5	Rock Engineering	12 Week	03

Details of Virtual Lab Course (https://www.vlab.co.in)			
Sr. No.	**Vitual Lab Course Title**	**Supporting Institution**	**Credit**
1	Surveying Lab	IIT Roorkee	
2	Basic Engineering Mechanism and Strength of Material Lab	IIIT Hydrabad	
3	Strength of Material Lab	NITK Suratkal	
4	Marine Structure Lab	NITK Suratkal	
5	Engineering Geology Lab	COEP Pune	

Distribution of the credits:

1. Two MOOCs Certification Courses (NPTEL):

Each course is worth 3 credits. These courses are likely to be available online and can be completed at the student's own pace within a set timeframe. The content will be specific to the student's field of study or programme.

2. Virtual Lab:

The student must complete two virtual lab work that adds 2 credits to simulate practical or experimental learning experiences in a controlled virtual environment.

Examination scheme for first year exit:

The marks gained from the two MOOCs are converted to a total of 100 marks. The report for the performed two Virtual Lab practices of 2 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of the virtual lab experiments conducted, encompassing the methodology, results, and conclusions.

Direct Second Year Entry Course

Earning of additional 2 mandatory credits for direct second year admitted students to Civil Engineering branch.

Sr. No.	Semester	Subject	Credit
1	III	Civil Engineering Infrastructure	2

Distribution of the credits:

For students admitted directly into the second year of a programme (at the entry level) from a different programme, earning an additional 2 credits is mandatory.

Examination scheme for direct second year entry students:

Students admitted directly into the second year of a programme from another programme are required to complete a 2-credit entry-level course as per the prescribed curriculum. This course should be completed at their own pace to ensure alignment with the programme foundational requirements. End Semester Examination (ESE) of 100 marks will be conducted at the institute level. It is mandatory to organize the examination and evaluate the performance of such students at the institute level during the third semester ESE. The evaluation report must be submitted to the Examination Section, Engineering and Technology, Shivaji University, Kolhapur.

CE-AC-201: Civil Engineering Infrastructure (DSY admitted additional course)

Teachning Scheme		**Evaluation Scheme**	
Lecture (Per week)	**: 3**	**MSE**	**: 30**
Tutorial (Per week)	**:**	**ISE**	**: 10**
Credit	**: 2**	**ESE**	**: 60**

Course Pre-requisite	Basic Civil Engineering	
Course Objective	1	To Understand various types of infrastructures.
	2	To Acquire knowledge regarding basics of planning for infrastructure.
	3	To Acquire knowledge regarding basics of execution and maintenance of infrastructure.
	4	To Understand forms of organizations.
Course Outcomes	After Completion of this course students will be able to	
	1	Understand various types of infrastructures.
	2	Acquire knowledge regarding basics of planning for infrastructure.
	3	Understand basics of Docks and Harbor
	4	Understand basics of Railway
	5	Understand basics of Roadway
	6	Understand forms of organizations.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1							1
CO2	3		1	2	1							1
CO3	3	1	1	1	2							1
CO4	3		1	1	2							1
CO5	3	1	1	1	1							1
CO6	3	1	1	2	1							1

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

MSE: 30

ISE: 10

ESE: 60

Unit No.	Content	Hours
1	**Introduction to Infrastructure** Definition of Basic Terminologies, Role of Infrastructure In Economic Development, Types of Infrastructure, Goals And Objectives Of Infrastructure Planning. Issues related with infrastructure development.	**4**
2	**Introduction of infrastructure systems** Water supply and distribution, Transport systems, Energy management, Building infrastructure, Need for making these infrastructures smart.	**5**
3	**Ports and harbors** Basics of planning of ports and harbors, breakwaters, jetties. Airport: - Airport system planning and construction, Components of airport, site selection criteria, airport capacity.	**5**
4	**Railway** History of Indian railways, planning surveys, components of railway track ,railway alignment, safety measures, track inspection and maintenance, track drainage, Site selection and facilities for railway stations and yards, High Speed Railways- Modernization of railways.	**5**
5	**Roads and highways** Roads and highways: - Types of pavements, Components of road, materials used for road construction, selection of construction materials, road maintenance, and highway drainage – need. Bridges: - Types, Components, Maintenance.	**5**
6	**Forms of Organization** Proprietorships, Partnerships, Joint Ventures, Introduction to PPP(Public Private Partnership)	**4**

Text Book :

Sr. No.	Title	Author	Publication & Edition
01	Highway Engineering	Justo C. E. G., Khanna S. K., Veeraragavan A.	Nemchand& Bros (10th Edition)
02	Principles and Practices of Highway Engineering	Kadiyali L. R. and Lal N. B.	Khanna Publishers (7th Edition). 2013.
03	Railway And Bridge Engineering	VaibhaoSonarkar	

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Highway Engineering	Wright P. H. and Dixon K.	Wiley India Pvt. Ltd., (7th Edition)
02	Infrastructure Development & Financing in India		New Century Publications
03	Infrastructure Planning Handbook	Alvin Goodman, Makarand Hastak	McGraw-Hill Education

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

SCHEME OF INSTRUCTION & SYLLABI

Programme Civil Engineering

Scheme of Instructions: Second Year B.Tech. Civil Engineering

Semester – III

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME			
									MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0231	Engineering Mathematics - III	3	1	-	4	4	30	10	60	100
2	PCC	CE0232	Building Construction	3	--	--	3	3	30	10	60	100
3	PCC	CE0233	Strength of Materials	3	--	--	3	3	30	10	60	100
4	CEP	CE0234	Building Construction Lab	--	--	2	2	1	--	50	25	75
5	MDM	CE0235	Multi-disciplinary Minor – 01	2	--	--	2	2	30	10	60	100
6	OE	CE0236	Open Elective -01	3	--	--	3	3	30	10	60	100
7	HSSM	CE0237	Universal Human Values	2	--	--	2	2	-	50	-	50
8	CEP	CE0238	Strength of Materials Lab	--	--	2	2	1	-	50	25	75
9	HSSM	CE0239	Economics for Engineers	2	--	--	2	2	-	50	-	50
10	OE	CE02310	Open Elective -01 Lab	--	--	2	2	1	-	25	25	50
			Total	**18**	**1**	**6**	**25**	**22**	**150**	**275**	**375**	**800**

L-Lecture T-Tutorial P-Practical MSE-Mid Semester Examination ISE/CA- In Semester Evaluation/ Continuous Assessment
ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	**16**	**20**	**--**	**-**	**-**	**02**	**02**	**--**	**04**
Semester Credits	**--**	**-**	**12**	**-**	**06**	**-**	**04**	**-**	**-**
Cumulative Sum	**16**	**20**	**12**	**-**	**06**	**02**	**06**	**-**	**04**

PROGRESSIVE TOTAL CREDITS: 44 + 22 = 66

SCHEME OF INSTRUCTION & SYLLABI
Programme Civil Engineering
Scheme of Instructions: Second Year B.Tech. in Civil Engineering
Semester– IV

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME			
									MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0241	Surveying	3	--	--	3	3	30	10	60	100
2	PCC	CE0242	Structural Mechanics	3	--	--	3	3	30	10	60	100
3	PCC	CE0243	Fluid Mechanics	3	--	--	3	3	30	10	60	100
4	MDM	CE0244	Multi-disciplinary Minor - 02	2	--	--	2	2	30	10	60	100
5	OE	CE0245	Open Elective -02	2	--	--	2	2	30	10	60	100
6	HSSM	CE0246	Strategic Management	2	--	--	2	2	-	50	-	50
7	HSSM	CE0247	Professional Ethics	2	--	--	2	2	-	25	-	25
8	VEC	CE0248	Surveying lab	--	--	2	2	1	-	50	25	75
9	PCC	CE0249	Fluid Mechanics Lab	--	--	2	2	1	-	25	25	50
10	VEC	CE02410	Building Planning and Design	2	--	--	2	2	--	25	25	50
11	BSC	CE02411	Environmental Science	2	--	--	2	Audit	30	10	60	100
12	VSEC	CE02412	Building Drawing	--	--	2	2	1		50	--	50
			Total	**21**	**--**	**6**	**28**	**22**	**180**	**285**	**435**	**800+100**(Audit

L-Lecture T-Tutorial P-Practical MSE-Mid Semester Examination ISE/CA- In Semester Evaluation/ Continuous Assessment
ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective Other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	**16**	**20**	**12**	**-**	**06**	**02**	**06**	**-**	**04**
Semester Credits	**-**	**-**	**13**	**-**	**04**	**01**	**04**	**--**	**-**
Cumulative Sum	**16**	**20**	**25**	**-**	**10**	**03**	**10**	**--**	**04**

PROGRESSIVE TOTAL CREDITS: 66 + 22 = 88

Following Degrees will begin with effect from Academic Year 2026-27.

A) Bachelor's Engg./Tech. Honours Degree in chosen Major Engg./Tech. Discipline with Multidisciplinary Minor (194 credits)

B) Bachelor's Engg./Tech. Honours with Research Degree in chosen Major Engg./Tech. Discipline with Multidisciplinary Minor (194 credits)

C) Bachelor's Engg./Tech. Degree in chosen Major Engg./Tech. Discipline with Double Minor (Multidisciplinary and Specialization Minor) (194 credits)

List of Electives: Verticals

Specialization	Structural Engg	Water Resources and Environmental Engg	Geotechnical and Construction Engg	Transportation Engg
Elective-I	Advanced Structural Analysis	Municipal Solid Waste Management	Construction Methods and Equipment Management, Engineering Geology	Bridge and Tunnel Engineering
Elective-II	Advanced Design of RC Structures	Air Pollution and Control	Foundation Engineering	Airport Engineering
Elective-III	Design of Bridges	Open Channel Hydraulics	Smart City, Green Building	Traffic Engineering
Elective-IV	Design of Water Tanks	Environmental Management System	Ground Improvement Techniques, Advanced Engineering Geology.	Pavement Design
Elective-V	Prestressed Concrete Structures	Industrial Wastewater Management	Soil Exploration and Investigations Techniques	Docks, Harbours and Offshore Structures
Elective-VI	Earthquake Engineering	Design of Hydraulic Structures; Surface and Groundwater Hydrology	Soil Dynamics and Structures	

List of Open Electives

Open Elective-I	Building Construction and Planning
Open Elective-II	Municipal Solid Waste Management
Open Elective-III	Smart City

List of MDM Courses in Civil Engg.,

Multi-disciplinary Minor-01	Building Construction	2
Multi-disciplinary Minor-02	Waste Management	2
Multi-disciplinary Minor-03	Infrastructure Engineering	3
Multi-disciplinary Minor-03 Lab	Material Testing Lab	1
Multi-disciplinary Minor-04	Concrete Technology	2
Multi-disciplinary Minor-05	Soil and Water Engineering	2
Multi-disciplinary Minor-06	Field Project	2

Instructions regarding Examinations:

1. Compulsory passing with 40% marks is mandatory in ESE examinations and combined passing marks (MSE+ISE/CA+ESE) for theory course is 40%
2. Mid sem. examination will be based on 50% syllabus from beginning (First Three Units).
3. No compulsory passing for **MSE.**
4. ESE paper setting weightage will be **25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units).**
5. Passing percentage for ESE practical examination 40%.

PCC-CE0231: Engineering Mathematics III

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**:01**	**ISE**	**:10**
Credit	**:04**	**ESE**	**:60**

Course Pre-requisite	Basics of matrices, complex algebra, derivative and its properties. Integration and its basic properties, Basic of Numerical methods.	
Course Objective	1	To develop mathematical skills and enhance thinking power of students
	2	To give the knowledge to the students of statistics, Linear Differential Equations, Vector Differential Calculus, Laplace Transforms, Probability, Numerical Integration with an emphasis on the application of solving engineering problems.
	3	To prepare students to formulate a mathematical model using engineering skills& interpret the solution in real world.
Course Outcomes	After Completion of this course students will be able to	
	1	Make use of Linear Differential Equations to solve the civil engineering problems.
	2	Apply knowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields
	3	Describe the statistical data numerically by using Lines of regression and Curve fittings
	4	Solve basic problems in probability theory, including problems involving the Binomial, Poisson, and Normal distributions
	5	Find Laplace transforms of given functions and use it to solve linear differential equations
	6	Apply Numerical Integration.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3											
CO4	3											
CO5	3											
CO6	3											
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
1. The Theory exam shall be consisting of MSE and ESE. The weightage of MSE shall be 30% and of ESE shall be 60%. 2. ESE paper setting weightage will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units). 3. The number of optional questions marks in a theory paper shall be 25 to 30 percent of the maximum marks.

Unit No.	Content	Hours
1	**Linear Differential Equations and it's Applications:** Linear Differential Equations with constant coefficients; Rules to find complementary functions; Methods to find particular integral ($e^{ax}, sinax\ or\ cosax, x^m, e^{ax}x^m, e^{ax}sinax\ ore^{ax}cosax$), Applications of Linear Differential Equations to Cantilever, Strut, Beam.	**08**
2	**Vector Differential Calculus:** Differentiation of vectors, Gradient of scalar point function, Directional Derivatives, Divergence of vector point function, Curl of vector point function, Irrotational, Solenoidal and Scalar Potential -function of a vector field	**07**
3	**Correlation, Regression, and Curve Fitting:** Introduction, Karl Pearson's coefficient of Correlation, Lines of regression of bivariate data, Fitting of Curves by method of least squares: Fitting of a straight line, Fitting of Second degree parabolic curves, Fitting of an exponential curve.	**07**
4	**Probability Distribution:** Random variables, Discrete probability distribution, Continuous probability distribution, Binomial Distribution, Poisson Distribution, Normal Distribution.	**08**
5	**Laplace Transforms & it's Applications:** Laplace transform of elementary functions, Properties of Laplace Transforms(First shifting, Change of scale property, Multiplication,& Division by t) Laplace transform of derivatives and integral, Inverse Laplace transform by partial fractions & Convolution theorem, Solution of Linear Differential equation with constant coefficients by using Laplace Transform.	**08**
6	**Numerical Integration:** Newton Cote's Formulae, Trapezoidal Rule, Simpson's 1/3 rd rule, Simpson's 3/8th rule Weddle's rule.	**07**

General Instructions:

1) For the term work of 10 marks, batch wise tutorials are to be conducted. The number of Students per batch per tutorial should be as per University rules.

2) Number of tutorials should be at least six (All units should be covered).

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Engineering Mathematics-III(Civil)	S.S.Patil	ELECTROTECH Publication
02	Engineering Mathematics-III	G.V.Kumbhojkar	C. Jamnadas & Company January 2020 ISBN-10 : 8194026784 ISBN-13 : 978-8194026785

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Higher Engineering Mathematics	B.S.Grewal	Khanna Publication, Delhi December 2020 ISBN-10 : 8900120905 ISBN-13 : 978-8900120905
02	Advanced Engineering Mathematics	H.K.Das	S.Chand Publication December 2007 ISBN-10 : 8121903459 ISBN-13 : 978-8121903455
03	Advanced Engineering Mathematics	Jack Goldberg	Oxford University Press
04	Applied Mathematics	Navneet D. Sangale	Cengage Publication June 2014 ISBN-10 : 9383971444 ISBN-13 : 978-9383971442
05	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India
06	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill July 2017 ISBN-10 : 007063419X ISBN-13 : 978-0070634190
07	Mathematical Methods of Science and Engineering.	KantiB.Datta	Cengage Learning

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

PCC-CE0232: Building Construction

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**:-**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	Basic Civil Engineering	
Course Objective	1	To impart in-depth knowledgeon the properties and suitability of building materials.
	2	To provide the pertinent details of building and its components
	3	To illustrate the various masonry work, doors and windows with their functional requirements.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain the properties and suitability of various building materials.
	2	Describe the functional requirement of building and its components.
	3	Explain the types of masonry and identify the various bonds.
	4	Classify the doors and windows and draw schematic sketches.
	5	Explain the types of stair case.
	6	Explain different types of roof coverings & types of flooring.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3											
CO4	3											
CO5	3											
CO6	3											
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
1. The Theory exam shall be consisting of MSE and ESE. The weightage of MSE shall be 30% and of ESE shall be 60%. 2. ESE paper setting weightage will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units). 3. The number of optional questions marks in a theory paper shall be 25 to 30 percent of the maximum marks.

Unit No.	Content	Hours
1	**Construction Materials** Stones – Requirements of good building stone, uses of building stones. Bricks – Manufacturing, Types (clay bricks, fly ash, cellular light weight concrete brick, aerated cement concrete brick or autoclave brick) and Engineering Properties. Concrete – Ingredients, grades, Types (SCC,SHC,HPC) Steel – Standard structural sections, steel as reinforcement, TMT bars. Tiles - Natural Stone, Paving Blocks,Ceramic, Vitrified.	**07**
2	**Building requirements &Components** Basic requirements of a building as a whole: Strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting and ventilation. Sound insulation and anti-termite treatment. Building components and their basic requirements : Foundations, plinth, walls and columns in superstructure, floors, doors and windows, sills, lintels and weather sheds, roofs, steps and stairs, utility fixtures. Formwork: Materials (wooden, steel and aluminum), Tailored Formwork	**08**
3	**Masonry** Stone Masonry – Types of stone masonry. Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry. Brickwork and Brick Bonds - English, Flemish, Header, Stretcher. Composite masonry, cavity wall.	**06**
4	**Door & Windows** Doors – Classification, T.W. Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening. Windows - Classification, T.W. Glazed Windows, Aluminum Glazed Windows, fixtures and fastening.	**06**
5	**Staircase** Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Design of stairs (Dog Legged, quarter turn and Open Well), Ramps, lifts and escalator.	**06**
6	**Roofs & Floors** Roofs and Roof coverings: Terms used. Roof and their selection, pitched roofs and their types, Steel Trusses types and their suitability, roof covering, material, details, fixtures Mangalore tiles, A. C., G. I. and Precoated sheets, concept of proflex (truss less) roof and selection. Floors: Concrete Flooring, R.C.C. slab, R.C.C. beam and slab, Flat slab	**06**

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Building Construction	B.C.Punmia	Laxmi Publications January 2016 ISBN-10 : 9788131804285 ISBN-13 : 978-8131804285
02	A Text Book of Building Construction	S.P. Arora, S.P. Bindra	DhanpatRai Publications January 2010 ISBN-10 : 8189928805 ISBN-13 : 978-8189928803

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	A to Z of Practical Building Construction and Its Management	Sandeep Mantri	SatyaPrakashan, New Delhi. July 2020 ISBN-10 : 9351922626 ISBN-13 : 978-9351922629
02	Handbook of Building Construction	M. M. Goyal	Amrindra Consultancy January 2013 ISBN-10 : 9350674416 ISBN-13 : 978-9350674413
03	Engineering Materials	R.K.Rajput	S Chand September 2000 ISBN-10 : 8121919606 ISBN-13 : 978-8121919609

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

PCC-CE0233: Strength of Materials

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**:-**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	Engineering Mathematics, Engineering Physics, Engineering Mechanics	
Course Objective	1	To discuss the mechanical properties of the materials.
	2	To provide concept of axial, bending, shear behavior of different structural elements.
	3	To conceptualize the fundamentals of bending and shear stresses.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain the basic concepts of the stresses and strains for different materials and Identify the response of elastic body for external actions
	2	Analyze the trusses.
	3	Draw SFD and BMD for determinate beams.
	4	Calculate the bending and shear stress of beam.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2		3										
CO3		3										
CO4		3										
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
1. The Theory exam shall be consisting of MSE and ESE. The weightage of MSE shall be 30% and of ESE shall be 60%. 2. ESE paper setting weightage will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units). 3. The number of optional questions marks in a theory paper shall be 25 to 30 percent of the maximum marks.

Unit No.	Content	Hours
1	**Stress & Strain**	**07**
	Engineering properties of different materials. Concept of stress and strain, Stress strain behavior of ductile and brittle material in uniaxial state of stress. Elastic constants, Hooke's law, Relation between elastic constants. , elastic behavior of the body under external actions. Composite sections under axial loading	
2	**Temperature stresses and Strain Energy**	**06**
	Temperature stresses, Strain Energy (Due to Strain energy due to different types of actions, suddenly applied load, gradually applied load & impact load)	
3	**Analysis of trusses**	**06**
	Introduction to truss, Analysis of truss using method of joints & method of sections.	
4	**Shear force diagram (SFD) & bending moment diagram (BMD) for determinate beams**	**07**
	Concept and definition of SF & BM, relation between SFD, BMD & loading. SFD & BMD due to point load, UDL, UVL & moments/couples.	
5	**Bending Stresses**	**06**
	Bending stresses in simple beam, Assumptions and derivation of simple bending, Theory of pure bending. Derivation of flexural formula. 5Bending stress for symmetrical & unsymmetrical section	
6	**Shear stresses**	**07**
	Shear stress distribution in beams, Maximum Shear stress, Average shear stress, Shearstress distribution Diagram for various beam cross sections.	

Text Book :

Sr. No.	Title	Author	Publication & Edition
01	Strength of Materials	R.K.Bansal,	Laxmi Publications January 2018 ISBN-10 : 9788131808146 ISBN-13 : 978-8131808146
02	Strength of Materials	S Ramamrutham	DhanapatRai Publications. August 2012 ASIN : 818743354X
03	Structural Analysis	Bhavikatti S.S	Vikas Publications house New Dehli. January 2021 ISBN-10 : 8194751985 ISBN-13 : 978-8194751984
04	Strength of materials	S.S.Rantan	Tata McGraw Hill. July 2017 ISBN-10 : 9789385965517 ISBN-13 : 978-9385965517

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Mechanics of Materials	Gere and Timoshenko,	CBS publishers January 2004 ISBN-10 : 9788123908946 ISBN-13 : 978-8123908946
02	Mechanics of Material	Beer and Johnston M.	McGraw Hill publication July 2009 ISBN-10 : 0070153892 ISBN-13 : 978-0070153899
03	Strength of Material	F. L. Singer and Pytel,	Harper and Row publication.
04	Intermediate Structural Analysis	R.C.Hibbler	Pearson Education Publishers.

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

CEP-CE0234: Building Construction Lab

Teaching Scheme		Evaluation Scheme	
Practical (Per week)	**:02**	**MSE**	**:-**
Tutorial (Per week)	**:-**	**ISE**	**:-**
Credit	**:02**	**ESE**	**:25**

Exp. No.	Experiment Title
	Construction Details and Drawings of
01	Foundations: Isolated, Combined Footing, Under Reamed Piles (With reinforcement details)
02	Stone Masonry
03	Brick Masonry
04	Doors
05	Windows
06	Stairs: Dog legged, quarter turn and Open well.

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Building Construction	B.C.Punmia	Laxmi Publications January 2016 ISBN-10 : 9788131804285 ISBN-13 : 978-8131804285
02	A Text Book of Building Construction	S.P. Arora, S.P. Bindra	DhanpatRai Publications January 2010 ISBN-10 : 8189928805 ISBN-13 : 978-8189928803

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	A to Z of Practical Building Construction and Its Management	Sandeep Mantri	SatyaPrakashan, New Delhi. July 2020 ISBN-10 : 9351922626 ISBN-13 : 978-9351922629
02	Handbook of Building Construction	M. M. Goyal	Amrindra Consultancy January 2013 ISBN-10 : 9350674416 ISBN-13 : 978-9350674413
03	Engineering Materials	R.K.Rajput	S Chand September 2000 ISBN-10 : 8121919606 ISBN-13 : 978-8121919609

MDM-CE0235: Multi-disciplinary Minor- 01 (Building Construction)

Teaching Scheme		**Evaluation Scheme**	
Theory (Per week)	**:02**	**MSE**	**:30**
Tutorial (Per week)	**:-**	**ISE**	**:10**
Credit	**:02**	**ESE**	**:60**

Course Pre-requisite	No Pre Requisite required (NPR)	
Course Objective	1	To impart in-depth knowledgeon the properties and suitability of building materials.
	2	To provide the pertinent details of building and its components
	3	To illustrate the various masonry work, doors and windows with their functional requirements.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain the properties and suitability of various building materials.
	2	Describe the functional requirement of building and its components.
	3	Explain the types of masonry and identify the various bonds.
	4	Classify the doors and windows and draw schematic sketches.
	5	Explain the types of stair case.
	6	Explain different types of roof coverings & types of flooring.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2											
CO3	2											
CO4	2											
CO5	2											
CO6	2											
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
MSE: 30 M ISE: 10 M ESE: 30 M

Unit No.	Content	Hours
1	**Construction Materials** Stones – Requirements of good building stone, uses of building stones. Bricks –Engineering Properties. Concrete – Ingredients, grades, Types (SCC,SHC,HPC) Steel – Standard structural sections, steel as reinforcement, TMT bars. Tiles - Natural Stone, Paving Blocks, Ceramic, Vitrified.	**05**
2	**Building requirements &Components** Basic requirements of a building as a whole: Strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques Building components and their basic requirements : Foundations, plinth, walls and columns in superstructure, floors, doors and windows, sills, lintels and weather sheds, roofs, steps and stairs, utility fixtures.	**05**
3	**Masonry** Stone Masonry – Types of stone masonry. Brickwork and Brick Bonds - English, Flemish, Header, Stretcher.	**04**
4	**Door & Windows** Doors – Classification, T.W. Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening. Windows - Classification, T.W. Glazed Windows, Aluminum Glazed Windows, fixtures and fastening.	**04**
5	**Staircase** Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Ramps, lifts and escalator.	**04**
6	**Roofs & Floors** Roofs and Roof coverings: Terms used. Roof and their selection, pitched roofs and their types, Steel Trusses types and their suitability, roof covering, material, details, fixtures Mangalore tiles, A. C., G. I. and Precoated sheets, Floors: Concrete Flooring, R.C.C. slab, R.C.C. beam and slab, Flat slab	**04**

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Building Construction and Materials	Dr B C Punmia	Laxmi Publications January 2016 ISBN-10 : 9788131804285 ISBN-13 : 978-8131804285
02	Building Construction and Construction Materials	G S Birdie and T S Ahuja	DhanpatRai Publications January 2010 ISBN-10 : 8189928805 ISBN-13 : 978-8189928803

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Building Construction	S P Arora and S P Bindra	SatyaPrakashan, New Delhi. July 2020 ISBN-10 : 9351922626 ISBN-13 : 978-9351922629
02	A course in Civil engineering Drawing	V B Sikka	Amrindra Consultancy January 2013 ISBN-10 : 9350674416 ISBN-13 : 978-9350674413
03	Building Construction and Maintenance- Practical handbook(Marathi Version - 3rd edition)	Ar. Pramod Beri	S Chand September 2000 ISBN-10 : 8121919606 ISBN-13 : 978-8121919609

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

OE-CE0236: Open Elective- 01 (Building Construction and Planning)

Teaching Scheme		**Evaluation Scheme**	
Theory (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**:-**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	-	
Course Objective	1	To impart Necessary knowledge and concepts in Building Planning and functional design.
	2	To impart Necessary knowledge and concepts in the utilization of building materials, their properties and their applications in construction of building.
Course Outcomes	After Completion of this course students will be able to	
	1	Grasp the principles of planning, building bye laws to apply in the planning of residential/public buildings in relation to functional planning.
	2	Classify the various components and their relationships in buildings and identify the materials and building services to be adopted for different buildings.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2											
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme

Unit No.	Content	Hours
1	**Site, Building and Building Drawings** Categories of buildings, Types of Residential buildings, Site selection, Factors influencing selection of site, guidelines for planning and drawing of buildings, Positions of various building components, types of drawings and relevant scales.	**6**
2	**Principles of Building Planning and Building** Bye laws Principles of planning: Aspects, prospect, Privacy, Furniture, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Flexibility, Elegance, Sanitation, Economy. Bye laws: Minimum plot size, building frontage, open spaces, standard dimensions in buildings, Provision for light & ventilation, FSI, Height of Building	**7**
3	**Planning concepts in Buildings** Requirements in different types of buildings, Integrated approach to planning in various aspects like aesthetics, landscape, interior, etc. Guidelines for planning & drawing residential and public buildings.	**6**
4	**Components of building** Sub structure, Foundations, Bearing Capacity of Soils, Types of Shallow and Deep foundations, Conditions for their applications, masonry, Bonds, Doors, Windows, Staircases, Roofs and Floors, Flooring and their Applications	**7**
5	**Construction Materials** Types, Engineering properties and Uses of Bricks, Stones, Aggregate, Lime, Cement, Steel, Aluminium, PVC, Glass. Concrete: Ingredients, Preparation, Properties of concrete, Types of concrete and their applications	**6**
6	**Building Services and Finishes** Plumbing services for water supply, plumbing services for drainage, symbols, Electrification, symbols of electrical fixtures, Types of Plastering and Pointing, Defects, Paints and Varnishes Types, Application, Methodology on various surfaces, Defects.	**7**

Text Book :

Sr. No.	Title	Author	Publication & Edition
1	Building Materials	R.K.Rajput S.	S. Chand Publications
2	Building Construction	Bindra and Arora,	DhanpatRai and Sons

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
1	The A to Z of Practical Building Construction and its Managemen	Sandeep Mantri	Mantri Institute of Devp. and Research. Pune, 1994.
2	Building drawing with Integrated approach	Shah, Kale & Patki,	Tata Mc Graw Hill Pub.
3	National Building Code of India and SP- 7.	-	-

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

HSSM-CE0237: Universal Human Values

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:00**
Tutorial (Per week)	**:-**	**ISE**	**:50**
Credit	**:02**	**ESE**	**:00**

Course Pre-requisite	Introduction to Philosophy or Ethics, Basic Knowledge of Social Sciences	
Course Objective	1	To develop a comprehensive understanding of the fundamental values that underpin human existence and social harmony.
	2	To enable students to integrate ethical considerations into their personal and professional lives.
	3	To foster the ability to critically analyze societal norms and values from a humanistic perspective.
	4	To encourage the application of universal values in decision-making processes within technical and professional contexts.
	5	To cultivate empathy, respect, and social responsibility among students.
	6	To promote a holistic approach to education by combining technical proficiency with moral and ethical awareness.
Course Outcomes	After Completion of this course students will be able to	
	1	Articulate the core principles of universal human values and their relevance to personal and professional life.
	2	Analyze and reflect on ethical dilemmas and societal issues using a values-based framework.
	3	Apply universal human values to decision-making processes in technical and professional settings.
	4	Demonstrate the ability to foster and maintain respectful and empathetic relationships in diverse environments.
	5	Evaluate the impact of technological advancements on human values and ethical standards.
	6	Develop strategies to incorporate universal values into leadership and teamwork within professional settings.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2						
CO2								2				
CO3						2						
CO4							2					
CO5								2				
CO6									2			
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
Assignments on each Unit

Unit No.	Content	Hours
1	**Introduction to Universal Human Values** Understanding Human Values- Definition and significance of human values Categories of human values: moral, ethical, social, Core Values in Different Cultures-Comparative analysis of values across cultures, Universal values vs. cultural-specific values, Philosophical Foundations- Major philosophical perspectives on human values (e.g., Utilitarianism, Deontology, Virtue Ethics), The role of values in human development, Value Systems and Human Behavior- How values influence behavior and decision-making, .Case studies illustrating value-based decisions.	**07**
2	**Ethics and Morality** Concepts of Ethics and Morality- Definition and scope of ethics, Relationship between ethics, morality, and laws, Ethical Theories and Principles- Overview of major ethical theories: Consequentialism, Deontology, Virtue Ethics, Application of ethical principles in real-life scenarios, Ethical Dilemmas in Professional Life- Identifying and resolving ethical dilemmas, Case studies from various professions (engineering, business, healthcare), Promoting Ethical Practices- Developing personal and organizational ethical standards, Mechanisms for ethical decision-making and accountability.	**06**
3	**Social Responsibility and Integrity** Understanding Social Responsibility- Definition and scope of social responsibility, Corporate social responsibility (CSR) and its impact, Integrity and Professional Ethics- The role of integrity in professional settings, Strategies for maintaining integrity in challenging situations, Social Justice and Equality- Concepts of social justice and equality, Addressing social inequalities and advocating for justice, Case Studies on Social Responsibility- Analysis of successful social responsibility initiatives, Lessons learned from ethical and unethical practices.	**06**
4	**Personal Development and Human Values** Self-awareness and Personal Growth- Techniques for self-reflection and personal growth, Aligning personal values with professional goals, Building Empathy and Respect- Importance of empathy in personal and professional relationships, Practical exercises to enhance empathy and respect, Leadership and Values- The role of values in effective leadership, Case studies of value-driven leadership, Future Challenges	**07**

	and Values- Emerging global challenges and their implications for human values, Preparing for future ethical dilemmas and maintaining values-based decision-making.	

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Business Ethics: A Stakeholder and Issues Management Approach	Joseph Weiss	4th Edition, Cengage Learning, 2014
02	The Elements of Moral Philosophy	James Rachels and Stuart Rachels	9th Edition, McGraw-Hill Education, 2019
03	Ethics and the Engineering Profession	H. Richard and C. H. K. J. Lynch	1st Edition, Publisher: Wadsworth Publishing, 2004
04	Ethics: Theory and Contemporary Issues	Barbara MacKinnon	9th Edition, Cengage Learning, 2020

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Moral Philosophy: A Contemporary Introduction	Daniel R. DeNicola	2nd Edition, Publisher: Routledge, 2016
02	The Moral Landscape: How Science Can Determine Human Values	Sam Harris	1st Edition, Publisher: Free Press, 2010
03	Ethics in the Workplace: A Practical Guide	Dean Bredeson	2nd Edition, Wiley, 2017
04	A Theory of Justice	John Rawls	3rd Edition, Publisher: Harvard University Press, 2005

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

CEP-CE0238: Strength of Materials Lab

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:-**
Tutorial (Per week)	**:-**	**ISE**	**:50**
Credit	**:01**	**ESE**	**:75**

At least 8 experiments need to complete.

Exp. No.	**Experiment Title**
01	Study of Universal Testing Machine
02	Tensile test on Mild steel and TMT steel
03	Compression test on M.S. and C.I, cement bricks/fly ash/ laterite bricks or paving blocks
04	Compression test on timber
05	Direct shear test on M.S. bar
06	Charpy or Izod Impact test on different metals
08	Bending test on Timber
09	Flexure test on tiles
10	Hardness test on metals

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	"Strength of Materials".	R.K.Bansal.,	Laxmi Publications January 2018 ISBN-10 : 9788131808146 ISBN-13 : 978-8131808146
02	"Strength of Materials"	S Ramamrutham	DhanapatRai Publications. August 2012 ASIN : 818743354X
03	"Structural Analysis"	Bhavikatti S.S	Vikas Publications house New Dehli. January 2021 ISBN-10 : 8194751985 ISBN-13 : 978-8194751984
04	Strength of materails	S.S.Rantan	Tata McGraw Hill. July 2017 ISBN-10 : 9789385965517 ISBN-13 : 978-9385965517

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	"Mechanics of Materials"	Gere and Timoshenko,	CBS publishers January 2004 ISBN-10 : 9788123908946 ISBN-13 : 978-8123908946
02	Mechanics of Material"	Beer and Johnston M.	McGraw Hill publication July 2009 ISBN-10 : 0070153892 ISBN-13 : 978-0070153899
03	Strength of Material" -	F. L. Singer and Pytel,	Harper and Row publication.
04	Intermediate Structural Analysis	R.C.Hibbler	Pearson Education Publishers.

HSSM-CE0239: Economics for Engineers

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:00**
Tutorial (Per week)	**:-**	**ISE**	**:50**
Credit	**:02**	**ESE**	**:00**

Course Pre-requisite	Engineering Mathematics, Introduction to Engineering Management	
Course Objective	1	To introduce the basic principles of economics relevant to engineering practice.
	2	To enable students to understand and apply economic concepts to engineering decision-making processes.
	3	To develop the ability to evaluate economic feasibility and financial viability of engineering projects.
	4	To equip students with the skills to perform cost-benefit analysis and evaluate the financial viability of engineering projects.
	5	To develop analytical skills for project evaluation, including techniques for risk analysis, cost-benefit analysis, and financial appraisal methods
	6	To foster an understanding of economic sustainability, resource allocation, and their impact on engineering solutions.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain fundamental economic principles and their relevance to engineering.
	2	Conduct cost-benefit analysis and assess the economic feasibility of engineering solutions.
	3	Analyze the impact of economic factors on engineering project decisions and societal outcomes.
	4	Analyze different market structures and assess their impact on pricing strategies and competition within engineering sectors.
	5	Conduct project feasibility analysis using financial appraisal methods like NPV, IRR, and payback period.
	6	Evaluate the financial and economic sustainability of engineering solutions with respect to resource allocation, environmental impact, and societal needs.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2										3	
CO2	2										3	
CO3	2										3	
CO4	2										3	
CO5	2										3	
CO6	2										3	

Level of Mapping as: Low 1, Moderate 2, High 3
Marking Scheme
Assignments on each Unit

Unit No.	Content	Hours
1	**Introduction to Economics and Engineering Economics**	**04**
	Definition, scope, and importance of economics in engineering.Microeconomics vs. macroeconomics.Basic economic concepts: scarcity, opportunity cost, and trade-offs. Introduction to engineering economics: Role of engineers in economic decision-making.Key Economic Indicators: GDP, Inflation	
2	**Project Evaluation and Risk Analysis**	**04**
	Project Feasibility Analysis: Steps in project feasibility studies, Economic feasibility vs. technical feasibility, Risk Management in Projects: Identifying and assessing risks, Decision-Making under Uncertainty: Techniques for decision-making in uncertain conditions	
3	**Engineering Economics and Financial Analysis**	**05**
	Types of costs: Fixed, variable, total, marginal, and average costs. Profitability Ratios: Net Profit Ratio, Gross Profit Ratio, Price Earnings Ratio, Return On Investment (ROI).Cost estimation techniques in engineering. Break-even analysis: Determining the break-even point for engineering projects.Applications of cost analysis in decision-making and optimization, Use of decision trees and Monte Carlo simulations	
4	**Engineering Project Evaluation and Cost-Benefit Analysis**	**05**
	Time value of money: Discounting, compounding, and present value, Future Value.Investment appraisal methods: Net present value (NPV), Internal Rate of Return (IRR), and payback period.Cost-benefit analysis for engineering projects.Case studies: Evaluating infrastructure projects using cost-benefit analysis	
5	**Market Structures and Pricing Strategies**	**04**
	Market structures: Perfect competition, monopoly, monopolistic competition, and oligopoly. Pricing strategies in different market structures. Case studies: Pricing strategies in engineering product development and services.	
6	**Sustainability, Resource Allocation, and Economic Impact**	**04**
	Principles of sustainability and its economic significance in engineering. Resource allocation and its impact on engineering processes and solutions. Economic Impact of Engineering Project. Case studies: Sustainable engineering solutions and their economic impact.	

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	**Engineering Economics**	R. Panneerselvam	2nd Edition PHI Learning
02	Economics for Engineers	P.K. Nag	3rd Edition Tata McGraw Hill
03	Engineering Economics and Financial Accounting	A.R. Aryasri	3rd Edition Tata McGraw Hill,
04	Principles of Engineering Economics with Applications	T. N. Hajela	1st Edition Ane Books Pvt Ltd

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Engineering Economics	Sasmita Mishra	2nd Edition,PHI Learning
02	Managerial Economics	D.N. Dwivedi	9th Edition, Vikas Publishing House
03	Economics	Paul A. Samuelson and William D. Nordhaus	19th Edition McGraw Hill Education
04	Indian Economy	Ramesh Singh	14th EditionMcGraw Hill Education
05	Engineering Economy	Leland Blank and Anthony Tarquin	8th EditionMcGraw Hill Education

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

OE-CE02310: Open Elective- 01 Lab (Building Construction and Planning)

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:-**
Tutorial (Per week)	**:-**	**ISE**	**:25**
Credit	**:02**	**ESE**	**:25**

Exp. No.	**Experiment Title**
1	A) Site visit to i) Construction site ii) residential/public buildings B) Prepare report
2	Study of residential building drawing of existing building
3	Preparation of line plan of a residential building for given requirements
4	Study the Engineering properties of i) Cement ii) Brick iii) Concrete iv) Steel
5	Study of plumbing system of a residential building

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
1	Building Materials	R.K.Rajput S.	S. Chand Publications
2	Building Construction	Bindra and Arora,	DhanpatRai and Sons

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
1	The A to Z of Practical Building Construction and its Management‟	MantriInstitute‟s „	Mantri Institute of Devp. and Research. Pune, 1994.
2	Building drawing with Integrated approach	Shah, Kale & Patki,	Tata Mc Graw Hill Pub.
3	National Building Code of India and SP- 7.	-	-

PCC-CE0241: Surveying

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**:-**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	Basic Civil Engineering	
Course Objective	1	To introduce the basic surveying principles and its application
	2	To provide knowledge on modern concepts of surveying
	3	To inculcate knowledge on curve surveying
Course Outcomes	After Completion of this course students will be able to	
	1	Apply basic principles of surveying through surveying equipment.
	2	Explain the concepts of geodetic surveying and photogrammetry
	3	Explain applications of RS, GIS and GPS
	4	Apply surveying knowledge for curve setting

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2							
CO2	3											
CO3	3				1							
CO4		3										
CO5	3											
CO6	3											

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

MSE: 30

ISE: 10

ESE: 60

Total: 100

Unit	Content	Hours
1	**Basic Surveying** Levelling, Methods, Study of dumpy and auto levels Contouring, Methods Planimeter-Introduction to digital planimeter. Plane Table Surveying, accessories used, methods of Plane Table Surveying (Radiation and intersection only)	7
2	**Theodolite and Total Station** Vernier theodolite, Components, uses and adjustments. Trigonometrical levelling. Tacheometry, Principles, Methods Study of Total Station	7
3	**Geodetic Surveying** Triangulation Principle and Classification, system, Selection of station, Base line, Measurement, Correction and use of substance bar. Signals.	6
4	**Curve Surveying** Horizontal Curves- Simple and Compound curves, elements of simple circular curves, linear and angular methods of setting out circular curves Transition Curves- types Vertical Curves- Necessity and types,	7
5	**Photogrammetry** Photogrammetry, Types, Terms, Scale of vertical photographs, Flight planning and mosaic. (Introduction to terrestrial photogrammetry) Use of UAV (drones) in aerial mapping, Stereoscopy	6
6	**RS, GPS, and GIS** Remote sensing – Definition, relevance, types, electromagnetic radiation andenergy sources and its characteristics, applications to civil engineering. GPS – Basic principles, GPS segments, receivers, applications in survey. GIS – Terminology, advantages, basic components of GIS, data types, GIS analysis, applications of GIS software.	6

Text Book :			
Sr. No.	**Title**	**Author**	**Edition/Publication**
01	Surveying and Levelling.	N. N. Basak	Tata McGraw Hill July 2017 ISBN-10 : 9789332901537 ISBN-13 : 978-9332901537
02	Surveying, Vol. I & II	Dr.B.C.Punmia, Ashok K.Jain, Arun K.Jain	Laxmi Publications. January 2016 ISBN-10 : 9788170088530 ISBN-13 : 978-8170088530
03	Surveying and Levelling	R. Agor	Khanna Publishers, New Delhi. January 1980 ISBN-10 : 8174092358 ISBN-13 : 978-8174092359
04	Surveying, Vol. I & II	S. K. Duggal	TataMc-Graw Hill. July 2017 ISBN-10 : 9781259028991 ISBN-13 : 978-1259028991

Reference Book :			
Sr. No.	**Title**	**Author**	**Edition/Publication**
01	Surveying and Leveling‟ Vol. I and Vol. II”	T. P. Kanetkar and S.V. Kulkarni	Pune Vidyarthi Griha Prakashan ISBN-10 : 8185825114 ISBN-13 : 978-8185825113
02	Elements of Photogrammetry	Paul R. Wolf	McGraw Hill Publication.
03	Remote sensing and Geographical Information System	A. M. Chandra and S. K.Ghosh	Narosa Publishing House. January 2015 ISBN-10 : 1842659707 ISBN-13 : 978-1842659700
04	Surveying: Theory and Practice	James M. Anderson, Edward M. Mikhail	Tata Mc-Graw Hill.
05	Advanced Surveying -Total Station, GIS and Remote Sensing.	Satheesh Gopi, R. Sathikumar and N. Madhu	Pearson publication.
06	The GIS Book,	George B. Korte	PE onwards press. 5th Edition,

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

PCC-CE0242: Structural Mechanics

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**: -**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	Structural Mechanics, Engineering Mathematics, Engineering Physics, Engineering Mechanics, Strength of Materials	
Course Objective	1	To explain the concepts of principal & torsional stresses.
	2	To provide knowledge on the structural elements under various loading conditions.
	3	To discuss the slope & deflection of beams under various condition.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain stress, strain and torsion effect on bodies.
	2	Analyzethe circular shaft for torsion and bending
	3	Analyze the buckling effect on columns
	4	Analyze the beams for slope & deflection
	5	Apply the fundamental concepts of direct & bending stresses.

CO-PO Mapping

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3											
CO2		3										
CO3		3										
CO4		3										
CO5		3										

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

MSE: 30

ISE: 10

ESE: 60

Total: 100

Unit	Content	Hours
1	**Principal planes & stresses** Normal and shear stresses on any oblique plane, Concept of principal planes and stresses by analytical & graphical methods (Mohr's circle of stress 2-D). Theories of failure: Maximum normal stress, maximum shear stress and maximum strain energy theory.	7
2	**Torsion of circular shaft:** Analysis of circular shaft subjected to torsion. Power transmitted to circular shaft. Shafts subjected to combined bending, torsion & axial thrust.	6
3	**Influence line diagrams** Muller's Breslau's principle & its applications to statically determinate simple. ILD for member forces in statically determinate truss.	7
4	**Buckling of long columns** Effective length for various end conditions. Slenderness ratio. Euler's theory & Rankine's theory	6
5	**Slope and deflection of determinate beams:** Double integration method. Macaulay's method. Moment-Area method & Conjugate beam method.	7
6	**Combined direct and bending stresses:** Combined direct and bending stresses, eccentric load, core /kernel of section. Stability analysis of gravity dam, retaining wall & chimney.	6

Text Book :

Sr.No.	Title	Author	Edition/Publication
01	Structural Analysis	Bhavikatti S.S,	Vikas Publications house New Dehli. January 2021 ISBN-10 : 8194751985 ISBN-13 : 978-8194751984
02	Theory of Structures	R. S. Khurmi and N Khurmi	S. Chand Publishers January 2020 ISBN-10 : 8121905206 ISBN-13 : 978-8121905206
03	Strength of Materials	S Ramamrutham	DhanapatRai Publications August 2012 ASIN : 818743354X
04	Basic structural analysis	C.S Reddy	Tata MacGraw July 2017 ISBN-10 : 9780070702769 ISBN-13 : 978-0070702769

Reference Book :			
Sr.No.	**Title**	**Author**	**Edition/Publication**
01	Mechanics of Materials	Hibbeler R. C.	Pearson Education, 10th Edition, 2016
02	Matrix Analysis of Framed Structures	Weaver and Gere J. M.,	CBS Publications and Distributors, 2nd Edition, 2004.
03	Indeterminate Structural Analysis	Wang C. K.	Tata McGraw-Hill Publishing CompanyLtd., New Delhi, 1st Edition, 1983.

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

PCC-CE0243: Fluid Mechanics

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:03**	**MSE**	**:30**
Tutorial (Per week)	**: -**	**ISE**	**:10**
Credit	**:03**	**ESE**	**:60**

Course Pre-requisite	Basics of physics, Basics of Applied Mechanics	
Course Objective	1	To explain laws of fluid mechanics and evaluate pressure, velocity, acceleration and losses for various fluid flows
	2	To provide the fundamental principles governing open channel Hydraulics to the design of engineering systems
Course Outcomes	After Completion of this course students will be able to	
	1	Explain the fluid properties and hydrostatic pressure force at various locations in a fluid.
	2	Apply the principles of statics and kinematics of flow in solving problems of fluid mechanics.
	3	Apply the Bernoulli's equation to solve the problems of fluid mechanics.
	4	Explain laminar flow, turbulent flow and identify the losses in pipes
	5	Identify the most efficient, economic open channel section and illustrate mathematical relationships for hydraulic jumps, critical flow, uniform flow, gradually varied flow.
	6	Explain impact of jet on vanes.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2		3										
CO3		3										
CO4	3											
CO5		3										
CO6	3											

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

MSE: 30 ISE: 10

ESE: 60 Total: 100

Unit	Content	Hours
1	**Properties of fluid & Fluid Statics** Introduction: Physical Properties of Fluids (Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity: Dynamic and Kinematic Viscosity, Compressibility, Surface tension, Capillary Effect, Vapour Pressure and Cavitation), Newton's law of viscosity, Types of Fluids. Pressure, Types of Pressure, Pascal's Law, Hydrostatic Law. Total Pressure and Centre of Pressure, Forces on Plane and Curved Surfaces, Buoyancy and Floatation: Archimedes' Principle, Metacentre, Stability of Submerged and Floating Bodies.	7
2	**Fluid Kinematics:** Types of Flows, Stream lines, Streak Line, Path Line, Stream Tube, Stream Bundle, Equipotential lines, velocity and acceleration of fluid, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses).	5
3	**Fluid Kinetics:** Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's equations, Bernoulli's Theorem assumptions, Limitations and modifications. Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Orifices, Time required for Emptying the Tank, Concept of HGL and TEL. Introduction of mouthpiece and Rotameter. Concept of CFD (Theory)	7
4	**Flow through Pipes:** Laminar Flow and Turbulent Flow: Reynold's Experiment, Hazen Poisulle's Equation for Viscous Flow through Circular Pipes, (Derivation not required) Introduction to Moody's Chart. Major and Minor Losses, Darcy-Wiesbach Equation, Concept of Equivalent Pipe, Dupit's Equation. Pipes in Series, Parallel and Syphon, Two Reservoir Problems, Concept of Water hammer. Surge Tanks (Function, Location and Uses).	7
5	**Uniform Flow in Open Channel:** Types of Flows in Open Channel, Geometric Elements, Measurement of Velocity- (Pitot tube, Current Meter) Hydraulically Efficient Section (Rectangular, Triangular, Trapezoidal) ,Specific Energy, Critical, Sub-Critical, Super-Critical Flow, Specific Force (Definition and Diagram)	7
6	**Non uniform Flow in Open Channel :** Gradually Varied Flow (GVF): Definition, Classification of Channel Slopes, GVF and RVF (Introduction, type, application) Hydraulic jump Type of Hydraulic ,Application,	6

Text Book :			
Sr. No.	Title	Author	Edition/Publication
01	Fluid Mechanics – Hydraulic and Hydraulic Mechanics	Modi / Seth	Standard Book House, New Delhi. 23rd Edition, 2022
02	Fluid Mechanics and hydraulic machine	R.K.Bansal	Laxmi Pubication January 2019 ISBN-10 : 8131808157 ISBN-13 : 978-8131808153
03	Fluid Mechanics	A.K. Jain	Khanna Pub., Delhi January 1998 ISBN-10 : 8174091947 ISBN-13 : 978-8174091949

Reference Book :			
Sr. No.	Title	Author	Edition/Publication
01	Fluid Mechanics	Arora	Standard Publishers December 2020 ISBN-10 : 8180140709 ISBN-13 : 978-8180140709
02	Flow in open channels	K. Subramanyam	Tata McGraw-Hill Pub. Co., Delhi April 2019 ISBN-10 : 9353166292 ISBN-13 : 978-9353166298
03	Fluid Mechanics	Garde-Mirajgaonkar	Nemchandand Bros., Roorkee August 2010 ISBN-10 : 8188429015 ISBN-13 : 978-8188429011
04	Elementary Fluid Mechanics	H. Rouse	Toppan C. Ltd. Tokyo
05	Open Channel flow	Rangaraju	Tata McGraw-Hill Pub. Co., Delhi. July 2001 ISBN-10 : 007460497X ISBN-13 : 978-0074604977

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

MDM-CE0244: Multi-disciplinary Minor –02 Waste Management

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**:30**
Tutorial (Per week)	**: -**	**ISE**	**:10**
Credit	**:02**	**ESE**	**:60**

Course Pre-requisite	-	
Course Objective	1	To introduce concepts of wastewater engineering and solid waste processing
	2	To provide pertinent knowledge on waste management facilities
Course Outcomes	After Completion of this course students will be able to	
	1	Explain collection and characteristics of wastewater and solid waste
	2	Explain treatment/processing/control technologies for prevention of pollution associated with wastewater and solid waste.
	3	Explain technologies for biomedical, e waste and plastic waste management.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2						2					
CO2	2						2					
CO3	2						2					
CO4	2						2					

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

Unit No.	Content	Hours
1	**Wastewater** Sources, Flow rate and variations, Quantitative estimation, Characteristics	4
2	**Wastewater Collection and Treatment** Gravity sewer collection system: Nomenclature, Manhole, Pumping station, Wastewater treatment: Philosophy, Unit operations and unit processes, Disposal	5
3	**Municipal Solid waste** Solid Waste: Characteristics, Generation, Collection and transportation	4
4	**Municipal Solid waste Processing** Engineered systems for solid waste processing: Mechanical, Thermal, Biological Sanitary land fill: Location, Components	4
5	**Biomedical Waste** **Biomedical Waste** Generation, identification, storage, collection, transport, treatment, common treatment and disposal, occupational hazards and safety measures. Biomedical waste legislation in India	5
6	**E waste and Plastic Waste** E waste- composition and generation, Technologies for recovery of resources from electronic waste, resource recovery potential of e-waste, E-waste control measures Plastic Waste – Sources, Production, : Plastic Waste Management Practices – Use of Plastic waste in roads, issues and challenges,Plastics Resource Recovery	4

Text Book :

Sr.No.	Title	Author	Edition/Publication
01	Solid Waste Management	Dr. A. D. Bhide	Indian National Scientific Documentation Centre, New Delhi.
02	Environmental Engineering	Peavy ,Rowe and Tchobanoglous	McGraw-Hill July 2017 ISBN-10 : 9351340260 ISBN-13 : 978-9351340263

Reference Book :			
Sr.No.	Title	Author	Edition/Publication
1	CPHEEO, "Manual on Municipal Solid waste management", Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000	-	
2	Electronic waste	Fowler B,	Elsevier

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

OE-CE0245: Open Elective -02 Municipal Solid Waste Management

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**:30**
Tutorial (Per week)	**: -**	**ISE**	**:10**
Credit	**:02**	**ESE**	**:60**

Course Pre-requisite	-	
Course Objective	1	To explain functional elements of solid waste management.
	2	To provide basics of solid waste processing techniques
Course Outcomes	After Completion of this course students will be able to	
	CO1	Determine solid waste properties for municipal solid waste.
	CO2	Select suitable processing technique for solid waste management.
	CO3	Analyze collection routes to enhance the efficiency of solid waste collection services.
	CO4	Select processing technique to enhance the efficiency and effectiveness of solid waste management systems.

CO-PO Mapping

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2						2					
CO2	2						2					
CO3	2						2					
CO4	2						2					

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

MSE: 30

ISE: 10

ESE: 60

Total: 100

Unit	Content	Hours
1	**Solid Waste, Solid Waste Management & Indian Scenario** Solid Waste: Sources, Types, Composition, Quantities, Physical, Chemical and Biological properties. Solid Waste Management: Objectives, Functional elements, Environmental impact of mismanagement, Factors affecting. Indian Scenario: Present scenario and measures to improve system for different functional elements of solid waste management system	**4**
2	**Solid Waste Generation Rate** Solid Waste Generation Rate: Definition, Typical values for Indian cities, Factors affecting. Storage and collection: General considerations for waste storage at source, Collection components, Types of collection systems.	**5**
3	**Waste Processing Techniques & Material Recovery and Recycling** Waste Processing Techniques: Purpose, Mechanical volume and size reduction, component separation techniques. Material Recovery and Recycling: Objectives, Recycling program elements, Commonly recycled materials and processes	**4**
4	**Energy recovery from solid waste**: Parameters affecting, Fundamentals of thermal processing, Biomethanation, Pyrolysis, Incineration, Refuse derived fuels, Planning and design of incineration facility, Energy recovery	**5**
5	**Composting of Solid Waste** Benefits, Processes, Stages, Technologies, Factors affecting, Properties of compost. Vermicomposting.	**4**
6	**Landfills** Site selection, Types, Principle, Processes, Land filling methods, Leachate and landfill gas management	**4**

Text Book :

Sr.No.	Title	Author	Edition/Publication
01	Solid Waste Management	Dr. A. D. Bhide	Indian National Scientific Documentation Centre, New Delhi.
02	Environmental Engineering	Peavy,Rowe and Tchobanoglous	McGraw-Hill

Reference Book :			
Sr.No.	**Title**	**Author**	**Edition/Publication**
01	Solid Waste Management	Gorge Tohonanoglous	McGRAW-HILL
02	CPHEEO, "*Manual on Municipal Solid waste management*", Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000	-	-

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

HSSM -CE0246: Strategic Management

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**: -**
Tutorial (Per week)	**: -**	**ISE**	**:50**
Credit	**:02**	**ESE**	**: -**

Course Pre-requisite	Basic Civil Engineering, Engineering Economics,	
Course Objective	1	To provide students with a comprehensive understanding of strategic management principles and their application in civil engineering projects.
	2	To develop the ability to analyze both internal and external environments using strategic tools
	3	To equip students with skills to formulate, implement, and evaluate competitive strategies and project-based strategies in civil engineering, with a focus on sustainability, innovation, and digital transformation.
Course Outcomes	After Completion of this course students will be able to	
	1	Explain the fundamentals of strategic management and its importance in civil engineering projects.
	2	Explain the internal and external environments affecting civil engineering organizations using strategic tools.
	3	Explain effective strategies for project management
	4	Explain strategic planning techniques to real-world civil engineering problems
	5	Discuss the role of leadership and organizational culture in strategy implementation
	6	Evaluate case studies to identify best practices in strategic management within the civil engineering sector

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											2	
CO2						2	2					
CO3											3	
CO4						2						
CO5									2			
CO6											2	
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
Assignments on each Unit ISE:50 Marks Total: 50 Marks

Unit No.	Content	Hours
1	**Introduction to Strategic Management** **Overview of Strategic Management:** Definition and significance in civil engineering, Levels of strategy: corporate, business, and functional. **Strategic Management Process**: Vision, mission, and objectives, Steps in the strategic management process.	4
2	**Environmental Analysis** **External Environment Analysis**: PESTEL analysis (Political, Economic, Social, Technological, Environmental, Legal), Porter's Five Forces model. **Internal Environment Analysis**: SWOC analysis (Strengths, Weaknesses, Opportunities, Challenges), Value chain analysis.	5
3	**Strategy Formulation** **Competitive Strategies**: Cost leadership, differentiation, and focus strategies. **Project-Based Strategies in Civil Engineering**: Strategic project management, Resource allocation and project portfolio management.	5
4	**Strategy Implementation** **Organizational Structure and Design**: Aligning structure with strategy, Types of organizational structures in engineering firms. **Leadership and Culture**: Role of leadership in strategy execution, Impact of organizational culture on strategic initiatives.	5
5	**Strategic Control and Evaluation** **Performance Measurement**: Key performance indicators (KPIs) for civil engineering projects. **Feedback Mechanisms**: Continuous improvement and learning organization, Case studies on successful strategy implementation.	6
6	**Case Studies and Best Practices** **Real-World Applications**: Analysis of case studies from the civil engineering sector, Discussion of strategic failures and lessons learned. **Emerging Trends in Strategic Management**: Sustainability and innovation in civil engineering, Impact of digital transformation on strategy.	5

Text Book :			
Sr.No.	**Title**	**Author**	**Edition/Publication**
01	Strategic Management: Concepts and Cases	Dr. R. Srinivasan	Prentice Hall India, (2015)
02	Strategic Management	Prof. J. M. B. Raghunath	Macmillan India, (2013)
03	Strategic Management: Theory and Practice	Dr. N. R. Narasimhan	Excel Books (2017)

Reference Book :			
Sr.No.	**Title**	**Author**	**Edition/Publication**
01	Strategic Management: Theory and Practice	John A. Pearce II and Richard B. Robinson Jr.	McGraw-Hill Education Edition: 11th (2017)
02	The New Competitor Intuition: The Complete Strategy Guide	Giovanni Gavetti	Harvard Business Review Press Edition: 1st (2012)
03	Managing Strategic Innovation and Change	Michael L. Tushman and Charles A. O'Reilly III	Oxford University Press Edition: 1st (1997)

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

HSSM -CE0247: Professional Ethics

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**: -**
Tutorial (Per week)	**: -**	**ISE**	**:25**
Credit	**:02**	**ESE**	**: -**

Course Pre-requisite		
Course Objective	1	Enhance Self-Awareness
	2	Cultivate Ethical and Professional Standards
	3	Develop Effective Time Management and Goal-Setting Skills
Course Outcomes	After Completion of this course students will be able to	
	1	Apply analytical techniques to enhance self awareness of personality types
	2	Utilize ethical decision making principle to cope with complex dilemma
	3	Implement professional work ethics to achieve excellence in practice
	4	Analyze positive interpersonal skills through effective collaboration strategies

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								3				1
CO2								3				
CO3								3				
CO4								3		2		

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

Assignments on each Unit

ISE:25 Marks
Total: 25 Marks

Unit No.	Content	Hours
1	**Self Knowledge** Self-Awareness, Personality Profiles and Categories, Understanding Personality Traits Utilizing Insights from Personality Understanding, Leveraging Knowledge of Learning Styles, Navigating Introversion and Extraversion	4
2	**Values and ethics** Self-Reflection, Ethical Guidelines: Dos and Don'ts, Developing a, Personal Code of Ethics, The Significance of Punctuality, The Importance and Practice of Accountability, Personal, Financial, and Private Responsibility	4
3	**Professional excellence:** Cultivating a Strong Work Ethic, Commitment to Unselfish Excellence, Understanding Professional Etiquette, Embracing a Professional Mindset, Upholding Professional Privacy, Maintaining, Professional Integrity	5
4	**Situations with Genuine Enthusiasm** Strategies for Being Proactively Kind in the Workplace, Enhancing Interpersonal Skills at Work, Practicing Kindness in Business Interactions, Your Contribution to Team Dynamics, Self-Study: The Advantages of Mentoring	4
5	**Time Management and Goal-Setting Skills** Overcoming the Urgency Trap, Establishing Personal Goals, Setting Short-Term Goals, Defining Long-Term Goals, Creating a Structured Plan, Combating Procrastination, Enhancing Memory Skills	5
6	**Balance for Success** Managing Unrealistic Expectations, The Value of Hard Work, Adapting to Challenges, Owning Your Mistakes, The Importance of a Sense of Humor	4

Text Book :

Sr.No.	Title	Author	Edition/Publication
01	Professional Ethics and Etiquette	David Strelecky, Ferguson	2nd Edition, An imprint of Facts On File
02	Professional Ethics	R. Subramanian	Oxford University Press, 2015.

Reference Book :			
Sr.No.	Title	Author	Edition/Publication
01	Engineering Ethics, Concepts Cases	Charles E Harris Jr., Michael S Pritchard, Michael J Rabins	4th edition, Cengage learning, 2015.
02	Engineering Ethics	Charles B. Fleddermann	Pearson Prentice Hall, New Jersey, 2004.
03	Ethics and the Conduct of Business	John R Boatright	Pearson Education, New Delhi, 2003
04	Fundamentals of Ethics for Scientists and Engineers	Edmund G Seebauer and Robert L Barry	Oxford University Press, Oxford, 2001.
05	Business Ethics: Decision Making for Personal Integrity and Social Responsibility	Laura P. Hartman and Joe Desjardins	McGraw Hill education, India Pvt. Ltd., New Delhi, 2013.

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

VEC-CE0248: Surveying lab

Teaching Scheme		Evaluation Scheme	
Practical (Per week)	**:02**	**MSE**	**:**
Tutorial (Per week)	**:**	**ISE**	**:50**
Credit	**:01**	**ESE**	**:25**

Marking Scheme

Exp. No.		Experiment Title
A)		**At least 8 experiment need to complete**
	01	Differential levelling, by Auto or Dumpy Level.
	02	Reciprocal levelling, by Auto or Dumpy Level.
	03	Plane table survey
	04	Use of theodolite
	05	Trigonometrical levelling
	06	Determination of tacheometric constants and distance measurement
	07	Study of total station
	08	Use total station for distance, angle and area measurement
	09	Setting out of simple curve- linear method
	10	Setting out of simple curve- angular method
B)		Survey Projects **(Any Two)** a) Theodolite traverse b) Radial contouring. c) Block Contouring d) Road Project

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Surveying and Levelling.	N. N. Basak	Tata McGraw Hill July 2017 ISBN-10 : 9789332901537 ISBN-13 : 978-9332901537
02	Surveying, Vol. I & II	Dr.B.C.Punmia, AshokK.Jain, ArunK.Jain	Laxmi Publications. January 2016 ISBN-10 : 9788170088530 ISBN-13 : 978-8170088530

03	Surveying and Levelling	R. Agor	Khanna Publishers, New Delhi. January 1980 ISBN-10 : 8174092358 ISBN-13 : 978-8174092359
04	Surveying, Vol. I & II	S. K. Duggal	TataMc-Graw Hill. July 2017 ISBN-10 : 9781259028991 ISBN-13 : 978-1259028991

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Surveying and Leveling‟ Vol. I and Vol. II”	T. P. Kanetkar and S.V. Kulkarni	Pune Vidyarthi Griha Prakashan ISBN-10 : 8185825114 ISBN-13 : 978-8185825113
02	Elements of Photogrammetry	Paul R. Wolf	McGraw Hill Publication.
03	Remote sensing and Geographical Information System	A. M. Chandra and S. K.Ghosh	Narosa Publishing House. January 2015 ISBN-10 : 1842659707 ISBN-13 : 978-1842659700
04	Surveying: Theory and Practice	James M. Anderson, Edward M. Mikhail	Tata Mc-Graw Hill.
05	Advanced Surveying -Total Station, GIS and Remote Sensing.	SatheeshGopi, R. Sathikumar and N. Madhu	Pearson publication.
06	The GIS Book	George B. Korte	PE onwards press. 5th Edition,

PCC-CE0249: Fluid Mechanics Lab

Teaching Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:**
Tutorial (Per week)	**:**	**ISE**	**:25**
Credit	**:01**	**ESE**	**:25**

Marking Scheme

At least 8 experiment need to complete

Exp. No.	Experiment Title
01	Measurement of Discharge
02	Study of different Pressure measurement devices
03	Determination of Metacentric Height for Floating Bodies
04	Verification of Bernoulli's Theorem.
05	Calibration of Venturimeter& Orificemeter
06	Determination of Hydraulic Coefficients of Orifice
07	Study of different types of flow by using the Reynolds experiment
08	Determination of Friction Factor in Pipe
09	Determination of Minor Losses in pipe flow
10	Study of Moody's Chart / Nomogram

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Fluid Mechanics – Hydraulic and Hydraulic Mechanics	Modi / Seth	Standard Book House, New Delhi. 23rd Edition, 2022
02	Fluid Mechanics and hydraulic machine	R.K.Bansal	Laxmi Pubication January 2019 ISBN-10 : 8131808157 ISBN-13 : 978-8131808153
03	Fluid Mechanics	A.K. Jain	Khanna Pub., Delhi January 1998 ISBN-10 : 8174091947 ISBN-13 : 978-8174091949

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
01	Fluid Mechanics	Arora	Standard Publishers

			December 2020 ISBN-10 : 8180140709 ISBN-13 : 978-8180140709
02	Flow in open channels	K. Subramanyam	Tata McGraw-Hill Pub. Co., Delhi April 2019 ISBN-10 : 9353166292 ISBN-13 : 978-9353166298
03	Fluid Mechanics	Garde-Mirajgaonkar	Nemchandand Bros., Roorkee August 2010 ISBN-10 : 8188429015 ISBN-13 : 978-8188429011
04	Elementary Fluid Mechanics	H. Rouse	Toppan C. Ltd. Tokyo
05	Open Channel flow	Rangaraju	Tata McGraw-Hill Pub. Co., Delhi. July 2001 ISBN-10 : 007460497X ISBN-13 : 978-0074604977

VEC-CE02410: Building Planning and Design

Teaching Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**: -**
Tutorial (Per week)	**: -**	**ISE**	**:25**
Credit	**:02**	**ESE**	**:25**

Course Pre-requisite	Building Construction and Materials	
Course Objective	1	To explain the planning and design of residential buildings, considering principles of planning and building bye-laws and regulations.
	2	To demonstrate the planning and design of various types of public buildings.
	3	To provide knowledge on perspective drawings of various objects and buildings.
	4	To explain systems such as plumbing, electrification, air conditioning, fire resistance, and thermal insulation (IS 13920), as well as architectural composition, terminology, and building finishes.
Course Outcomes	After Completion of this course students will be able to	
	1	Describe Building Bye-Laws and regulations.
	2	Plan and draw residential building considering principle of planning and Building Bye- Laws and regulations.
	3	Describe the building systems such as plumbing, electrification.
	4	Illustrate the concept of ventilation, air conditioning, acoustics and safety.
	5	Describe different types of building finishes.

CO-PO Mapping

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3											
CO2		3										
CO3	3											
CO4	3											
CO5	3											

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme

Term work – 25 Marks End Semester Evaluation – 25 Marks

ISE: 25 Total: 50

Unit No.	Content	Hours
1	**Building Planning Byelaws** Site Selection criteria: Principles of Building planning, Significance Sun pathdiagram,Wind Diagram, Orientation, Factors affecting, criteria under Indian condition. Building Planning Byelaws and regulations: As per SP-7, 1983 National Building codeof India group 1 to 5.	4
2	**Planning of Residential Building**: Bungalows, Row Bungalows, Apartments and TwinBungalowsProcedureof Building Permission, significance of commencement, plinthcompletion or occupancy certificate.	4
3	**Planning of Public building** Educational Buildings: Younger age range, Middle age range Building for Health:Health centers, Hospitals Assembly Buildings:Recreational halls, Cinema theatres, Restaurants, Hotels, Clubs Business and Mercantile Buildings:Shops, Banks, Markets and malls Industrial Buildings:Factories, Workshops, Cold storages Office Buildings:Administrative buildings, corporate office Buildings for Transportation: Bus stations, Railway / metro stations	6
4	**Plumbing system and Electrification** Various Materials for system like A-PVC, C-PVC, GI, and HDPE. Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing andDrainage plan, Introduction to rainwater harvesting. Electrification: Concealed and Open Wiring, Requirements and Location of various points, Concept of Earthing.	4
5	**Ventilation and Acoustics** Definition and necessity of Ventilation, functional requirement, various system and selection criteria. Air conditioning: Purpose, Classification, Principles, Systems and Various Components of the same. Thermal Insulation: General concept, Materials, Methods. Introduction to Acoustics: Absorption of sound, various materials, conditions for good acoustics. Sound Insulation: Methods of noise control. Introduction to fire safety.	4
6	**Building Finishes** Paints: Different types and application methods. Plastering: Pointing and various techniques. Wall cladding: Skirting, dado work with various materials. Miscellaneous finishes: POP, Gypsum plaster.	4

Text Book :			
Sr.No.	**Title**	**Author**	**Edition/Publication**
01	Building drawing with an integrated approach to Built Environment Drawing"	MG Shah, CM Kale, SY Patki	Tata McGraw Hill Publishing co. Ltd., New Delhi July 2017 ISBN-10 : 0071077871 ISBN-13 : 978-0071077873
02	Building Construction	Gurucharan Singh	Standard Publishers, & distributors, New Delhi January 2019 ISBN-13: 9788189401214
03	Building Design and Constructions	Mentt	Tata McGraw Hill (Second edition)
04	Building Construction	Punmia B C	Laxmi Publication January 2016 ISBN-10 : 9788131804285 ISBN-13 : 978-8131804285

Reference Book :			
Sr.No.	Title	Author	Edition/Publication
01	NBC 2016 volume I and II	NBC	National Building Code
02	Building Planning	Kumar Swami	Charotar Publication January 2019 ISBN-10 : 9385039385 ISBN-13 : 978-9385039386
03	Time Saver Standard by	Dodge F. W., F. W. Dodge Corp.	Time Saver Standard
04	National Building Cod	BIS Bureau of Indian Standards	BIS Bureau of Indian Standards
05	Fire safety in Buildings	Jain V.K.	New Age International Publisher November 2020 ISBN-10 : 9389802199 ISBN-13 : 978-9389802191

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

BSC-CE02411: Environmental Science (Decided by University)

Teachning Scheme		**Evaluation Scheme**	
Lecture (Per week)	**:02**	**MSE**	**: 30**
Tutorial (Per week)	**: -**	**ISE**	**:10**
Credit	**:Audit**	**ESE**	**:60**

Course Pre-requisite		
Course Objective	1	Understand the scope & multidisciplinary nature of Environmental Studies.
	2	Get acquainted with the problems associated with natural resources and their conservation.
	3	Familiarize the environmental & social problems with global concern.
	4	Recognize the importance of Biodiversity with respect to Western Ghats.
Course Outcomes	After Completion of this course students will be able to	
	1	Understand the importance of Environmental Studies and recognize significance of ecosystem.
	2	Classify the values of natural resources with associated problems for sustainable lifestyles.
	3	Describe the social and global environmental issues
	4	Make aware of Pollution issues with its mitigation measures.
	5	Familiarize the basics of Biodiversity and concerned issues in the context of Western Ghats.
	6	Acquaint with the role of environmental laws and regulations in conservation efforts.

CO-PO Mapping

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1							3					
CO2							3					
CO3							3					
CO4							3					
CO5							3					

Level of Mapping as: Low 1, Moderate 2, High 3

Marking Scheme
Field work: (Field work is equal to 4 lectures) **10 marks** **Note - The ISE/CA is carried out through the Field work and Report writing.** • Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc.

Unit	Content	Hours
1	**Nature of Environmental Studies and Importance of ecosystems** Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness. **Ecosystem** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Food chains, food webs and ecological pyramids, ,Introduction, types, characteristics features, structure and function of the following ecosystem- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Degradation of the ecosystems and it's impacts.	**6**
2	**Natural Resources and Associated Problems** Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. Food resources: World food problem, changes caused by agriculture, effect of modern agriculture, fertilizer-pesticide problems. Energy resources: Growing energy needs, renewable and non- renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individuals in conservation of natural resources. Equitable use of resources for sustainable lifestyles	**6**
3	**Social Issues and the Environment** Human population growth and impact on environment. Environmental ethics: Role of Indian religious traditions and culture in conservation of the environment. Environmental movements- Chipko Movement, Appiko Movement, Silent Valley Movement. Resettlement and rehabilitation of people; its problems and concerns. Water conservation, rain water harvesting. Disaster management: floods, earthquake, cyclone, tsunami and landslides, Case studies.	**4**

4	**Environmental Pollution** Definition: Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Global warming, acid rain, ozone layer depletion. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Solid waste management, control& rules, Role of an individual in prevention of pollution	**4**
5	**Biodiversity and its conservation:** Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega- diversity nation. Western Ghat as a biodiversity region. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts, Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity.	**4**
6	**Environmental Protection-Policies and practices** Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act Wildlife Protection Act Forest Conservation Act National and International Conventions and agreements on environment.	**4**

Text Book
Reference Book :

Sr.No.	Title	Author	Edition/Publication
1	Environmental Studies	Raut P.D.,	Shivaji University Press, 2021
2	Environmental Studies,		
3	Water in crisis, Pacific Institute for studies in Dev.,	Gleick, H.,1993,	Environment& Security. Stockholm Env. Institute. Oxford Univ. Press 473p
4	Encyclopedia of Indian Natural History,	Hawkins R.E.,	Bombay Natural History Society, Bombay (R)
5	Global Biodiversity Assessment,	Heywood, V.H.& Watson, R.T.1995	Cambridge Univ. Press 1140p.
6	Environmental Protection and Laws,	Jadhav, H.& Bhosale, V.M.1995,	Himalaya Pub. House, Delhi 284p.
7	Environmental Science Systems & Solutions,	McKinney, M.L.& School. R.M.1196	Web enhanced edition, 639p
8	Master Hazardous,	Mhaskar A.K.,	Techno-Science Publications (TB)

Guidelines regarding the Question Paper Setting:		
Question No.	**Unit No.**	**Marks**

VSEC -CE02412: Building Drawing

Teachning Scheme		**Evaluation Scheme**	
Practical (Per week)	**:02**	**MSE**	**:**
Tutorial (Per week)	**:**	**ISE**	**:50**
Credit	**:01**	**ESE**	**:**

Course Pre-requisite	Basic Civil Engineering, Building Construction, Building Planning and Design	
Course Objective	1	To explain the planning and design of residential buildings, considering principles of planning and building bye-laws and regulations.
	2	To provide knowledge study the planning and design of various types of public buildings.
	3	To explain prepare perspective drawings of various objects and buildings.
	4	To discuss systems such as plumbing, electrification, air conditioning, fire resistance, and thermal insulation (IS 13920), as well as architectural composition, terminology, and building finishes.
Course Outcomes	After Completion of this course students will be able to	
	1	Demonstrate the ability to plan and design residential buildings by effectively applying principles of planning and adhering to building bye-laws and regulations.
	2	Develop design solutions for various types of public buildings, considering functionality, aesthetics, and compliance with relevant standards and regulations.
	3	Prepare perspective drawings of various objects and buildings, showcasing an understanding of spatial relationships and visual representation techniques.
	4	Evaluate and integrate building systems such as plumbing, electrification, air conditioning, fire resistance, and thermal insulation following the guidelines of IS 13920 to ensure safety and efficiency.

CO-PO Mapping												
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1		3										
CO2			3									
CO3		3										
CO4			3									
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme
ISE: 50 Marks

Exp. No.	Experiment Title
1	Imperial size sheet based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase, Site plan, Area statement and brief Specifications (G+1 building and minimum 5 rooms, Measurement drawing should be done in group of maximum 5 students).
2	Planning and design of residential building (G+1).
3	Full set of drawings for the building planned in 2- (a) Municipal Submission drawing. (b) Working Drawings (Max. 2 student group). • Foundation / Center Line Drawing. • Furniture layout plan. • Electrification plan. • Water supply and drainage plan.
4	Project report giving details of following systems • Stair Case • Drainage System • Water Supply System • Water Tank • Septic Tank • Design of terrace Drainage System.
5	Visit to a building complex and a report based on that.
6	Line plan of buildings on graph paper of at least five remaining types of public buildings
7	Perspective view of the buildings planned above.

Text Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
1	Building Construction	B.C.Punmia	Laxmi Publication January 2016 ISBN-10 : 9788131804285 ISBN-13 : 978-8131804285
2	Building drawing with an integrated approach to Built Environment Drawing" ,	MG Shah, CM Kale, SY Patki	Tata McGraw Hill Publishing co. Ltd., New Delhi Tata McGraw Hill Publishing co. Ltd., New Delhi July 2017 ISBN-10 : 0071077871 ISBN-13 : 978-0071077873
3	Building Design and Constructions",	Mentt	Tata McGraw Hill (Second edition)

Reference Book :			
Sr. No.	**Title**	**Author**	**Publication & Edition**
1	A to Z of Practical Building Construction and Its Management	SandeepMantri	SatyaPrakashan, New Delhi
2	Handbook of Building Construction	M. M. Goyal	Amrindra Consultancy P. Ltd. January 2013 ISBN-10 : 9350674416 ISBN-13 : 978-9350674413
3	A Course in Civil Engineering Drawing	V.B.Sikka	S.K. Kataria and Sons
4	Civil Engineering Drawing	M. Chakraborty.	Charotar Publication January 2019 ISBN-10 : 9385039385 ISBN-13 : 978-9385039386
5	Building Planning	Kumar Swami	Charotar Publication
6	Time Saver Standard	Dodge F. W., F. W. Dodge Corp.	Time Saver Standard
7	National Building Code, BIS, New Delhi.	BIS Bureau of Indian Standards	BIS Bureau of Indian Standards
8	Fire safety in Buildings	Jain V.K.	New Age International Publisher November 2020 ISBN-10 : 9389802199 ISBN-13 : 978-9389802191

CIVIL ENGINEERING

Equivalence of Subjects between CBCS and NEP for

S.Y. B. Tech (Sem-III & IV)

Name of Programme: Civil Engineering

Class: S. Y. B. Tech Semester- III

Sr. No	Name of Subjects in existing CBCS 2018 onwards pattern **(Add all subjects)**	Name of Subjects in NEP pattern	Reason	Remark
1	Engineering Mathematics-III	Engineering Mathematics - III	80% syllabus matches	
2	Surveying-I	Surveying	50% syllabus matches	
3	Strength of Materials	Strength of Materials	80% syllabus matches	
4	Fluid Mechanics-I	Fluid Mechanics	60% syllabus matches	
5	Building Construction and Materials	Building Construction	70% syllabus matches	
6	Numerical Method (Term work Based subject)	--	--	

Class: S. Y. B. Tech Semester- IV

Sr. No	Name of Subjects in existing CBCS 2018 onwards pattern **(Add all subjects)**	Name of Subjects in NEP pattern	Reason	Remark
1	Structural Mechanics	Structural Mechanics	80% syllabus matches	
2	Surveying-II	Surveying	50% syllabus matches	
3	Fluid Mechanics-II	Fluid Mechanics	40% syllabus matches	
4	Building Design and Drawing	Building Planning and Design Building Drawing	90% syllabus matches with BPD and and 80% matches with BD	
5	Concrete Technology	--	--	
6	Computer Aided Drawing (Term work Based subject)	--	--	

S.Y. Exit Course

Bucket List of NPTEL course and Virtual Lab course

Choose any Two as S. Y. Exit Course after completion of Semester IV from given below list. Corresponding lab need to be chosen based on NPTEL course selected as MOOC course. Exit course covers total 08 credits which include NPTEL Courses cover 06 credits (03 credit of each) and virtual lab cover 02 credits (01 credit of each).

Bucket list cum correlative course and lab Table		
Sr. No.	**NPTEL Course Title**	**Vitrual Lab Title**
1	Hydraulic Engineering	Hydraulics and Fluid Mechanics Lab
2	Geotechnical Engineering- I or Advance Foundation Engineering	Geotechnical Engineering Lab
3	Geotechnical Engineering- II or Advance Soil Mechanics	Soil Mechanics Lab
4	Water and Waste water Treatment	Environmental Engineering-I Lab Environmental Engineering-II Lab
5	Highway Engineering	Transportation Engineering Lab

Note:

1. There is an uncertainty of the availability of the NPTEL courses mentioned above as there is constant updation of the courses. The students can choose equivalent subjective course of the required duration with permission from the concerned institute.

2. To fulfill the required credit score of 03 credits and taking the courses available in consideration students can go for 1 course of 12 week or 2 course of 8 week or 3 courses of 4 weeks.

3. For NPTEL course visit to website https://swayam.gov.in and register and create your account. Log in the account and join the required course and follow the instructions to compete the course. Similarly, for Virual Lab visit to website https://www.vlab.co.in and (sometimes need register and create your account, also log in the account and) join the required lab and follow the instructions to compete the course (need to do all listed experiment under that Lab).

Details of NPTEL Course (https://swayam.gov.in)			
Sr. No.	**NPTEL Course Title**	**Duration**	**Credit**
1	Hydraulic Engineering	12 Week	02
2	Geotechnical Engineering- I or Advance Foundation Engineering	12 Week	03
3	Geotechnical Engineering- II or	12 Week	03

	Advance Soil Mechanics		
4	Water and Waste water Treatment	12 Week	03
5	Highway Engineering	12 Week	03

Details of Virtual Lab Course (https://www.vlab.co.in)			
Sr. No.	**Vitual Lab Course Title**	**Supporting Institution**	**Credit**
1	Hydraulics and Fluid Mechanics Lab	IIIT Hydrabad	
2	Geotechnical Engineering Lab	NITK Suratkal	
3	Soil Mechanics Lab	IIIT Hydrabad	
4	Environmental Engineering-I Lab Environmental Engineering-II Lab	NITK Suratkal	
5	Transportation Engineering Lab	NITK Suratkal	

Distribution of the credits:

1. Two MOOCs Certification Courses (NPTEL):

Each course is worth 3 credits. These courses are likely to be available online and can be completed at the student's own pace within a set timeframe. The content will be specific to the student's field of study or programme.

2. Virtual Lab:

The student must complete two virtual lab work that adds 2 credits to simulate practical or experimental learning experiences in a controlled virtual environment.

Examination scheme for second year exit:

The marks gained from the two MOOCs are converted to a total of 100 marks. The report for the performed two Virtual Lab practices of 2 credits will be evaluated for 25 marks. The report should include a detailed write-up and analysis of the virtual lab experiments conducted, encompassing the methodology, results, and conclusions.