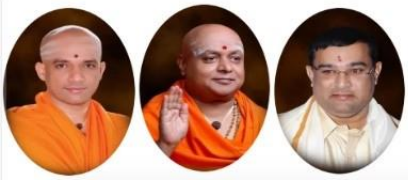

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)

SJB Institute of Technology

An AUTONOMOUS INSTITUTION UNDER VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Approved by AICTE, 2(f) and 12(B) recognized by UGC, New Delhi
Accredited by NAAC, Accredited by NBA, Certified by ISO 9001 - 2015

B.E.

Autonomous Scheme & Syllabus

CIVIL ENGINEERING

ACADEMIC YEAR 2025-2026

V & VI Semesters

2023-2027 Batch

SERVICE TO MANKIND IS SERVICE TO GOD

His Divine Soul Padmabhushana

Sri Sri Sri Dr. Balagangadharanath MahaSwamiji

Founder President, Sri Adichunchanagiri Shikshana Trust®

Belief in God is not ignorance or illusion. It is a belief that there is an unseen, ineffable Power that transcends all our powers of muscles, mind and lives.

His Holiness Parama Pujya

Sri Sri Sri Dr. Nirmalanandanatha MahaSwamiji

President, Sri Adichunchanagiri Shikshana Trust ®

True richness is the generosity of heart. Cultivate it and work to help the less fortunate ones in life.

Revered Sri Sri Dr. Prakashanatha Swamiji

Managing Director, BGS & SJB Group of Institutions & Hospitals

People and prosperity follow the path which the leaders take. So the elders and leaders should make sure that they give the right lead an

SJB Institute of Technology

VISION:

To become a recognized technical education center with a global perspective.

MISSION:

To provide learning opportunities that foster students' ethical values, intelligent development in science technology and social responsibility so that they become sensible and contributing members of society.

Department of Civil Engineering

VISION

To produce high quality Civil Engineering graduates to suit the ever-dynamic infrastructure industry.

MISSION

M1: To establish as a state of art learning center to meet the demands of future through conducive learning programs.

M2: To develop as a recognized consultancy and research centre to cater the needs of the industry and society.

M3: To contribute towards the country's infrastructure growth by encouraging creativity in aspiring civil engineers.

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Certified by ISO 9001 - 2015

2023 Scheme – UG

Syllabus Book for (Civil Engineering)

Syllabus for V & VI Semester

The syllabus, scheme and guidelines are provided in detail.
The syllabus, scheme and guidelines are subjected to changes if any needed.
The updates will be done timely.
Regularly access the institution website for the updated information.

The Syllabus book is available on	www.sjbit.edu.in
For any queries, please write to	academicdean@sjbit.edu.in

UPDATES

Release / Revision	Date	Remarks
Release	07/04/2025	First release
Rev-1		

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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 3rd Year CV

SCHEME: 2023 **SEM: V** **Revision date: 07-04-2025**

S. #	Course Type	Course type Series	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O	CIE Marks	SEE (Dur. & Marks)			
								Lecture	Tutorial	Practical	PBL/ABL / SL/etc.		Dur.	Th.	Lab	Tot.
1	PCC	3	23CVT501	Design of RC Structural Elements	CV	CV	**3**	3	0	0		50	03	50	-	100
2	IPCC	5	23CVI502	Highway Engineering	CV	CV	**4**	3	0	2		50	03	50	-	100
3	IPCC	6	23CVI503	Water & Wastewater Engineering	CV	CV	**4**	3	0	2		50	03	50	-	100
4	PCCL	3	23CVL504	Software Application Lab	CV	CV	**1**	0	0	2		50	03	-	50	100
5	PEC	1	23CVP51y	Professional Elective Course - 1	CV	CV	**3**	3	0	0		50	03	50	-	100
6	ETC	3	23CVE53y	Emerging Technology Course - 3	CV	CV	**3**	3	0	0	@	50	03	50	-	100
7	HSMC	6	23SFHH06/ 23UHVH07	Bioscience or UHV-Universal Human Values	any dept	any dept	**1**	0	2	0	@	50	02	50	-	100
8	AEC	5	23CVAE5y	Ability Enhancement Course - 5	CV	CV	**1**	1	0	0		50	02	50	-	100
								(or)								
								0	0	2		50	02	-	50	100
9	NCMC	4	23PASN01	Physical Education - Sports and Athletics	PED	PED	**PP/NP**	-	-	-	2	50	-	-	-	50
			23YOGN02	Yoga	PED	PED										
			23NSSN03	NSS - National Service Scheme	NSS	NSS										
			23NCCN04	NCC - National Cadet Corps	NCC	NCC										
			23IKSN05	Indian Knowledge System	HSS	HSS										
Total							**20**	**16**	**2**	**8**	**2**	**450**		**350**	**100**	**850**

PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; AEC: Ability Enhancement Course; HSMC: Humanities, Social Sciences & Management Course; NCMC: Non Credit Mandatory Course;
{@ - Compulsory one activity during the semester};
{I.E.-Industry Experts}.
PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

Bioscience & UHV-Universal Human Values:

1) Any one of the course will be offered by the departments in each semester of IV & V based on the institutional planning.
2) Both the courses shall be studied and completed by the students registering each in the two semesters. For example, if Bioscience is offered in the IV semester, UHV-Universal Human Values is offered in the V semester.

Ability Enhancement Course-5: 23xxAE5y - 1 Credit course

1) The courses and the syllabus shall be defined by the respective dept. BOS.
2) SEE will be MCQ if offered as theory course. If offered as LAB course, SEE will be practical, with two internal examiners. Handled by Controller of Examinations.

NCMC (Non Credit Mandatory Course) for course type series-4: Refer to guidelines in III SEM.

Professional Elective Course - 1		Emerging Technology Course - 3		Ability Enhancement Course - 5	
Course Code	**Course Title**	**Course Code**	**Course Title**	**Course Code**	**Course Title**
23CVP511	Matrix Methods of Structural Analysis	23CVE531	Pre engineered Buildings	23CVAE51	Interior Designing
23CVP512	Alternate Building Materials	23CVE532	Repair & Rehabilitation of Structures	23CVAE52	Problem Solving with Python
23CVP513	Environmental Impact Assessment	23CVE533	Rural,Urban Planning & Architecture	23CVAE53	Microsoft Office Tools
23CVP514	Ground Water Hydraulics	23CVE534	Building Information Modelling in Civil Engi	23CVAE54	Extensive Survey Practice

BOS Chairman/HOD **Academic Dean** **Principal** **Academic Director**

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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 3rd Year CV

SCHEME: 2023 **SEM: VI** **Revision date: 07-04-2025**

S. #	Course Type	Course type Series	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O	CIE Marks	SEE (Dur. & Marks)			
								Lecture	Tutorial	Practical	PBL/ABL / SL/etc.		Dur.	Th.	Lab	Tot.
1	PCC	4	23CVT601	Design of Steel Structural Elements	CV	CV	3	3	0	0		50	03	50	-	100
2	IPCC	7	23CVI602	Geotechnical Engineering	CV	CV	4	3	0	2		50	03	50	-	100
3	PCCL	4	23CVL603	Detailing of RC & Steel Structural Elements	CV	CV	1	0	0	2		50	03	-	50	100
4	PEC	2	23CVP62y	Professional Elective Course - 2	CV	CV	3	3	0	0		50	03	50	-	100
5	OEC	1	23CVO61y	Open Elective Course - 1	Any dept.	Any dept.	3	3	0	0		50	03	50	-	100
6	ETC	4	23CVE64y	Emerging Technology Course - 4	CV	CV	3	3	0	0	@	50	03	50	-	100
7	AEC	6	23RMAE61	Research Methodology & IPR	CV	CV	3	3	0	0	@	50	02	50	-	100
8	PRJ	1	23CVPRJ1	Project Phase I	CV	CV	2	0	0	4	@	50	03	-	50	100
9	HSMC	7	23SCRH08	Social Connect & Responsibility	Any dept	Any dept	1	1	0	0	@	50	-	-	-	50
10	NCMC	4	23PASN01	Physical Education - Sports and Athletics	PED	PED	PP/NP	-	-	-	2	50	-	-	-	50
			23YOGN02	Yoga	PED	PED										
			23NSSN03	NSS - National Service Scheme	NSS	NSS										
			23NCCN04	NCC - National Cadet Corps	NCC	NCC										
			23IKSN05	Indian Knowledge System	HSS	HSS										
Total							**23**	**19**	**0**	**8**	**2**	**500**		**300**	**100**	**900**

PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; PEC: Professional Elective Course; OEC: Open Elective Course;
HSMC: Humanities, Social Sciences & Management Course; AEC: Ability Enhancement Course; NCMC: Non Credit Mandatory Course; PRJ: Project work.
{@ - Compulsory one activity during the semester};
{I.E.-Industry Experts};
PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

Open Elective Courses (OEC):

1) Open Electives listed here are to offer for other department students.
2) Students shall select open elective courses offered from other departments, separate consolidated list of courses offered from various departments will be published time to time.

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

NCMC (Non Credit Mandatory Course) for course type series-4: Refer to guidelines in III SEM.

Professional Elective Course - 2 (23xxP62y)		Open Elective Course - 1 (23xxO61y)		Emerging Technology Course - 4 (23xxE64y)	
Course Code	**Course Title**	**Course Code**	**Course Title**	**Course Code**	**Course Title**
23CVP621	Earthquake Engineering	23CVO611	Integrated Building Services	23CVE641	Urban Transport Planning
23CVP622	Prestressed Concrete Structures	23CVO612	Road Safety & Traffic Engineering	23CVE642	Quality control and safety
23CVP623	Railways, Harbours, Tunnelling and Airports	23CVO613	Green Buildings	23CVE643	IOT in Civil Engineering
23CVP624	Solid and Hazardous Waste Management	23CVO614	Climate Change & Sustainability	23CVE644	Fire Safety in Buildings

BOS Chairman/HOD **Academic Dean** **Principal** **Academic Director**

Table of Content

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Civil Engineering

Semester:	V	**Course Type:**	**PCC**		
Course Title: Design of RC Structural Elements					
Course Code:	**23CVT501**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

Identify, formulate and solve engineering problems of RC elements subjected to different kinds of loading.
Follow a procedural knowledge in designing various structural RC elements.
Impart the usage of codes for strength, serviceability and durability
Acquire knowledge in analysis and design of RC elements.

II. Teaching-Learning Process (General Instructions):

1. Blackboard teaching 2. Power point Presentation 3. Videos, NPTEL materials 4. Quiz/Assignments/Open book test to develop skills 5. Adopt problem-based learning (PBL) to develop analytical and thinking skills 6. Encourage collaborative learning, site visits related to subjects and impart practical knowledge.

III. COURSE CONTENT

Module-1: Introduction to working stress and limit State Design — 8 Hrs

Introduction to working stress and limit State Design: Introduction to working stress method, Difference between Working stress and Limit State Method of design. Philosophy and principle of limit state design with assumptions. Partial Safety factors, Characteristic load and strength. Stress block parameters, concept of balanced section, under reinforced and over reinforced section. Limiting deflection, short term deflection, long term deflection, Calculation of deflection of singly reinforced beam only.

Textbook: Design of Concrete Structures by N Subramanian

Self-Learning: Design process and basis for design

RBT Levels: L1 L2

Module-2: Limit State Analysis of Beams — 8 Hrs

Limit State Analysis of Beams: Analysis of singly reinforced, doubly reinforced and flanged beams for flexure and shear

Textbook: Design of Concrete Structures by N Subramanian

Self-Learning: Beam in pure shear failure

RBT Levels: L1 L2 L3

Module-3: Design of singly reinforced beams — 8 Hrs

Design of singly reinforced beams with check for shear, check for development length and other checks. Design of doubly reinforced beams and flanged sections without checks.

Textbook: Design of Concrete Structures by N Subramanian

Self-Learning: Beam in pure bending failure.

RBT Levels: L1 L2 L3

Module-4: Limit State Design of Slabs and Stairs	8 Hrs

Limit State Design of Slabs and Stairs: Introduction to one way and two-way slabs, Design of Cantilever, simply supported and one-way continuous slab. Design of two-way slabs for different boundary conditions. Design of dog legged and open well staircases

Textbook: Reinforced Concrete Design by Unnikrishnan Pillai and Devdas Menon

Self-Learning: detailing of slabs and staircase

RBT Levels: L1 L2 L3

Module-5: Limit State Deign of Columns and Footings	8 Hrs

Limit State Deign of Columns and Footings: Analysis and design of short axially loaded RC column. Design of columns with uniaxial and biaxial moments, Design concepts of the footings. Design of Rectangular and square column footings with axial load.

Textbook: Reinforced Concrete Design by Unnikrishnan Pillai and Devdas Menon

Self-Learning: Ductile Detailing

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand the design philosophy and principles.
CO2	Solving problems of RC elements subjected to flexure, shear and torsion
CO3	Demonstrate the procedure in designs of RC structural elements such as slabs, columns and footings.
CO4	Owns professional and ethical responsibility.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2												2			
CO2	3	3					3						3			
CO3	3	3					3						3			
CO4	3	3			3		3						3			
CO5	3	3			3		3						3			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Reinforced Concrete Design	Unnikrishnan Pillai and Devdas Menon	2021	McGraw Hill, New Delhi
2	Design of Concrete Structures	N Subramanian	2014	Oxford university Press
3	Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete)	H J Shah	2004	Charotar Publishing House Pvt. Ltd

VII(b): Reference Books:

1	Limit State design of reinforced concrete	P C Varghese	2018	PHI, New Delhi.
2	Reinforced and Pre-Stressed Concrete	Kong and Evans	2017	Springer Publications

VII(c): Web links and Video Lectures (e-Resources):
https://nptel.ac.in/courses/105105105

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

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Civil Engineering

Semester:	V	**Course Type:**	IPCC		
Course Title: HIGHWAY ENGINEERING					
Course Code:	**23CIV502**			**Credits:**	4
Teaching Hours/Week (L:T:P:O)			3:0:2:0	**Total Hours:**	40 + 12 Lab slots
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	3

I. Course Objectives:

- Provide knowledge about the importance of transportation and various rural road development projects in India.
- Understand aspects of highway geometric elements and road traffic.
- Acquire knowledge on pavement and its components, highway materials, pavement design, road construction and highway drainage systems.
- Understand the concepts of highway economics and financing.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, power point presentation, animations

III. COURSE CONTENT

III (a). Theory Component

Module-1	**08 hours**

Highway Development and Planning: Importance of transportation, Different modes of transportation and comparison. Characteristics of Road Transport, Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute. Road types and classification, road patterns, master plan, phasing road development, Road development plan in India.

Highway Alignment and Surveys: Ideal Alignment, Factors affecting the alignment, engineering surveys-Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects.

Textbook: Highway Engineering by S K Khanna and C E G Justo.

Self-Learning: Recent scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL)

RBT Levels: L1 L2

Module-2	**08 hours**

Highway Geometric Design-I: Factors affecting geometric design of roads, Cross Sectional Elements, Sight Distance - Restrictions to sight distance, Stopping sight distance, Overtaking sight distance, overtaking zones-. Sight distance at intersections.

Highway Geometric Design-II: Horizontal Alignment-Radius of Curve, Super elevation, Extra widening, Transition curve, Vertical alignment –gradients, summit and valley curves.

Textbook: Highway Engineering by S K Khanna and C E G Justo
Self-Learning: Case studies
RBT Levels: L1 L2 L3

Module-3	**08 hours**
Introduction to Traffic Engineering: Objectives and scope of Traffic Engineering. Traffic Characteristics: Road user characteristics – PIEV theory, vehicular characteristics – static and dynamic characteristics, Concepts of passenger car units for mixed traffic flow, Level of service. **Pavement Materials:** Sub grade soil -desirable properties - HRB soil classification determination of CBR and modulus of sub grade reaction with Problems. Aggregates- Desirable properties. Bituminous Binders & Mixes- Types, desirable properties. Pavement Quality concrete- Materials, Requirements. **Textbook**: Highway Engineering by S K Khanna and C E G Justo **Self-Learning: Recent product development.** **RBT Levels:** L1 L2 L3	
Module-4	**08 hours**
Pavement Design: Pavement types, component parts of flexible and rigid pavements and their functions, ESWL and its determination (Graphical method only)-Examples. **Highway Construction:** Construction of Subgrade, Specification and construction of i) Granular Sub base, ii) WBM Base iii) WMM base iv) Bituminous Macadam v) Dense Bituminous Macadam vi) Bituminous Concrete vii) Dry Lean Concrete and PQC. **Textbook**: Highway Engineering by S K Khanna and C E G Justo **Self-Learning:** Case studies. **RBT Levels:** L1 L2 L3	
Module-5	**08 hours**
Highway Drainage System: Importance and requirements, Surface and Subsurface drainage system -methods, Design of filters. **Highway Economics:** Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts. **Textbook**: Highway Engineering by S K Khanna and C E G Justo Self-Learning: Case studies. **RBT Levels:** L1 L2 L3	
III (a). Practical Component	

1. Tests on Aggregates
a. Aggregate Crushing value
b. Los Angeles abrasion test
c. Aggregate impact test
d. Aggregate shape tests (combined index and angularity number)

2. Tests on Bituminous Materials
a. Penetration test
b. Ductility test
c. Specific gravity test
d. Softening point test
e. Viscosity test

3. Tests on Soil
a. Wet sieve analysis
b. CBR test

4. Tests on Bituminous Mixes
a. Marshall Stability Test (Demo Experiment)

IV. COURSE OUTCOMES

CO1	Describe the importance of highway development and conduct necessary engineering surveys to prioritize highway proposals for road development
CO2	Identify the fundamental components of traffic and design geometric elements of highway required for safe movement of vehicles
CO3	Evaluate the properties of highway materials and suggest the suitability in pavement construction.
CO4	Understand the basic principles of highway design and construction as per standard practices.
CO5	Analyse highway economics and quantify the road users benefits.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2				1						1		3		
CO2	3	3	2			1		1				1		3		
CO3	3	2		1		1		1				1		3		
CO4	3	2	2			2		1				1		3		
CO5	3	3				2						1		3		

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 2

Continuous Internal Evaluation (CIE): Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	"Highway Engineering"	S K Khanna and C E G Justo	10th Edition, 2015	Nem Chand Bros
2	"Principles and Practices of Highway Engineering"	L R Kadiyali	1st Edition, 2018	Khanna Publishers
3	"Traffic Engineering and Transport Planning"	L R Kadiyali	1st Edition, 1999	Khanna Publishers

VII(b): Reference Books:

1	"Transportation Engineering"	C. Jotin Khisty, B. Kentlal	3rd Edition, 2017	PHI Learning Pvt. Ltd

2	"Transportation Engineering"	K. Subramaniam	2015	SciTech Publications
3	Specifications for Roads and Bridges – MoRT & H, IRC, New Delhi.			
4	Relevant BIS & IRC Codes			

VII(c): Web links and Video Lectures (e-Resources):
https://nptel.ac.in/courses/105101087
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
• Field Visits • Quiz/Assignments/Open book test to develop skills • Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

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Civil Engineering

Semester:	V	**Course Type:**	**IPCC**		
Course Title: Water & Wastewater Engineering					
Course Code:	**23CVI503**			**Credits:**	04
Teaching Hours/Week (L:T:P:O)			3:0:2:0	**Total Hours:**	40+12 lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

To introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment and disposal and deign of intake structures and sewerage system.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Water Supply	8 Hrs

Objectives and Components of a Water Supply System, Estimation of Surface and Sub-Surface Water Resources, Ground Water as a Source of Water Supply, Predicting Demand for Water, Impurities of Water and their Significance, Physical, Chemical and Bacteriological Analysis in water, Water Borne Diseases, Intake Structures (surface water sources)

Textbook: Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers

Self-Learning: Water Quality Parameters

RBT Levels: L1 L2

Module-2: Water Treatment	8 Hrs

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clarifloccuator, filtration, design Disinfection, softening, removal of iron and manganese, Defluoridation, Softening, Desalination process.

Textbook: Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers

Self-Learning: Water treatment units

RBT Levels: L1 L2 L3

Module-3: Water Storage And Distribution	8 Hrs

Requirements of a Good Water Distribution System, Water Storage and Balancing Reservoirs, Water Storage Capacity of Distribution Reservoirs, Distribution System - Layout (Water Storage), Hydraulics of Pipe Lines, Pipe Fittings, Analysis of Water Distribution Systems, Leakage Detection In Underground Distribution Pipes, Water Distribution System & their Maintenance, Pumping Station, House Service Water Connection.

Textbook: Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010
Self-Learning: Layout design
RBT Levels: L1 L2 L3

Module-4: Planning And Design Of Sewerage System	8 Hrs

Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control - Sewage pumping-drainage in buildings - Plumbing systems for drainage.
Textbook: Garg, S.K., Environmental Engineering Vol.II, Khanna Publishers, New Delhi, 2015
Self-Learning: Types of wastewater carriage system
RBT Levels: L1 L2 L3

Module-5: Sewage Treatment And Disposal	8 Hrs

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage Recent Advances in Sewage Treatment - Construction, Operation and Maintenance aspects. - Discharge standards-sludge treatment -Disposal of sludge.
Textbook:
Self-Learning: Industrial wastewater treatment
RBT Levels: L1 L2 L3

IV. PRACTICAL COMPONENT OF IPCC

1	Preparation chemical solutions required for analysis and sampling methodologies
2	Determination of pH, Conductivity, TDS and Turbidity
3	Determination of Acidity and Alkalinity
4	Determination of Calcium, Magnesium and Total Hardness
5	Determination of Dissolved Oxygen
6	Determination of BOD
7	Determination of Chlorides
8	Determination of percentage of % of available chlorine in bleaching powder sample, Determination of Residual Chlorine and chlorine demand
9	Determination of Solids in Sewage: i) Total Solids, ii) Suspended Solids, iii) Dissolved Solids, iv) Volatile Solids, Fixed Solids v) Settleable Solids
10	Determination of optimum coagulant dosage using Jar test apparatus
11	Determination Nitrates and Iron by spectrophotometer
12	Determination of COD (Demonstration)
13	Air Quality Monitoring (Demonstration)
14	Determination of Sound by Sound level meter at different locations (Demonstration)

V. COURSE OUTCOMES

CO1	Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission
CO2	Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations
CO3	Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process
CO4	Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge disposal methods.
CO5	Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage

VI. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3					2						1		2		

CO2	3	2				2						1		2		
CO3	3	2	2									1		2		
CO4	3	2	2									1		2		
CO5	3	2	2			2						1				

VII. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 2

Continuous Internal Evaluation (CIE): Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

VIII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Environmental Engineering-Vol.I	Garg, S.K	2010	Khanna Publishers, New Delhi
2	Environmental Engineering Vol.II	Garg, S.K.,	2015	Khanna Publishers, New Delhi
3	Water Supply Engineering	P.N. Modi	2016	Standard Book House, New Delhi.
4	Elements of Environmental Engineering	Duggal K.N	2014	S. Chand and Co. Ltd., New Delhi.
VII(b): Reference Books:				
1	Manual on Water Supply and Treatment,	CPHEEO	1999	Ministry of Urban Development, Government of India
2	Waste water Engineering - Treatment and Reuse	Metcalf and Eddy	2010	Tata Mc. Graw-Hill Company, New Delhi.
3	Water Works Engineering Planning, Design and Operation	Syed R. Qasimand Edward M. Motley Guang Zhu	2009	Prentice Hall of India Learning Private Limited, New Delhi

VII(c): Web links and Video Lectures (e-Resources):
https://archive.nptel.ac.in/courses/105/106/105106119/

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

|| Jai Sri Gurudev ||
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Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	V	**Course Type:**	**PCCL**		
Course Title: Software Application Lab					
Course Code:	**23CVL504**			**Credits:**	01
Teaching Hours/Week (L: T:P:O)			**0:0:2:0**	**Total Hours:**	12 lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Practical**			**Exam Hours:**	03

I. Course Objectives:

- Use industry standard software in a professional set up.
- Understand the elements of finite element modelling, specification of loads and boundary condition, performing analysis and interpretation of results for final design.
- Develop customized automation tools.

II. Teaching-Learning Process (General Instructions):

1. Blackboard teaching/PowerPoint presentations
2. Regular review of students by asking questions based on topics covered in the class.
3. Laboratory Experiments.

III. Practical Part

Experiments / Programs / Problems

1	Analysis of plane trusses, continuous beams, portal frames using software
2	3D analysis of multistoried frame structures
3	Basic features of Project management software. Constructing Project: create WBS, Activities, and tasks and Computation Time using Excel spread sheet and transferring the same to Project management software.
4	Identification of Predecessor and Successor activities with constrain. Constructing Network diagram (AON Diagram) and analyzing for Critical path,
5	Critical activities and Other non-Critical paths, Project duration, Floats. Study on various View options available
6	Basic understanding about Resource Creation and allocation. Understanding about Splitting the activity, linking multiple activity, assigning Constrains, Merging Multiple projects, Creating Baseline Project
7	Design of singly reinforced and doubly reinforced rectangular beams, design of one way and two-way slabs Using Excel
8	Computation of earthwork, Design of horizontal curve by offset method, Design of super elevation Using Excel

IV. COURSE OUTCOMES

CO1	Use software for analysis and design of structural elements using commercially available software
CO2	Modelling of structural elements of buildings using commercially available software
CO3	Understanding project management concepts and principles using MS.
CO4	Design using excel spread sheet

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4

CO1	2	2	1	1	1	1				1		2	2				
CO2	2	2	1	1	1	1				1		2	2				
CO3	2												2				
CO4	2	2	1	1	1	1				1		2	2				

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 4

Continuous Internal Evaluation (CIE): Refer Annexure section 4

Semester End Examination (SEE): Refer Annexure section 4

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Reinforced Concrete Design	Unnikrishnan Pillai and Devdas Menon	4th Edition October 20, 2021	McGraw Hill, New Delhi
2	Design of Concrete Structures	N Subramanian	26 December 2013	Oxford university Press
VII(b): Reference Books:				
1	Surveying Vol 2	BC Punmia	1 January 2017	Laxmi Publications
2	Civil Engineering Project Management	Alan Twort, Gordon Rees	4th Edition, 2004	CRC Press
3	Estimating and Costing in Civil Engineering Theory and Practice	B N Dutta	28 th Edition, 2021	CBS Publications

VII(c): Web links and Video Lectures (e-Resources):

- ANALYSIS OF SIMPLE TRUSS USING Staad.Pro - Problem No-1
- ANALYSIS OF SIMPLE BEAM USING Staad.Pro - Problem No-1
- ANALYSIS OF SIMPLE FRAME USING Staad.Pro - Problem No-1
- Design of RCC beam as per IS-456(2000) using excel sheet
- Analysis of Multi-storey Residential Building using Staad.Pro
- Preparing Construction Planning Schedule | project management | MS Project|

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Hands on experiments

Sl. No.	BOS Member	Affiliation	Signature
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Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**V**	**Course Type:**	**PEC**		
Course Title: Matrix Methods of Structural Analysis					
Course Code:	**23CVP511**			**Credits:**	**03**
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**03**

I. Course Objectives:

- Gain basic knowledge of structural systems and application of concepts of flexibility and stiffness matrices for simple elements.
- Understand flexibility and stiffness matrices to solve problems in beams, frames and trusses.
- Gain knowledge of direct stiffness method to solve problems in beams, frames and trusses.
- Gain knowledge of solving problems involving temperature changes and lack of fit.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1: Introduction	8 Hrs

Introduction: Structural systems, geometric and material non-linearity, principle of superposition, equilibrium and compatibility conditions, static and kinematic indeterminacy, principle of minimum potential energy and minimum complementary energy, concepts of stiffness and flexibility, flexibility and stiffness matrices of beam and truss elements.
Textbook: Computational Structural Mechanics – Rajasekaran S
Self-Learning: Development Stiffness and Flexibility Matrices for Beam and Truss Element
RBT Levels: L1, L2, L3

Module-2: Element Flexibility Method	8 Hrs

Element Flexibility Method: Force transformation matrix, global flexibility matrix, analysis of continuous beams, rigid frames and trusses.
Textbook: Computational Structural Mechanics – Rajasekaran S
Self-Learning: Force Transformation Matrix for different Redundants
RBT Levels: L1, L2, L3, L4

Module-3: Element Stiffness Method	8 Hrs

Element Stiffness Method: Displacement transformation matrix, global stiffness matrix, analysis of continuous beams, rigid frames and trusses.
Textbook: Computational Structural Mechanics – Rajasekaran S
Self-Learning: Force Transformation Matrix
RBT Levels: L1, L2, L3, L4

Module-4: Design of Compression Members	8 Hrs

Effects of Temperature Changes and Lack of Fit: Related numerical problems by flexibility and stiffness method as in Module 2 and Module 3.

Textbook: Computational Structural Mechanics – Rajasekaran S

Self-Learning: Comparison of Flexibility and Stiffness Methods.

RBT Levels: L1, L2, L3, L4

Module-5: Design of Beams	8 Hrs

Direct Stiffness Method: Local and global coordinates systems, principle of contra gradience, global stiffness matrices of beam and truss elements, analysis of continuous beams and trusses.

Textbook: Limit state design of steel structures- Duggal S K

Self-Learning: Laterally supported rolled steel beam.

RBT Levels: L1, L2, L3, L4

IV. COURSE OUTCOMES

CO1	Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems.
CO2	Identify, formulate and solve engineering problems with respect to flexibility matrices as applied to continuous beams, rigid frames and trusses.
CO3	Identify, formulate and solve engineering problems with respect to stiffness matrices as applied to continuous beams, rigid frames and trusses.
CO4	Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3											2			
CO2	3	3											2			
CO3	3	3											2			
CO4	3	3											2			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Computational Structural Mechanics	Rajasekaran S	First Edition, 2001	PHI, New Delhi
2	Matrix Analysis of Framed Structures	Weaver W and Gere J H	Third Edition, 2012	CBS publications
3	Structural Analysis – A Matrix Approach	Pandit and Gupta	Second Edition, 2016	Tata McGraw Hill

VII(b): Reference Books:

1	Matrix and Finite Element Analysis of Structures	Madhujit Mukhopadhay	Third Edition 2012	Ane Books Pvt. Ltd.
2	Elements of Matrix Analysis and Stability of Structures	Manikaselvam	Fifth edition 2018	Khanna Publishers, New Delhi

3	Introduction to Matrix Methods in Structural Analysis	H C Martin	Fourth Edition 2017	McGraw Hill.

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/Wa9ZSWlrpnk?si=XfQUYAVDNzXFTrRi
- https://youtu.be/3Lr3klTURdc?si=vSXTFeH282iqvpF8
- https://youtu.be/58DrizBBo7s?si=khEGBYjA4NqKiv4Z
- https://youtu.be/2-7G35K_KD8?si=3HG4reTnj_6Pdvur
- https://www.youtube.com/live/jPeOYEkdrjM?si=1Frk95Kd88JUWBwy
- https://youtu.be/bcE1brQVMgs?si=s36Aby3pQHr1PH-y
- https://youtu.be/bAv93yNcb2g?si=XD8gLN68eXAAD7-B

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Group Discussion to solve complex Numerical problems.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

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Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Alternative Building Materials					
Course Code:	**23CVP512**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

Understand environmental issues due to building materials and the energy consumption in manufacturing building materials
Study the various masonry blocks, masonry mortar and structural behaviour of masonry under compression.
Study the alternative building materials in the present context.
Understand the alternative building technologies which are followed in present construction field

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction	8 Hrs

Introduction: Energy in building materials, Environmental issues concerned to building materials, Embodied energy and life-cycle energy, Global warming and construction industry, green concepts in buildings, green building ratings – IGBC and LEED manuals – mandatory requirements, Rainwater harvesting & solar passive architecture. Environmental friendly and cost-effective building technologies, Requirements for buildings of different climatic regions

Textbook: KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

Self-Learning: Comparison of Various Green building ratings

RBT Levels L1, L2, L3

Module-2	8 Hrs

Elements of Structural Masonry: Elements of Structural Masonry, Masonry materials, requirements of masonry units' characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders, laterite Blocks, Fal- G blocks and Stabilized mud block. Manufacture of stabilized blocks. Structural Masonry Mortars: Mortars, cementations materials, sand, natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar. Uses of masonry, masonry bonding, Compressive strength of masonry elements, Factors affecting compressive strength, Strength of Prisms/wallets and walls, Effect of brick bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry, Design of masonry compression elements subjected to axial load **Textbook**: KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

Self-Learning:Specification for Structural Masonry.
RBT Levels L1,L2,L3

Module-3	8 Hrs

Alternative Building Materials: Lime, Pozzolana cements, Raw materials, Manufacturing process, Properties and uses. Fibers- metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications. Building materials from agro and industrial wastes ,Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes

Textbook: KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

Self-Learning:Material Testing Standards.
RBT Levels L1,L2,L3

Module-4	8 Hrs

Alternative Building Technologies: Use of arches in foundation, alternatives for wall constructions, composite masonry, confined masonry, cavity walls, rammed earth, Ferro cement and ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications. Top down construction, Mivan Construction Technique. Alternative Roofing Systems: Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes

Textbook: KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

Self-Learning:Case Studies.
RBT Levels L1,L2,L3

Module-5	8 Hrs

Equipment for Production of Alternative Materials: Machines for manufacture of concrete, Equipments for production of stabilized blocks, Moulds and methods of production of precast elements, Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis: Case studies using alternatives.

Textbook: KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

Self-Learning:Specifications.
RBT Levels L1,L2,L3

IV. COURSE OUTCOMES

CO1	Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;
CO2	Suggest appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.
CO3	Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
CO4	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2					2					2	2			
CO2	3	2			1		2	2				1	2			
CO3	3	2			2		2	2				1	2			

CO4	3	3			2		2					1	2			
CO5	3	3			2		2						2			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Alternative Building Materials and Technologies	KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao	2023	New Age International pub
2	Structural Masonry	Arnold W Hendry	2nd, 1998	Macmillan Publishers

VII(b): Reference Books:

1	Building Materials in Developing Countries	RJS Spence and DJ Cook	2019	Wiley pub
2	Green Building Rating System	LEED India	2011	IGBC pub.

VII(c): Web links and Video Lectures (e-Resources):

E-learning content on L&T EduTech Platform.
https://www.youtube.com/watch?v=n-klbhJz68E

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
1			
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BOS Chairman (Sign & Seal)

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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Environmental Impact Assessment					
Course Code:	**23CVP513**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To appreciate the need for EIA and identify the EIA methodology.
- To develop the environmental Impact assessment procedure.
- To design the environmental management plan effectively and monitored.
- To prepare the various EIA models for project

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1. Introduction to EIA — 8 Hrs

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, international agreements

Textbook: Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, Self-Learning: List of projects requiring Environmental clearance, Application form,

RBT Levels: L1 L2

Module-2 : **EIA Methodologies** — 8 Hrs

EIA Methodologies: Environmental attributes -Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods- Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

Textbook: Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies Self-Learning: EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

RBT Levels L1,L2

Module-3 : **Environmental Management Plan** — 8 Hrs

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

Textbook: Barthwal, R. R., Environmental Impact Assessment,
Self-Learning: Identification of Significant or Unacceptable Impacts Requiring Mitigation
RBT Levels: L1 L2

Module-4 : **Environmental Legislation and Life cycle Assessment**	8 Hrs

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria case studies.

Textbook: Barthwal, R. R., Environmental Impact Assessment
Self-Learning: Solid and Hazardous waste management rules
RBT Levels: L1 L2

Module-5 : **Case Studies:**	8 Hrs

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

Textbook: Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies
Self-Learning: Municipal Solid waste processing plant, Air ports.
RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Identify the environmental attributes to be considered for the EIA study
CO2	Formulate objectives of the EIA studies
CO3	Identify the methodology to prepare rapid EIA
CO4	Prepare EIA reports and environmental management plans

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2					2					2		2		
CO2	3	2			1		2	2				1		2		
CO3	3	2			2		2	2				1		2		
CO4	3	3			2		2					1		1		

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Environmental Impact Assessment Methodologies	Anjaneyulu. Y and Manickam. V	Second edition & June 2007	B.S. Publications, Hyderabad
2	Environmental Impact Assessment,	Barthwal, R. R	First edition & 2002	New Age International Publishers

VII(b): Reference Books:

1	Environmental Impact Analysis	Jain, R.K., Urban, L.V., Stracy, G.S	First edition & 1991	Van Nostrand Reinhold

2	Environmental Impact Assessment	Rau, J.G. and Wooten	First edition & 1996	McGraw Hill Pub. Co

VII(c): Web links and Video Lectures (e-Resources):
https://www.youtube.com/watch?v=V7W3l1Qgj-0
https://www.youtube.com/watch?v=fPegn9PM-4o
https://www.youtube.com/watch?v=9-MEVIXr3Ko
https://www.facebook.com/thehindu/videos/what-is-eia-and-why-is-indias-new-eia-draft/problematic/3170113636359261/
https://www.youtube.com/watch?v=aznhAlo8rJo

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:		**Course Type:**	**PEC**		
Course Title: Groundwater Hydraulics					
Course Code:	**23CVP514**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

1. To identify the characteristics of aquifers.
2. To estimate the quantity of ground water by various methods.
3. To locate the zones of ground water resources.
4. To select particular type of well and augment the ground water storage

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction	8 Hrs

Importance, vertical distribution of subsurface water, occurrence in different types of rocks and soils, definitions-aquifers, aquifuge, aquitard, aquiclude, confined and Unconfined aquifers.

Textbook: Principles of Hydrology by Mysooru R. Yadupathi Putty

Self-Learning: Importance of subsurface water.

RBT Levels: L1, L2

Module-2: Fundamentals of Ground Water Flow	8 Hrs

Aquifer parameters, specific yield and specific retention, porosity, storage coefficient, derivation of the expression, Darcy's law, hydraulic conductivity, coefficient of permeability and intrinsic permeability, transmissibility, permeability in isotropic, anisotropic layered soils.

Textbook: Ground Water Hydrology by K. Todd

Self-Learning: Aquifer parameters

RBT Levels: L1, L2, L3

Module-3: Well Hydraulics	8 Hrs

Steady Flow, Radial flow in confined and unconfined aquifers, pumping test Unsteady Flow, General equation, derivation; thesis method, Cooper and Jacob method, Chow's method, solution of unsteady flow equations, leaky aquifers (only introduction), interference of well, image well theory.

Textbook: Ground Water Hydrology by K. Todd

Self-Learning: Image well theory

RBT Levels: L1 L2 L3

Module-4: Ground Water Exploration	8 Hrs

Introduction, Seismic method, Electrical resistively method, Geo-physical techniques, Electrical logging, Radioactive logging, Induction logging, Sonic and Fluid logging, Latest techniques.

Textbook: Modern Ground Water Exploration by Robert Bission

Self-Learning: Geo-physical techniques

RBT Levels: L1 L2 L3

Module-5: Ground Water Development	8 Hrs

Ground Water Development:

Types of wells, methods of construction, tube well design, dug wells, pumps for lifting water, working principles, power requirement, Conjunctive use, necessity, techniques and economics.

Ground Water Recharge:

Artificial recharge, Rainwater harvesting for ground water recharge.

Textbook: Irrigation and water resources engineering by B C Punmia.

Self-Learning: Artificial recharge

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Find the characteristics of aquifers and groundwater flow.
CO2	Estimate the quantity of ground water by various methods.
CO3	Locate the zones of ground water resources using suitable methods.
CO4	Select particular type of well and augment the ground water storage.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	2					3	2					1		2
CO2	3					2	2					1		2
CO3	3				2	2	2					1		2
CO4	3				2	2	2	2				1		2

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Hydrology	H.M. Raghunath,	Second, 2006	Wiley Eastern Publication, New Delhi.
2	Principles of Hydrology	Mysooru R. Yadupathi Putty	Second, 2019	Dreamtech Press
3	Irrigation and water power engineering	Dr. B C Punmia and Dr. Pande B B Lal	Seventh, 2022	Laxmi Publications private Ldt.

VII(b): Reference Books:

1	Ground Water and Tube Wells	Garg Satya Prakash	Sixth, 2011	Oxford and IBH, New Delhi
2	Ground Water Resources and Evaluation	W. C. Walton	Second, 2007	McGraw Hill, Delhi
3	Water Wells and Pumps	Michel, D. M., Khepar, S. D., Sondhi, S. K	Second, 2011	McGraw Hill, Delhi

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=uZGdYsLmklk&list=PLLy_2iUCG87BLVJlIwz2d5o1bBif4GAYH
- https://www.youtube.com/watch?v=FDEPGj453G4&list=PLLy_2iUCG87BLVJlIwz2d5o1bBif4GAYH&index=2
- https://www.youtube.com/watch?v=XTDkU7kPfUQ&list=PLbMVogVj5nJQrSFlE4ZUl-Uu1NQJIDTvm
- https://www.lands.gov.fj/index.php/department-of-mineral-resources/geological-services/ground-water-development
- https://indiawris.gov.in/wiki/doku.php?id=cgwb_ground_water_resources

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits, Group discussions, Pick and speech
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Hands on with groundwater exploration equipment.

Sl. No.	BOS Member	Affiliation	Signature
1			
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BOS Chairman (Sign & Seal)

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Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Pre-Engineered Buildings					
Course Code:	**23CVE531**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Impart concepts of precast concrete building design.
- Comprehend various aspects like selection and planning of structural system and its components, significance, plant and production methods, transportation and erection sequence of precast elements.
- Evaluate actual loads, integrating architectural and services requirements, structural modelling & analysis of a precast building.
- Design and detailing of precast multistoried building using software

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction to Precast and its elements — 8 Hrs

Introduction to Precast and its elements: Limitations, Residential, Commercial & Industrial Applications of precast, Materials used, Code provisions and clauses. Major elements (Beam, slab, wall, column, foundation, staircase, roof elements, façade Classification, Types and shapes, selection, application, erection, advantages, infra works - Pipes & drains, duct bank, baggage handling tunnel, culvert and sleeper, facia element, pavement and channel.

Textbook: Building Design and Erection Using Prefabricated Concrete

Self-Learning:Advanced Materials

RBT Levels: L1 L2

Module-2: Precast Structural Systems — 8 Hrs

Precast Structural Systems, Production, Storage, & Logistics: Structural System: Skeletal System, Portal Frame system, Large Panel system, Cell Block system and hollow block system, Guidelines of selection – Residential & office buildings, Industrial Buildings, Commercial buildings, Structural Stability and Structural Behavior.

Plant and Production: Introduction -Types & Process, Production – Design and shop drawings, check lists, Molding, Casting and its types, Concreting, Curing, Demolding and inspection.

Storage, Delivery, Handling- introduction and types of equipment, lifting devices, Erection and installation - Horizontal components, vertical components, special elements

Textbook: Precast Concrete Structures by Hubert Bachmann

Self-Learning: Specifications

RBT Levels: L1 L2

Module-3: Precast Structural Elements — 8 Hrs

Modelling, Analysis and design of Wall system: Design Basis Criteria: Geometric parameters and Occupancy, Location and Associated Parameters, Systems and material specifications, analysis tools, Loads and Load Combinations – gravity loads, lateral loads (seismic and wind)
ETABS software, Modelling, Analysis and Design of structural elements for RC Wall system: Design of RC wall, beam, slab & staircase, Design for stripping, stacking, transportation
Textbook: Precast Concrete Structures by Hubert Bachmann
Self-Learning: Design Specifications
RBT Levels: L1 L2

Module-4: Analysis, Design of the Frame system:	8 Hrs

Joints Connections for RC Wall system, Modelling, Analysis, Design of the Frame system: Joints connections for RC wall system – Wall to foundation, wall to wall horizontal connection, wall to wall vertical connection, beam to wall connection, beam to beam connection, slab to wall – progressive collapse, diaphragm action & slab to beam connection, staircase to beam or wall connection.
Modelling, Analysis and design for Frame system and its connections: ETABS Modelling, Analysis and Design for frame system (foundation, column, beam, slab etc.
Textbook: Precast Concrete Structures by Hubert Bachmann
Self-Learning: Case Studies
RBT Levels: L1 L2

Module-5: Prestressed concrete and Preventive Measures and case studies	8 Hrs

Prestressed concrete and Preventive Measures and case studies: Prestressed Concrete, Various types of slab design and its check, Slab to beam connection Preventive Measures – Testing requirements, water tightness, temporary supports, MEP related preventive measures, progressive collapse – introduction and design, common defects and remedies. Case Studies - Residential Project, Commercial Project
Textbook: Precast Concrete Structures by Hubert Bachmann
Self-Learning: Testing Standards
RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Comprehend the necessity of precast construction
CO2	Adopt the appropriate mould and method for casting, transportation, and erection.
CO3	Compute loads (Dead, Superimposed, Live, Wind, Seismic) of various elements & services and select appropriate vertical & lateral load resisting systems for the various loads acting on the building
CO4	Create and analyze a precast building model using ETABS software
CO5	Design of precast building including connections, adhering to the code requirements & functional aspects

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2												2			
CO2	3	2					2						2			
CO3	3	2					2						2			
CO4	3	3			2		2						2			
CO5	3	3			2		2						2			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Precast Concrete Structures Paperback	Kim S. Elliott	2nd, 12 June 2019	CRC Press
2	Precast Concrete Structures	Hubert Bachmann and Alfred Steinle	2018	John Wiley & Sons
3	Building with Large Prefabricates	B. Lewicki	1998	Elsevier Publishing, New York

VII(b): Reference Books:

1	Precast concrete design and Applications	Hass, A.M.	1983	Applied Science Publishers
2	Handbook on Precast concrete for buildings	ICI Bulletin 02	2016	Indian Concrete Institute

VII(c): Web links and Video Lectures (e-Resources):

- E-learning content on L&T EduTech Platform.

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Repair & Rehabilitation of Structures					
Course Code:	**23CVE532**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Describe Causes of deterioration of concrete structures.
- Analyse failures of concrete structures.
- Evaluate failures and deterioration in concrete structures.
- Develop repair techniques for deteriorated concrete structures.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: General.	8 Hrs

Introduction and Definition for Repair, Retrofitting, Strengthening and rehabilitation. Physical and Chemical Causes of deterioration of concrete structures, Evaluation of structural damages to the concrete structural elements due to earthquake.

Textbook: RT Allen and SC Edwards, "Repair of concrete structures".

Self-Learning: Physical and chemical causes of deterioration of concrete.

RBT Levels: L1 L2

Module-2: Influence on serviceability and durability	8 Hrs

Effects due to climate, temperature, chemicals, wear and erosion, design and construction errors, corrosion mechanism, effects of cover, thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings cathodic protection.

Textbook: B Vedivelli, "Rehabilitation of concrete structures".

Self-Learning: Methods of corrosion protection.

RBT Levels: L1 L2

Module-3: Damage Assessment	8 Hrs

Purpose of assessment, Rapid assessment, Investigation of damage, Evaluation of surface and structural cracks, Damage assessment procedure, destructive, non-destructive and semi destructive testing systems.

Textbook: B Vedivelli, "Rehabilitation of concrete structures".

Self-Learning: Damage assessment procedure.

RBT Levels: L1 L2

Module-4: Techniques of repair	8 Hrs

Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete epoxy injection mortar repair for cracks shoring and underpinning.

Textbook: Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair".

Self-Learning: Polymers coating for rebar during repair foamed concrete

RBT Levels: L1 L2

Module-5: Repair to structures	8 Hrs

Repairs to overcome low member strength deflection, cracking chemical disruption, weathering wear fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures. Case Studies.

Textbook: S Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair".

Self-Learning: Case Studies

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Identify the causes of failures in concrete structures
CO2	Analyse failures in concrete structures
CO3	Evaluate causes for failures in deteriorated concrete structures
CO4	Develop simple and comprehensive solutions to rehabilitate deteriorated structures

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	1	-	2	2	2	-	-	-	-	2	1	1		1		
CO2	-	-	2	2	2	-	-	-	-	-	-	1		1		
CO3	1	-	1	1	-	-	-	-	-	-	-	1		1		
CO4	1	1	-	-	-	-	-	-	-	1	-	1		1		

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Repair of concrete structures	RT Allen and SC Edwards	1st, 1993	Blakie and sons I.
2	Rehabilitation of concrete structures	B Vedivelli	1st, 2013	Standard publishers

VII(b): Reference Books:

1	Concrete Structures – Materials, Maintenance and Repair	Denison Campbell, Allen & Harold Roper	5th, 20199	Longman Scientific and Technical.

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/Bmm1dATNnz0
- https://youtu.be/qO_RtTfbino
- https://youtu.be/HXO7mfUXiFU
- https://youtu.be/KR3UH6rrtvA
- https://youtu.be/NdLwHk-A0hc

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
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BOS Chairman (Sign & Seal)

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Rural, Urban Planning & Architecture					
Course Code:	**23CVE533**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To make the student understand about the past and present architecture of different parts of the world.
- Rural and urban planning and growth and circulation of patterns and effect of increase in Urbanization.
- The basic planning required for urban and rural centres with respect to physical and social aspect.
- Student s to visit the different place of architecture monuments to understand the concept.
- To understand different types of architecture and planning.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction — 8 Hrs

Introduction: Aim and importance of Architecture, Architecture as a fine art. Role of an architect and an engineer. Essential principles and qualities of architecture with examples

Factors of architecture: Mass, Form, Colour, Solids, and Voids, Uniformity, Balance and Symmetry, Painting with examples.

Textbook: Fletcher -History of Architecture.

Self-Learning: Essential principles and qualities of architecture.

RBT Levels: L1 L2

Module-2: Influence on serviceability and durability — 8 Hrs

Architectural influence of the following: Association, Tradition, Climate, Materials, Topography, Religion social customs and aspiration of time.

Architectural characteristics of the following architecture with examples. 1. Egyptian, 2. Greek, 3. Roman, 4. Buddhist, 5. Hindu, 6. Jain, 7. Chalukyan, 8. Modern architecture

Factors that have influence present day Modern Architecture, Aesthetic difference between the past and present Architecture.

Students are advised for a technical tour related Architecture and town planning to gain additional knowledge in this subject.

Textbook: Perey Brown -Indian architecture – Vol. I & II.

Self-Learning: Aesthetic difference between the past and present Architecture.

RBT Levels: L1 L2 L3

Module-3: Human settlements	8 Hrs

Human settlements, Rural and urban pattern of growth, Factors that promote growth and development of Rural and urban areas Ancient Town Planning in India: Principles of town planning and circulation pattern with examples.

Textbook: Lewis Keeble -Principle of town and country planning.

Self-Learning: Principles of town planning.

RBT Levels: L1 L2 L3

Module-4: Industrialisation	8 Hrs

Impact on town planning, Urbanisation causes, its effect on town and cities,
remedial measures both in urban and rural planning Circulation pattern in cities: Urban roads and streets, their fictional classification, traffic survey data and its use in town planning.

Textbook: Ramachandran R, Urbanization and Urban Systems in India.

Self-Learning: Traffic survey data.

RBT Levels: L1 L2 L3

Module-5: Contemporary objectives and methods of planning of town	8 Hrs

Development plans for cities, objectives and stages involved in their preparation and implementation, space standards for planning.

Textbook: Rangwala, C -Town planning.

Self-Learning: Space standards for planning

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand importance of architecture in rural and urban planning
CO2	Understand Influence of architecture
CO3	Design infrastructure for rural and urban region
CO4	Plan and design rural and urban roads

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	1	-	2	-	-	-	-	-	-	1	-	1		1		
CO2	1	-	2	-	-	-	-	-	-	-	-	1		1		
CO3	1	-	1	-	-	-	-	-	-	-	-	1		1		
CO4	1	-	-	-	-	-	-	-	-	1	-	1		1		

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	History of Architecture	Fletcher	2st, 1990	Architectural Press
2	The Urban Pattern City Planning and Design	Gallion Arthur .B	1950	D.van Nostrand Co. Inc Princeton New Jersey Toronto London
3	Indian Architecture Vol I and Vol II	Percy Brown	1942	B Taraporevala Sons & Co. Bombay

VII(b): Reference Books:

1	Principles and Practice of Town and Country Planning	Lewis Keeble	4th, 1969	Estates Gazette Ltd.
2	Urbanization and Urban Systems in India	R. Ramachandran	1992	Oxford Publishers
3	Town planning	Rangwala	3rd, 2025	Charothar Publication

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/q_XmlG3CwNk
- https://youtu.be/vHop5VgamRc
- https://youtu.be/XcrSwGqdo_U
- https://youtu.be/EJVw62u6tAM
- https://youtu.be/UMOcbXxjSVA

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	V	**Course Type:**	**ETC**		
Course Title: Building Information Modelling in Civil Engineering					
Course Code:	**23CVE534**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Describe Causes of deterioration of concrete structures.
- Analyse failures of concrete structures.
- Evaluate failures and deterioration in concrete structures.
- Develop repair techniques for deteriorated concrete structures.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: General.	8 Hrs

Introduction Building Information Modelling, Documented Inefficiencies of Traditional Approaches, benefits of BIM, history of building modeling technology, Early 3D Modeling of Buildings, Object - Based Parametric Modeling, Parametric Modeling of Buildings, User - Defi ned Parametric Objects, Design for Construction, Object Based CAD Systems, Property and Attribute Handling, Drawing Generation, Scalability.

Textbook: RT Allen and SC Edwards, "Repair of concrete structures".

Self-Learning: Physical and chemical causes of deterioration of concrete.

RBT Levels: L1 L2

Module-2: Influence on serviceability and durability	8 Hrs

Different kinds of exchange formats, background of product data models, Industry Foundation Classes, Implications of IFC Use.

Textbook: B Vedivelli, "Rehabilitation of concrete structures".

Self-Learning: methods of corrosion protection.

RBT Levels: L1 L2

Module-3: Damage Assessment	8 Hrs

Purpose of assessment, Rapid assessment, Investigation of damage, Evaluation of surface and structural cracks, Damage assessment procedure, destructive, non-destructive and semi destructive testing systems.

Textbook: B Vedivelli, "Rehabilitation of concrete structures".

Self-Learning: Damage assessment procedure.

RBT Levels: L1 L2

Module-4: Techniques of repair	8 Hrs

Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete epoxy injection mortar repair for cracks shoring and underpinning.

Textbook: Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair".

Self-Learning: Polymers coating for rebar during repair foamed concrete

RBT Levels: L1 L2

Module-5: Repair to structures	8 Hrs

Repairs to overcome low member strength deflection, cracking chemical disruption, weathering wear fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures. Case Studies.

Textbook: S Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair".

Self-Learning: Case Studies

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Identify the causes of failures in concrete structures
CO2	Analyse failures in concrete structures
CO3	Evaluate causes for failures in deteriorated concrete structures
CO4	Develop simple and comprehensive solutions to rehabilitate deteriorated structures

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	1	-	2	2	2	-	-	-	-	2	1	1		1		
CO2	-	-	2	2	2	-	-	-	-	-	-	1		1		
CO3	1	-	1	1	-	-	-	-	-	-	-	1		1		
CO4	1	1	-	-	-	-	-	-	-	1	-	1		1		

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Repair of concrete structures	RT Allen and SC Edwards	1st, 1993	Blakie and sons I.
2	Rehabilitation of concrete structures	B Vedivelli	1st, 2013	Standard publishers

VII(b): Reference Books:

1	Concrete Structures – Materials, Maintenance and Repair	Denison Campbell, Allen & Harold Roper	5th, 20199	Longman Scientific and Technical.

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/Bmm1dATNnz0
- https://youtu.be/qO_RtTfbino
- https://youtu.be/HXO7mfUXiFU
- https://youtu.be/KR3UH6rrtvA
- https://youtu.be/NdLwHk-A0hc

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**V**	**Course Type:**	**AEC**		
Course Title: Interior Designing					
Course Code:	**23CVAE51**			**Credits:**	01
Teaching Hours/Week (L: T:P:O): L			**1:0:0:0**	**Total Hours:**	15
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**MCQ**			**Exam Hours:**	01

I. Course Objectives:

- Get introduced to various concepts and aspects of interior design.
- Design interiors of a residential or commercial unit.
- Explore various interior surface materials and finishes.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1	3 Hrs

Introduction to interior design and its history of evolution. Basics of interior design - concepts of interior space making/furniture layout, elements of interior design, lighting design, and selection of materials, finishes & colors.
Textbook: Francis D.K Ching
RBT Levels: L1 L2

Module-2	3 Hrs

Components of Interior Design - Understanding the proportions to enhance the quality of interior space and its psychological effects of space such as ceiling, flooring, walls, furniture, lighting, etc.
Textbook: Francis D.K Ching
RBT Levels: L1 L2 L3

Module-3	3 Hrs

Services related to interior design to be integrated such as plumbing, air-conditioning, acoustics, electrical & lighting etc.
Textbook: Maureen Mitton
RBT Levels: L1 L2 L3

Module-4	3 Hrs

Ergonomics of furniture, materials used, its style, characteristics and functional applications. Furniture positioning considering day lighting and artificial lighting factors in the interiors.
Textbook: Maureen Mitton
RBT Levels: L1 L2 L3

Module-5	3 Hrs

Design, detailing, furniture layout, specification for the materials, and their application relate to residential, commercial, educational or interiors of other public spaces.

Textbook: Maureen Mitton

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Design the interior space using various concepts and elements of interior design
CO2	Develop schemes for interiors along with various parameters like services, furniture, space requirements, etc
CO3	Analyse the judicious use of materials considering the sensitivity of the design.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2				2								1			
CO2		2	2										1			
CO3			2										1			
CO4						2							1			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 5

Continuous Internal Evaluation (CIE): Refer Annexure section 5

Semester End Examination (SEE): Refer Annexure section 5

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Interior design Illustrated	Francis D.K Ching	4th Edition, 2018	Wiley & Sons
2	Time Saver's Standards for Interior Design	Julius Panero, Zelnik Martin & Joseph De Chiara	2nd edition, 2017, ISBN-10: 1259004090, ISBN-13: 978-1259004094	McGraw-Hill

VII(b): Reference Books:

1	Interior Design Visual Presentation: A Guide to Graphics, Models and Presentation Techniques	Maureen Mitton	4th edition, 2012, ISBN-10: 0470619023, ISBN-13: 978-0470619025	John Wiley & Sons,
2	Interior Design	John F Pile	4th edition, 2007, ISBN-10: 0132408902, ISBN-13: 978-0132408905	Pearson

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=FwUNzpFrWtY
- https://www.youtube.com/watch?v=ecJWqHNe3ik
- https://www.youtube.com/watch?v=ExYsEH7zRLY
- https://www.youtube.com/watch?v=VcapJG3zvqM
- https://www.youtube.com/watch?v=71xao01QxB0
- https://www.youtube.com/watch?v=kye1stlKLIU

- https://www.youtube.com/watch?v=fGP6fxKkpu0
- https://www.youtube.com/watch?v=rRvAUWRbNcc&list=PLLy_2iUCG87CctCRa8N5HXJBxRnV1KgkZ&index=7

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class.

Sl. No.	BOS Member	Affiliation	Signature
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Civil Engineering

Semester:	**V**	**Course Type:**	**AEC**		
Course Title: Problem Solving with Python					
Course Code:	**23CVAE52**			**Credits:**	01
Teaching Hours/Week (L: T:P:O)			**1:0:0:0**	**Total Hours:**	15
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To learn to solve problems using Python conditionals and loops.
- To learn to solve problems using Python conditionals and loops
- To define Python functions and use function calls to solve problems.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1:	3 Hrs

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list;
Textbook: Allen B. Downey, "Think Python: How to Think like a Computer Scientist"
Self-Learning: Use Google Colab/Jupyter Notebook for Python coding.
RBT Levels: L1 L2

Module-2:	3 Hrs

Variables, expressions, statements, tuple assignment, precedence of operators, comments;
Textbook: Allen B. Downey, "Think Python: How to Think like a Computer Scientist"
Self-Learning: Write a Python script to calculate the bending moment and shear force for a simply supported beam.
RBT Levels: L1 L2 L3

Module-3:	3 Hrs

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass;
Textbook: Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming"
Self-Learning Develop a script to compute bearing capacity of soil using Terzaghi's formula.
RBT Levels: L1 L2 L3

Module-4:	3 Hrs

Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

Textbook: Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming"

Self-Learning: Use Python to analyze a truss or frame structure.

RBT Levels: L1 L2 L3

Module-5:	3 Hrs

Introduction to Lists, tuples, dictionaries

Textbook: Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

Self-Learning: Automate rainfall-runoff estimation using Python.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Explain the fundamental concepts of Python programming, including data types, variables, expressions, and control structures.
CO2	Apply conditional statements, loops, and functions to solve basic computational problems using Python.
CO3	Analyze string operations, list manipulations, and debugging techniques to enhance program efficiency

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2			1							1	1			
CO2	3	3			3							2	1			
CO3	3	3			2							3	1			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 5

Continuous Internal Evaluation (CIE): Refer Annexure section 5

Semester End Examination (SEE): Refer Annexure section 5

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Think Python: How to Think like a Computer Scientist	Allen B. Downey	2nd, 2016	O'Reilly Publishers
2	Computational Thinking: A Beginner's Guide to Problem Solving and programming	Karl Beecher	1st, 2017	BCS Learning &amp

VII(b): Reference Books:

1	Python for Programmers	Paul Deitel and Harvey Deitel	1st, 2021	Pearson Education
2	Computational Thinking: A Primer for Programmers and Data Scientists	G Venkatesh and Madhavan Mukund	1st, 2021	Notion Press

VII(c): Web links and Video Lectures (e-Resources):
https://onlinecourses.nptel.ac.in/noc24_cs57/preview
https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Structural Analysis with Python: Write a program to analyze a simply supported beam or truss using Python.
- Soil Bearing Capacity Calculator: Implement Python code to compute soil bearing capacity based on Terzaghi's equation.
- Hydraulic Flow Simulation: Develop a script to analyze open channel flow using Manning's equation.

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Civil Engineering

Semester:	V	**Course Type:**	**AEC**		
Course Title: Microsoft Office Tools					
Course Code:	**23CVAE53**			**Credits:**	01
Teaching Hours/Week (L: T:P:O)			**1:0:0:0**	**Total Hours:**	15
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To develop proficiency in using Microsoft Office tools for document creation, data analysis, presentations, and collaboration.
- To enhance productivity by utilizing advanced features of Word, Excel, and PowerPoint in professional and academic settings.
- To introduce automation, templates, and cloud-based collaboration tools to improve efficiency in workplace tasks.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1:	3 Hrs

Introduction to Microsoft Word: Interface, Ribbon, and Toolbar, Document Creation: Creating, Saving, and Formatting Text, Paragraph and Page Formatting: Alignment, Indentation, Margins, Page Layout, Working with Tables, Images, and SmartArt, Header, Footer, Page Numbers, and Section Breaks, Proofing Tools: Spell Check, Grammar Check, Thesaurus, Printing and PDF Conversion

Textbook: Microsoft Office 365 For Beginners, Scott Burnett

Self-Learning: Prepare a formatted report with a title page, table of contents, headers, and footers. Create a resume using Word templates.

RBT Levels: L1 L2

Module-2:	3 Hrs

Introduction to Excel: Interface, Worksheets, and Cells, Data Entry and Formatting (Number, Date, Text Formatting), Basic Formulas & Functions: SUM, AVERAGE, MIN, MAX, Relative & Absolute Referencing in Formulas, Conditional Formatting and Data Validation, Creating and Customizing Charts & Graphs

Textbook: Microsoft Office 365 For Beginners, Scott Burnett

Self-Learning: Design a grade sheet with automatic total and percentage calculation. Create a chart/graph representing student performance.

RBT Levels: L1 L2 L3

Module-3:	3 Hrs

Logical Functions: IF, AND, OR, Nested IF, Lookup Functions: VLOOKUP, HLOOKUP, XLOOKUP, Pivot Tables and Data Summarization, Sorting & Filtering Data, Basic Data Analytics with Excel, Introduction to Macros and Automation.

Textbook: Microsoft Office 365 For Beginners, Scott Burnett

Self-Learning Develop an inventory management sheet using Pivot Tables. Create a salary calculation sheet using formulas and conditions.

RBT Levels: L1 L2 L3

Module-4:	3 Hrs

Introduction to PowerPoint: Interface and Slide Layouts, Formatting Text, Images, and Shapes, Slide Transitions and Animations, Creating Professional Presentations, Inserting Tables, Charts, and SmartArt, Presenter View and Slide Show Settings, Exporting Presentations to PDF/Video

Textbook: Excel Bible, John Walkenbach

Self-Learning: Design a business proposal presentation using animations and transitions. Prepare a 5-slide technical presentation on any engineering topic.

RBT Levels: L1 L2 L3

Module-5:	3 Hrs

Linking Word, Excel, and PowerPoint for Data Sharing, Creating Automated Reports using Excel Data in Word, Collaboration Features: Track Changes, Comments, and Sharing, Cloud Storage & Collaboration using OneDrive, Introduction to Microsoft Teams for Virtual Collaboration

Textbook: Microsoft Office 365 For Beginners, Scott Burnett

Self-Learning: Create a team project report integrating Word, Excel, and PowerPoint. Use Microsoft Teams for document sharing and collaborative editing.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Explain the fundamental features of Microsoft Office tools for document creation, data management, and presentation.
CO2	Apply Microsoft Word, Excel, and PowerPoint to create structured reports, perform data analysis, and design professional presentations.
CO3	Analyze automation and integration features to improve productivity and collaboration in real-world tasks.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2			3				1			3				
CO2	3	3			3				2			3				
CO3	3	3			3				2			3				

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 5

Continuous Internal Evaluation (CIE): Refer Annexure section 5

Semester End Examination (SEE): Refer Annexure section 5

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Microsoft Office 365 For Beginners	Scott Burnett	2021	Independently Published
2	Excel Bible	Mickel Alexander	2022	Wiley

VII(b): Reference Books:

1	MOS Study Guide for Microsoft Office 365	Joan Lambert	2021	Microsoft Press
2	Excel Formulas and Functions for Dummies	Ken Bluttman	2019	Wiley
3	Microsoft Office Inside Out	Ed Bott	2019	Microsoft Press

VII(c): Web links and Video Lectures (e-Resources):

https://learn.microsoft.com/en-us/training/

https://www.youtube.com/c/KevinStratvert

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Office Suite Project: Create a full business report integrating Word, Excel, and PowerPoint.
- Data Analysis Challenge: Analyze and visualize real-world construction project costs in Excel.
- Live Collaboration Task: Work in groups using Microsoft Teams to create and edit a document simultaneously.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**V**	**Course Type:**	**AEC**		
Course Title: Extensive Survey Practice					
Course Code:	**23CVAE54**			**Credits:**	**01**
Teaching Hours/Week (L: T:P:O):			**0:0:2:0**	**Total Hours:**	12 lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Practical**			**Exam Hours:**	03

I. Course Objectives:

This course will enable students to

1. Understand the practical applications of Surveying.
2. Use Total station and other Measurement Equipment's.
3. Work in teams and learn time management, communication and presentation skills.

II. Teaching-Learning Process (General Instructions) :

Note:

- To be conducted between 4th & 5th Semester for a period of 1 week including training on total station.
- Viva voce conducted along with 5th semester exams
- An extensive project preparation training involving investigation, collection of data is to be conducted. Use of Total Station is compulsory for minimum of TWO projects.
- The student shall submit a project report consisting of designs and drawings.
- Drawings should be done using CAD and survey work using total station
- Students should learn data download from total station, generation of contours, block leveling, longitudinal and cross-sectional diagrams, and capacity volume calculation by using relevant softwares.
- The course coordinators should give exposure and simulate activities to achieve the course outcomes.

III. PROJECTS

NEW TANK PROJECT

The work shall consist of:

1. Reconnaissance survey for selection of site and conceptualization of project.
2. Alignment of center line of the proposed bund, Longitudinal and cross sections of the center line.
3. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement
4. Design and preparation of drawing with report.

WATER SUPPLY AND SANITARY PROJECT

The work shall consist of:

1. Reconnaissance survey for selection of site and conceptualization of project.
2. Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population.
3. Preparation of village map by using total station.
4. Survey work required for laying of water supply and UGD
5. Location of sites for water tank. Selection of type of water tank to be provided. (ground level, overhead and underground)
6. Design of all elements and preparation of drawing with report

HIGHWAY PROJECT

The work shall consist of:

1. Reconnaissance survey for selection of site and conceptualization of project.
2. Preliminary and detailed investigations to align a new road (min. 1 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Surveying by using total station.
3. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed.
4. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road.

RESTORATION OF AN EXISTING TANK

The work shall consist of:

1. Reconnaissance survey for selection of site and conceptualization of project.
2. Alignment of center line of the existing bund, Longitudinal and cross sections of the center line.
3. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement
4. Design of all elements and preparation of drawing with report.

TOWN/HOUSING / LAYOUT PLANNING

The work shall consist of:

1. Reconnaissance survey for selection of site and conceptualization of project.
2. Detailed survey required for project execution like contour surveys
3. Preparation of layout plans as per regulations
4. Centerline marking-transfer of centre lines from plan to ground
5. Design of all elements and preparation of drawing with report as per regulations

IV. COURSE OUTCOMES

After studying this course, students will be able to:

CO1	Apply Surveying knowledge and tools effectively for the projects.
CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
CO3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3				2	2	2	2	2			1	1			
CO2	3				2	2	2	2	2			1	1			
CO3	3				2	2	2	2	2			1	1			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 4

Continuous Internal Evaluation (CIE): Refer Annexure section 4

Semester End Examination (SEE): Refer Annexure section 4

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Highway Engineering	S.K. Khanna and C.E.G Justo	Revised 10th Edition 2015	Nem Chand Bros.
2	Environmental Engineering -I	SANTOSH KUMAR GARG	Thirty third Edition: January 2019	KHANNA PUBLISHERS
3	Environmental Engineering (Vol. II)	SANTOSH KUMAR GARG	September, 2021 (Revised)	KHANNA PUBLISHERS
4	Irrigation And Water Power Engineering	Dr. B C Punmia and Dr. Pande B B Lal	17th Edition	Laxmi Publications
5	Town Planning	S C Rangwala	2009	Charotar Publishing House Pvt. Limited

VII(b): Reference Books:

1	Training manuals and User manuals
2	Relevant course reference books

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=wQBWh75lG1E
- https://www.youtube.com/watch?v=xdZILMrRkzo
- https://www.youtube.com/watch?v=HgKYf6TVrNE

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Site Visits.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

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Civil Engineering

Semester:	**VI**	**Course Type:**	**PCC**		
Course Title: Design of Steel Structural Elements					
Course Code:	**23CVT601**			**Credits:**	**03**
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**03**

I. Course Objectives:

- Understand the behaviour of structural elements in steel structures and well versed with Steel design principles according to the guidelines of IS: 800-2007.
- Apply their knowledge of Structural mechanics to analyse and design the steel structures.
- Design the steel structural elements of different forms and connections under different stresses.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Limit stat & Plastic Behavior of Structural Steel — 8 Hrs

Introduction: Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification.

Plastic Behavior of Structural Steel: Introduction, Plastic theory, Plastic Hinge Concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis.

Textbook: Design of Steel Structures- Ramachandra

Self-Learning: Load combinations, Plastic theory.

RBT Levels: L1 L2

Module-2: Bolted & Welded Connections — 8 Hrs

Bolted Connections: Introduction, Types of Bolts, Behavior of bolted joints, Design of High Strength friction Grip (HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints) and bracket connections both types(N).

Welded Connections: Introduction, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member and Bracket connections both types. Advantages and Disadvantages of Bolted and Welded Connections.

Textbook: Design of Steel Structures- Ramachandra

Self-Learning: Design of Simple bolted & welded Connections.

RBT Levels: L1 L2 L3

Module-3: Design of Tension Members & Column Bases — 8 Hrs

Design of Tension Members: Introduction, Types of Tension members, Slenderness ratio, Modes of Failure, Factors affecting the strength of tension members, Design of Tension members with Lug angles.

Design of Column Bases: Design of Simple Slab Base.
Textbook: Design of Steel Structures- Subramanian N
Self-Learning: Bolted and Welded Connections
RBT Levels: L1 L2 L3

Module-4: Design of Compression Members	8 Hrs

Design of Compression Members: Introduction, Failure modes, Behavior of compression members, Sections used for compression members, Effective length of compression members, Design of compression members and built-up Compression members, Design of Laced and Battened Systems.
Textbook: Design of Steel Structures- Subramanian N
Self-Learning: Design of compression members.
RBT Levels: L1 L2 L3

Module-5: Design of Beams	8 Hrs

Design of Beams: Introduction, sections used for beams, types of beams, factors affecting lateral stability and behavior of simple rolled steel beams in bending. Design of laterally supported rolled steel beams.
Textbook: Limit state design of steel structures- Duggal S K
Self-Learning: Laterally supported rolled steel beam.
RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Analyze the behavior of structural steel components under limit state and plastic conditions, considering failure criteria and design specifications.
CO2	Design bolted and welded connections for steel structures, ensuring structural integrity and compliance with IS code provisions.
CO3	Design tension members, column bases, and compression members, including laced and battened systems, considering various failure modes.
CO4	Evaluate and design laterally supported steel beams, understanding their lateral stability and bending behavior.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3	2	1			1					1	1			
CO2	3	3	2	1			1					1	1			
CO3	3	3	2	1			1					1	1			
CO4	3	3	2	1			1					1	1			

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Design of Steel Structures	Subramanian. N	Third edition 2018	Oxford University Press
2	Limit state design of steel structures	Duggal S K	Third Edition, 2019	TMH Publishers

VII(b): Reference Books:

1	Design of Steel Structures	Ramachandra	Seventh edition 2016	Standard Book house
2	Design of Steel Structures	Bhavikatti S S	Fifth edition 2019	Dreamtech press
3	Design of Steel Structures	Sai Ram K S	Third Edition 2020	Pearson India

VII(c): Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/105/106/105106216/
- https://nptel.ac.in/courses/105105162
- http://digimat.in/nptel/courses/video/105105162/L03.html
- http://kcl.digimat.in/nptel/courses/video/105105162/L59.html
- https://www.youtube.com/watch?v=LrDdQvXnv-0&list=PLPYKd0KLmzo5e4g4-DGlGGYQugyWBeYMn
- https://www.youtube.com/watch?v=CNE4hk_SGTo

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**IPCC**		
Course Title: Geotechnical Engineering					
Course Code:	**23CVI602**			**Credits:**	04
Teaching Hours/Week (L: T:P:O)			**3:0:2:0**	**Total Hours:**	40+12 lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Appreciate basic concepts of soil mechanics as an integral part in civil engineering.
- Comprehend basic engineering and mechanical properties of different types of soil.
- Become broadly familiar with geotechnical engineering requirements, such as, flow of water through soil medium and compaction characteristics.
- Model and measure strength & settlement characteristics and bearing capacity of soils.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Index Properties and classification — 8 Hrs

Index Properties: Phase Diagram, definitions, and their interrelationships. Determination of Index properties, Types of soil structures and Clay Minerals, IS soil classification of Soil.
Textbook: Punmia B C, Soil Mechanics and Foundation Engineering.
Self-Learning: Soil classification.
RBT Levels: L1 L2

Module-2: Soil -Water and Effective Stress Analysis — 8 Hrs

Soil Water: Permeability, Darcy's law-assumption and validity, coefficient of permeability and its determination (only laboratory method), permeability of stratified soils. Capillary phenomenon, Flow net characteristics and applications.
Effective Stress Analysis: Effective stress concept-total stress, effective stress and Neutral stress
Textbook: Punmia B C, Soil Mechanics and Foundation Engineering.
Self-Learning: Permeability of soil
RBT Levels: L1 L2 L3

Module-3: Compaction And Consolidation — 8 Hrs

Compaction: Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control Mass-spring analogy, Terzaghi's one dimensional consolidation theory (No derivation).
Consolidation characteristics of soil (Cc, av, mv and Cv). Laboratory one dimensional consolidation test, Pre-consolidation pressure and its determination by Casagrande's method.
Textbook: Punmia B C, Soil Mechanics and Foundation Engineering.
Self-Learning: Advanced techniques in compaction.
RBT Levels: L1 L2 L3

Module-4: Shear Strength	8 Hrs

Concept of shear strength, Mohr–Coulomb Failure Criterion, Modified Mohr–Coulomb Criterion Total and effective shear strength parameters, Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test and field Vane shear test, Factors affecting shear strength of soils.

Textbook: Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering

Self-Learning: Soil compression.

RBT Levels: L1 L2 L3

Module-5: Bearing Capacity and Settlement	8 Hrs

Bearing Capacity: Types of foundations, Determination of bearing capacity by Terzaghi's and BIS methods (IS: 6403), Modes of shear failure, Factors affecting Bearing capacity of soil. Effect of water table and load eccentricity on bearing capacity of soil, Field methods of determining bearing capacity of soil (SPT and plate load test).

Settlement: Types of settlements and importance, Computation of immediate and consolidation settlement, permissible differential and total settlements (IS 8009 Part 1).

Textbook: Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering

Self-Learning: Foundation definition.

RBT Levels: L1 L2 L3

IV. PRACTICAL COMPONENT OF IPCC

1	Water content determination by oven drying, Rapid moisture meter method
2	Grain size analysis (Sieve analysis of soil)
3	In-situ density tests i) Core-cutter method ii) Sand replacement method
4	Consistency limits i) Liquid limit test (by Casagrande's and cone penetration method) & ii) Plastic limit test
5	Co-efficient of permeability test i) Constant head test ii). Variable head test
6	Standard compaction test (light compaction only)
7	Direct shear test
8	Unconfined compression test & Laboratory vane shear test
9	Triaxial test (unconsolidated undrained test only)
10	Demonstration of Vane shear test
11	Demonstration of Standard penetration test & Boring equipment
12	Demonstration of Proctors Needle

V. COURSE OUTCOMES

CO1	Comprehend the fundamentals of Soil mechanics and identify and classify the soil
CO2	Apply the knowledge to determine MDD and OMC and compute consolidation properties and shear parameters of soil and compute the settlement and bearing capacity of soil
CO3	Apply the knowledge to determine shear parameters of soil and compute the settlement and bearing capacity of soil
CO4	Carry out experiments to assess the index properties of soil and determine Compaction, Permeability and Shear Strength characteristics of soil.

VI. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2			2					2					2		
CO2		2		2					2					2		
CO3	2	2	2	2					2					2		
CO4		2	2	2				2	2			2		2		

VII. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 2

Continuous Internal Evaluation (CIE): Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

VIII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Basic and Applied Soil Mechanics	Gopal Ranjan and Rao A.S.R	2016	New Age International (P) Ltd., New Delhi
2	Principles of Soil Mechanics and Foundation Engineering	Murthy V.N.S	2018	UBS Publishers and Distributors, New Delhi
3	Soil Mechanics and Foundation Engineering	Punmia B C	2017	Laxmi Publications co., New Delhi
VII(b): Reference Books:				
1	Geotechnical Engineering	Donald P Coduto	2010	Phi Learning Private Limited, New Delhi.
2	Geotechnical Engineering	Shashi K. Gulathi & Manoj Datta	2010	Tata McGraw Hill Publications

VII(c): Web links and Video Lectures (e-Resources)

- https://www.youtube.com/watch?v=LUwFaWGQydE
- https://www.youtube.com/watch?v=OIHCy5kGy8w&list=PLq46p_ppqQekRvzbvhayz2BB0mswOF8qQ
- https://www.youtube.com/watch?v=Lgcgu69TMBs&list=PLq46p_ppqQekRvzbvhayz2BB0mswOF8qQ&index=24
- https://www.youtube.com/watch?v=_legEtwhMeU&list=PLq46p_ppqQekRvzbvhayz2BB0mswOF8qQ&index=28
- https://www.youtube.com/watch?v=9a49Uf4NmS8&list=PLq46p_ppqQekRvzbvhayz2BB0mswOF8qQ&index=38
- NPTEL materials

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**PCCL**		
Course Title: Detailing of RC & Steel Structural Elements					
Course Code:	**23CVL603**			**Credits:**	01
Teaching Hours/Week (L:T:P:O)			**0:0:2:0**	**Total Hours:**	12 lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Practical**			**Exam Hours:**	03

I. Course Objectives:

- To equip students to understand basic requirements to enable to prepare neat and proportionate sketches to detail various structural members and connections between them.
- To enable students to prepare neat drawings giving details, following sound engineering practices

II. Teaching-Learning Process (General Instructions):

1. Blackboard teaching 2. Power point Presentation 3. Videos, NPTEL materials 4. Quiz/Assignments/Open book test to develop skills 5. Adopt problem-based learning (PBL) to develop analytical and thinking skills 6. Encourage collaborative learning, site visits related to subjects and impart practical knowledge.

III. COURSE CONTENT

Experiments
Detailing of RCC Structures
Beams – Simply supported, Cantilever and Continuous
Slab – One way, Two way and One-way continuous.
Staircase – Doglegged
Cantilever and Counter Fort Retaining wall
Circular Water Tank, Rectangular Water Tank.
Detailing of Steel Structures
Connections – Beam to beam, Beam to Column by Bolted and Welded Connections.
Built-up Columns with lacings and battens
Column bases and Gusseted bases with bolted and welded connections.
Roof Truss – Welded and Bolted
Welded Plate girder

IV. COURSE OUTCOMES

CO1	Prepare detailed working drawings.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3			3							2	3			

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 4

Continuous Internal Evaluation (CIE): Refer Annexure section 4

Semester End Examination (SEE): Refer Annexure section 4

VII. Learning Resources

VII(a): Textbooks:				
Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	Reinforced Concrete Design	Unnikrishnan Pillai and Devdas Menon	4th Edition, 2021	McGraw Hill, New Delhi
2	Structural Design and Drawing – Concrete Structures	Krishna Murthy	2nd Edition,2018	CBS Publishers, New Delhi
3	Structural Design and Drawing of Reinforced Concrete and Steel	N Krishna Raju	3rd Edition, 2009	University Press
VII(b): Reference Books:				
1	SP 34: Handbook on Concrete Reinforcement and Detailing	Bureau of Indian Standards	First Edition, 1987	Bureau of Indian Standards
2	IS 13920, Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces	Code of Practice, Bureau of Indian Standard.	First Edition, 1993	Code Of Practice, Bureau of Indian Standard.

VII(c): Web links and Video Lectures (e-Resources):
https://archive.nptel.ac.in/courses/105/105/105105105/

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

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Civil Engineering

Semester:	**VI**	**Course Type:**	**PEC**		
Course Title: Earthquake Engineering					
Course Code:	**23CVP621**			**Credits:**	**03**
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**03**

I. Course Objectives:

- Fundamentals of Engineering Seismology
- Irregularities in building which are detrimental to its Earthquake performance
- Different methods of computation seismic lateral forces for framed and masonry structures
- Earthquake resistant design requirements for RCC and Masonry structures
- Relevant clauses of IS codes of practice pertinent to earthquake resistant design of structures

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1: Engineering Seismology	8 Hrs

Engineering Seismology: Terminologies (Focus, Focal depth, Epicenter, etc.); Causes of Earthquakes; Theory of plate tectonics; Types and characteristics faults; Classification of Earthquakes; Major past earthquakes and their consequences; Types and characteristics of seismic waves; Magnitude and intensity of earthquakes; local site effects; Earthquake ground motion characteristics: Amplitude, frequency and duration; Seismic zoning map of India; (Problems on computation of wave velocities. Location of epicenter, Magnitude of earthquake).

Textbook: Earthquake Resistant Design of Structures – Pankaj Aggarwal and Manish Shrikhande

Self-Learning: Continental Drift Theory, elastic Rebound Theory

RBT Levels: L1, L2

Module-2: Response Spectrum	8 Hrs

Response Spectrum: Basics of structural dynamics; Free and forced vibration of SDOF system; Effect of frequency of input motion and Resonance; Numerical evaluation of response of SDOF system (Linear acceleration method), Earthquake Response spectrum: Definition, construction, Characteristics and application; Elastic design spectrum.

Textbook: Earthquake Resistant Design of Structures – Pankaj Aggarwal and Manish Shrikhande

Self-Learning: Strong Ground Motion parameters

RBT Levels: L1, L2, L3

Module-3: Seismic Performance of Buildings and over-view of IS-1893 (Part-1)	8 Hrs

Seismic Performance of Buildings and Over-view of IS-1893 (Part-1): Types of damages to building observed during past earthquakes; Plan irregularities; mass irregularity; stiffness irregularity; Concept of soft and weak storey; Torsional irregularity and its consequences; configuration problems; continuous load path; Architectural aspects of earthquake resistant

buildings; Lateral load resistant systems. Seismic design philosophy; Structural modeling; Code based seismic design methods.

Textbook: Earthquake Resistant Design of Structures – Pankaj Aggarwal and Manish Shrikhande

Self-Learning: Critical Load Path, Effective plan of buildings to withstand Earthquake

RBT Levels: L1, L2, L3

Module-4: Determination of Design Lateral Forces	8 Hrs

Determination of Design Lateral Forces: Equivalent lateral force procedure and dynamic analysis procedure. Step by step procedures for seismic analysis of RC buildings using Equivalent static lateral force method and response spectrum methods (maximum of 4 storeys and without infill walls).

Textbook: Earthquake Resistant Design of Structures – Pankaj Aggarwal and Manish Shrikhande

Self-Learning: Design of compression members.

RBT Levels: L1, L2, L3, L4

Module-5: Earthquake Resistant Analysis and Design of RC and Masonry Buildings	8 Hrs

Earthquake Resistant Analysis and Design of RC Buildings: Typical failures of RC frame structures, Ductility in Reinforced Concrete, Design of Ductile Reinforced Concrete Beams, Seismic Design of Ductile Reinforced Concrete column, Concept of weak beam-strong column, Detailing of Beam-Column Joints to enhance ductility, Detailing as per IS-13920. Retrofitting of RC buildings

Earthquake Resistant Design of Masonry Buildings: Performance of Unreinforced, Reinforced, Infill Masonry Walls, Box Action, Lintel and sill Bands, elastic properties of structural masonry, lateral load analysis, Recommendations for Improving performance of Masonry Buildings during earthquakes; Retrofitting of Masonry buildings.

Textbook: Earthquake Resistant Design of Structures – Duggal S K

Self-Learning: Behaviour of Lateral Load Resisting Systems, Ductile and Brittle Failures

RBT Levels: L1, L2, L3, L4

IV. COURSE OUTCOMES

CO1	Acquire basic knowledge of engineering seismology.
CO2	Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
CO3	Analyse multi-storied structures modelled as shear frames and determine lateral force distribution due to Earthquake input motion using IS-1893 procedures.
CO4	Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3					2										
CO2	3	3				2		2								
CO3	3	3						3					2			
CO4	3	3	3			2		3					2			

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Earthquake Resistant Design of Structures	Pankaj Aggarwal and Manish Shrikhande	Thirteenth edition 2014	PHI Learning
2	Earthquake Resistant Design of Structures	Duggal S K	Second Edition, 2013	Oxford
3	Earthquake Resistant Design of Building Structures	Vinod Hosur	First Edition, 2012	Wiley
VII(b): Reference Books:				
1	Dynamics of Structures	Anil K Chopra	Fifth Edition, 2020	Pearson India
2	Structural Dynamics	Mario Paz	Sixth Edition 2018	Springer

VII©: Web links and Video Lectures (e-Resources):

- **https://youtu.be/SwY7-hKL8FI?si=sYDCsuF81vPIi7ck**
- **https://youtu.be/q-kHDw37XOM?si=V6-IrtO31VZJnRiv**
- **https://youtu.be/L2MIXt79Qos?si=DdzDAjwlSV4En431**
- **https://youtu.be/6cbuMonSrfw?si=gALHr4d3xAwSUW_A**

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**VI**	**Course Type:**	**PEC**		
Course Title: Prestressed Concrete Structures					
Course Code:	**23CVP622**			**Credits:**	**03**
Teaching Hours/Week (L: T:P:O)			**3:0:0:0**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**03**

I. Course Objectives:

To learn Design of Pre-Stressed Concrete Elements.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction and Analysis of Members	8 Hrs

Concept of Pre-stressing - Types of Pre-stressing - Advantages - Limitations –Pre stressing systems - Anchoring devices - Materials - Mechanical Properties of high strength concrete - high strength steel - Stress-Strain curve for High strength concrete. Analysis of members at transfer - Stress concept - Comparison of behaviour of reinforced concrete – pre stressed concrete - Force concept - Load balancing concept - Kern point -Pressure line.

Textbook: Krishna Raju, N. "Pre stressed Concrete", Tata McGraw Hill Publishing Company, New Delhi 2006

Self-Learning: Advantages - Limitations

RBT Levels: L1 L2

Module-2: Losses in Pre stress	8 Hrs

Loss of Pre stress due to Elastic shortening, Friction, Anchorage slip, Creep of concrete, Shrinkage of concrete and Relaxation of steel - Total Loss.

Deflection and Crack Width Calculations of Deflection due to gravity loads - Deflection due to prestressing force -Total deflection - Limits of deflection - Limits of span-to-effective depth ratio - Calculation of Crack Width - Limits of crack width.

Textbook: Krishna Raju, N. "Pre stressed Concrete", Tata McGraw Hill Publishing Company, New Delhi 2006.

Self-Learning: Crack Width Calculations of Deflection due to gravity loads.

RBT Levels: L1 L2 L3

Module-3: Design of Sections for Flexure	8 Hrs

Analysis of members at ultimate strength - Preliminary Design - Final Design for Type 1members.

Textbook: Krishna Raju, N. "Pre stressed Concrete", Tata McGraw Hill Publishing Company, New Delhi 2006.

Self-Learning: Analysis of members at ultimate strength

RBT Levels: L1 L2 L3

Module-4: Design for Shear	8 Hrs

Analysis for shear - Components of shear resistance - Modes of Failure - Limit State of collapse for shear - Design of transverse reinforcement.

Textbook: Krishna Raju, N. "Pre stressed Concrete", Tata McGraw Hill Publishing Company, New Delhi 2006.

Self-Learning: Modes of Failure

RBT Levels: L1 L2 L3

Module-5: Stresses in Soil	8 Hrs

Different anchorage system and design of end block by latest IS codes.

Textbook: Krishna Raju, N. "Pre stressed Concrete", Tata McGraw Hill Publishing Company, New Delhi 2006.

Self-Learning: Different anchorage system

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand the requirement of PSC members for present scenario.
CO2	Analyse the stresses encountered in PSC element during transfer and at working.
CO3	Understand the effectiveness of the design of PSC after studying losses.
CO4	Capable of analyzing the PSC element and finding its efficiency.
CO5	Design PSC beam for different requirements.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3					2	2					1	1			
CO2	3	2				2	2					1	1			
CO3	3	2				2	2					1	1			
CO4	3	2				2	2					1	1			

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Pre stressed Concrete	Krishna Raju N	16thEdition	Tata McGraw Hill Publishing Company
2	Pre-stressed Concrete - Problems and Solutions	Krishna Raju N	6thEdition 2004	CBS Publishers and Distributors
3	Pre stressed Concrete	Rajagopalan N	5thEdition, 2023	Narosa Publishing Housel

VII(b): Reference Books:

1	Advanced Concrete Design	Praveen Nagarajan	3rd Edition,2011	Person Publishers
2	Pre stressed Concrete Structures	P. Dayaratnam	1st Edition, 2018	Scientific International Pvt. Ltd

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/4KYPltsNAWs
- https://youtu.be/aJfCAgeJ55I
- https://youtu.be/Vdx2dNGsuEM
- https://youtu.be/IHWEHikKH_Q
- https://youtu.be/aJJedgPfFVI

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	PEC		
Course Title: RAILWAYS, HARBOUR, TUNNELING AND AIRPORTS					
Course Code:	**23CVP623**			**Credits:**	03
Teaching Hours/Week (L:T:P)			**3:0:0**	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	

I. Course Objectives:

- Provide knowledge about components of railway track, rail failures and material quantities required for construction.
- Understand aspects of railway geometric elements, construction and of maintenance of tracks.
- Enable students to design orientation and length of runway and draw an airport layout considering the socio-economic characteristics of catchment area.
- Understand types, design features of tunnels, harbours and necessary navigational aids; also expose them to various methods of tunnelling and tunnel accessories.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, power point presentation, animations

III. COURSE CONTENT

Module-1 — 08 hours

Railway Planning: Significance of Road, Rail, Air and Water transports – Coordination of all modes to achieve sustainability – Elements of permanent way, - Rails, Sleepers, Ballast, Rail fixtures and fastenings, – Track Stress, coning of wheels, creep in rails, defects in rails Route alignment surveys, conventional and modern methods- – Soil suitability analysis – Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings (Explanation & Sketches of Right- and Left-hand turnouts only).

Textbook: A Course in Railway Engineering by SC Saxena and SP Arora

RBT Levels: L1 L2 L3

Module-2 — 08 hours

Railway Construction and Maintenance: Earthwork – Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construction & maintenance – Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

Textbook: A Course in Railway Engineering by SC Saxena and SP Arora

RBT Levels: L1 L2 L3

Module-3	08 hours

Harbour and Tunnel Engineering: Definition of Basic Terms: Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities, Coastal Structures, Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works. Tunnelling: Introduction, size and shape of the tunnel, tunnelling methods in soils, tunnel lining, tunnel drainage and ventilation.

Textbook: Dock and Tunnel Engineering by Srinivasan R

RBT Levels: L1 L2 L3

Module-4	08 hours

Airport Planning: Air transport characteristics, airport classification, airport planning: objectives, components, layout characteristics, and socio-economic characteristics of the catchment area, criteria for airport site selection and ICAO stipulations, typical airport layouts, Parking and circulation area. Aircraft characteristics.

Textbook: Airport Planning and Design by Khanna SK, Arora MG and Jain

RBT Levels: L1 L2 L3

Module-5	08 hours

Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of Taxiway Design, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.

Textbook: Airport Planning and Design by Khanna SK, Arora MG and Jain.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand, identify and describe the components of railways and airport.
CO2	Design geometric aspects of railway system, runway, taxiway and impart knowledge on visual aids.
CO3	Outline the construction aspects and maintenance of various components in railways Airport
CO4	Understand the fundamentals of Harbour and Tunnel Engineering.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3					1								2		
CO2	3	3				1		1				1		2		
CO3	3	3				1		1				1		2		
CO4	3	1				1						1		1		

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	"A Course in Railway Engineering"	S C Saxena and S P Arora	8th Edition, 2015	Dhanpat Rai and Sons
2	"Airport Planning and Design"	Khanna S K, Arora M G and Jain	6th Edition, 2017	Nemch and and Brothers

3	"Dock and Tunnel Engineering"	Srinivasan R	28th Edition, 2016	Charotar
VII(b): Reference Books:				
1	"Railway Engineering"	Satish Chandra and Agarwal M.M	2nd Edition, 2013	Oxford University Press
2	"Transportation Engineering- Volume II"	C Venkatramaiah	2016 Edition	University Press
3	"A Course in Docks and Harbour Engineering"	Bindra S P	2014 Edition	Dhanpat Rai and Sons
4	"Planning and Design of Airport"	R Horonjeff, Francis X. McKelvey, William J. Sproule, Seth B. Young	5th Edition, 2010	Mc. Graw-Hill Education

VII(c): Web links and Video Lectures (e-Resources):
https://nptel.ac.in/courses/105107123
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
• Field Visits • Quiz/Assignments/Open book test to develop skills • Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

|| Jai Sri Gurudev ||
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Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**PEC**		
Course Title: Solid and Hazardous waste management					
Course Code:	**23CVP624**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To Study the present methods of solid waste management system and to analyse their draw backs comparing with statutory rules.
- To comprehend different elements of solid waste management from generation of solid waste to disposal.
- To analyse different processing technologies and to study conversion of municipal solid waste to compost or biogas.
- To evaluate landfill site and to study the sanitary landfill reaction

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction Solid waste & management — 8 Hrs

Sources: Sources of Solid waste, Types of solid waste, Physical and Chemical composition of municipal solid waste. Generation rate, Numerical Problems. Collection: Collection of solid waste-services and systems, equipment's, Transportation: Need of transfer operation, transfer station, transport means and methods, route optimization. Solid waste management 2000 rules with, 2016 amendments.

Textbook: Solid and liquid waste management by Rajaram, Vasudevan, Siddiqui, Faisal

Self-Learning: Solid waste management 2000 rules with, 2016 amendments**.**

RBT Levels: L1, L2

Module-2: Processing Techniques — 8 Hrs

Processing techniques: Purpose of processing, Volume reduction by incineration, Process description, Mechanical volume reduction (compaction), Mechanical size reduction (shredding), component separation (manual and mechanical methods).

Textbook: Solid waste management and its application by Dr.H.S. Bhatia

Self-Learning: Volume reduction by incineration

RBT Levels: L1, L2

Module-3: Composting methods — 8 Hrs

Composting Aerobic and anaerobic method - process description, process microbiology, design consideration, Mechanical composting, Vermi composting, Numerical Problems. Sanitary land filling: Definition, advantages and disadvantages, site selection, methods, reaction occurring in landfill- Gas and Leachate movement, Control of gas and leachate movement, Design of sanitary landfill. Numerical Problems.

Textbook: "Integrated Solid Waste Management: Engineering principles and management issues by George Tchobanoglous, Hilary Theisen, Samuel A Vigil,

Self-Learning: Mechanical composting
RBT Levels: L1 L2 L3

Module-4: Bio medical and construction waste	8 Hrs

Bio medical and construction waste: Sources, collection, treatment and disposal: - Biomedical waste E-waste, construction and demolition waste. Incineration -3Ts factor affecting incineration, types of incinerations, Pyrolsis , Energy recovery technique from solid waste management
Textbook: "Integrated Solid Waste Management: Engineering principles and management issues by George Tchobanoglous, Hilary Theisen, Samuel A Vigil,
Self-Learning: Incineration -3Ts factor affecting incineration
RBT Levels: L1 L2

Module-5: Hazardous Waste Management	8 Hrs

Hazardous Waste Management: Sources, Classification, Impacts of Mismanagement, Problems in Developing Countries and Regulations for Hazardous Waste Management
Textbook: "Environmental Engineering" Howard S Peavy, Donald R Rowe and George Tchobanoglous,
Self-Learning: Problems in Developing Countries
RBT Levels: L1 L2

IV. COURSE OUTCOMES: After studying this course, students will be able to:

CO1	Analyse existing solid waste management system and to identify their drawbacks.
CO2	Evaluate different elements of solid waste management system.
CO3	Implement suitable scientific methods for solid waste management elements
CO4	Design suitable processing system and evaluate disposal sites

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2		
CO1	2	2				2	2		2		2		2	2		
CO2	2	2				3	3		2		2		2	2		
CO3	2	2				3	3		2		2		2	2		
CO4	2	2				3	3		2		2		2	2		

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Solid and liquid waste management	Rajaram, Vasudevan, Siddiqui, Faisal	First edition &14 July 2016	PHI Learning Pvt Ltd
2	Solid waste management and its application	Dr.H.S. Bhatia	First edition & January 2019	Misha Books
3	Integrated Solid Waste Management: Engineering principles and management issues	George Tchobanoglous, Hilary Theisen, Samuel A Vigil,	First edition & July1993	Mac GrawHill Publication

VII(b): Reference Books:

1	Municipal Solid Wastes (Management	Ministry of Environment and Forests Notification, New Delhi	25th September, 2000	Ministry of Environment and Forests

	and Handling) Rules, 2000.			Notification, New Delhi
2	Handbook of Solid waste management	George Tchobanoglous, Frank Kreith	Second edition & 2002, ISBN-13 978-0071356237	M/c Graw hill Education
3	Municipal Solid waste management manual	Central Public Health and Environmental Engineering Organization (CPHEEO)	2016, Ministry of Urban Development, Government of India.	Swachh Bharat Mission

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=1CSm4GG2VrU
https://www.youtube.com/watch?v=MC7a-FkHQMA
https://www.youtube.com/playlist?list=PLEADA072FA7A58250
https://www.worldbank.org/en/news/video/2023/06/13/towards-sustainability-and-resource-efficiency-in-solid-waste-management
https://www.thegpsc.org/solid-waste-management-videos

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of models and prototype preparations
- Hands on experiments with different sources of waste.

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**OEC**		
Course Title: Integrated Building Services					
Course Code:	**23CVO611**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand Electrical System along with substation for a building infrastructure
- Learn ELV System and its interface with other allied services
- Design and implement HVAC System
- Learn and implement Fire Alarm System (PAS)
- Understand and implement importance of Public Health Services

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1	8 Hrs

Advanced Electrical System Design for Buildings: Basics of Electrical System, Electrical terminologies, Major Electrical equipment, Building power distribution and its schemes, Fundamentals of Power& distribution transformers, HT, LT, DG Sets, Cables & Wires, UPS and its importance, Introduction of HT, LT switchgears systems, Importance of Lighting design & different Light fixtures used in buildings – Interior, external, street & offices, RMU, HT consumer, Substation Building in Master plan - Space planning for RMU,HT, DG set, HSD yard, Space provision for Electrical Equipment including Substation, Various equipment clearance requirements, HVAC, PHE, FPS service-electrical load input for designing electrical power distribution, Pedestals & ceiling support requirement for all Electrical equipment.

Textbook:. P K Barton, Barry G Fryer

RBT Levels: L1 L2

Module-2	8 Hrs

Extra Low Voltage System for Infrastructure: Introduction & Brief of ELV Systems, Concept of Building Management System (BMS) & Fire Alarm System, Interface with Architecture/ Structure, Access control, CCTV & Public address system - Brief and purpose, BMS - Brief and purpose, BMS interfaces with Electrical, HVAC, Fire & Life Safety and PHE, BMS interfaces with airport systems.

Textbook: P K Barton, Barry G Fryer

RBT Levels: L1 L2 L3

Module-3	8 Hrs

Heating, Ventilation & Air conditioning systems: Basics of HVAC - Psychrometry and its importance - Major Components of Air conditioning System - Fundamental concepts of Heat transfer, Air-conditioning system, Ventilation system, Pressurization Systems and their importance to Life safety, Chilled water system, Cooling towers and major HVAC equipment, Pumping system in HVAC, Importance of Thermal and Acoustic Insulation, Introduction and basics of Variable

Refrigerant Flow (VRF) systems, Radiant cooling, Underfloor distribution, Chilled beams – Space planning - Importance of Static weight / Operating weights of mechanical equipment - Importance of Floor slab and Terrace roof slab openings / cut-outs

Textbook: P K Barton, Barry G Fryer

RBT Levels: L1 L2 L3

Module-4	8 Hrs

Fire Protection and Life Safety System: Basics of Fire Protection System - Active Fire protection system - Passive Fire protection system - Basics of Smoke Control and Fire Stop Systems - Codes & Standards and Statutory Compliance - Fire and its Classes - Hazard Classification based on building occupancy - Means of Egress and its components - Importance of Life Safety - Refuge Area, Fire Tower and Fire Lift - Occupant Load and Capacity factors - Fire Stopping Materials - Compartmentation in a building - Smoke control & management in Fire Zoning - Components of Fire Compartments.

Textbook: P K Barton, Barry G Fryer

RBT Levels: L1 L2 L3

Module-5	8 Hrs

Public Health Engineering: Scope of works in Public Health Engineering - Sanitary fixtures and types - Water supply and treatment - Rain water drainage system - Landscape irrigation features – Water demand calculation based on building occupancy – Piping for different plumbing systems in buildings – Pump selection – Plant room sizing - Sewage treatment process - External water supply, storm drainage & sewerage system - Solid waste management - Interfacing PHE system with Architect and Structural engineers.

Textbook: P K Barton, Barry G Fryer

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand Electrical System along with substation for a building infrastructure
CO2	Learn ELV System and its interface with other allied services
CO3	Design and implement HVAC Systems
CO4	Learn and implement Fire Alarm System (PAS)
CO5	Understand and implement importance of Public Health Services

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2				2										
CO2	3	2				2										
CO3	3	2				2										
CO4	3	2				2										
CO5	3	2				2										

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Building Services Integration	P K Barton, Barry G Fryer	1st, 1983	Spon Press

VII(b): Reference Books:

1	"Protocols for Comunicating in the Factory", ,	M. A. Kaminski,	April 1986.	*IEEE Spectrum*

2	"Helping Computers Communicate",	J. Voelcker,	March 1986.	*IEEE Spectrum*,

VII(c): Web links and Video Lectures (e-Resources):
E-learning content on L&T EduTech Platform

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3			

BOS Chairman (Sign & Seal)

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	OEC		
Course Title: ROAD SAFETY & TRAFFIC ENGINEERING					
Course Code:	23CVO612			**Credits:**	03
Teaching Hours/Week (L:T:P:0)			3:0:0:0	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	03

I. Course Objectives:

- Understand road user characteristics and highway geometrics in road safety.
- Enable students to understand the importance of accident analysis and road safety.
- Acquire knowledge about traffic regulations, traffic management measures and hazard management techniques in road safety.
- Provides knowledge on safety audit and its methodology.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Road safety in Transport Planning — 08 Hours

Traffic Characteristics: Road user characteristics – human factors including reaction time and vehicular characteristics affecting road design and traffic flow.

Traffic studies - Data collection, analysis and interpretation of results of classified traffic volume, spot speed, speed and delay, origin and destination. Sampling in traffic studies – sampling techniques, sampling theory, accuracy and sample size.

Textbook: "Traffic Engineering and Transport Planning" by Kadiyali. L.R.

RBT Levels: L1 L2 L3

Module-2: Road Accidents and Safety — 08 Hours

Road accidents and safety: Accident characteristics, Condition and Collision Diagram, influence of road and its effects on accidents: Analysis of individual accidents, statistical analysis. Problems on above.

Road safety issues and various measures for road safety: Engineering, education and enforcement measures for improving road safety, Road user safety-innovative ideas in road safety-Safety for pedestrian and cyclists

Textbook: "Traffic Engineering and Transport Planning" by Kadiyali. L.R.

RBT Levels: L1 L2 L3

Module-3: Geometric Design for Road Safety — 08 Hours

Road Design and Safety Elements: Safety at intersection- Sight distance, Basic principles of intersection safety, channelization, Design traffic signal using Webster method

Road side hazards Management: Road side hazards, Management strategies, Safety measures, Safety barriers to resort roadside hazards.

Textbook: "Traffic Engineering and Transport Planning" by Kadiyali. L.R.
RBT Levels: L1 L2 L3

Module-4: Role of Visual Aids in Road Safety	08 Hours

Traffic regulations and control - Regulation on vehicles, drivers and traffic flow, Traffic control devices – Types & objectives of markings, signs, signals and islands, delineators
Highway lighting – Principle, types, factors influencing night visibility,
Textbook: "Traffic & Highway Engineering" by Nicholas Garber, Lester A. Hoel,
RBT Levels: L1 L2 L3

Module-5: Management of Road Safety	08 Hours

Traffic management techniques- Traffic Management Systems for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Road Safety Improvement Strategies, ITS and Safety.
Textbook: "Practical Road Safety Auditing" by Martin Belcher, Steve Proctor, and Phil Cook
RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Analyse the effect of human, vehicular and roadway characteristics in highway safety.
CO2	Collect and analyse various traffic data for safe and efficient traffic operation.
CO3	Identify various hazards related to the transport safety and suggest suitable management measures for improving road safety.
CO4	Propose suitable traffic regulatory system such as signs, signals, markings, etc.
CO5	Describe the aspects of road safety audit and its methodology

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3	2			1		1								
CO2	3	2				1										
CO3	3	3				1	1									
CO4	3	3	2			1		1		1						
CO5	3	2				1				1						

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	"Traffic Engineering and Transportation Planning"	L.R. Kadiyali, N. B. Lal	2015	Khanna Publishers
2	"Transportation Engineering; An Introduction",	Khisty, C.J., and Lal, B. K		Prentice-Hall India
3	"Practical Road Safety Auditing"	Martin Belcher, Steve Proctor, and Phil Cook	3rd Edition, 2015	ICE Publishing, USA
VII(b): Reference Books:				
1	"Traffic & Highway Engineering"	Nicholas Garber, Lester A. Hoel,	5th Edition, 2015	Brooks/Cole
2	"The Highway Risk Problem – Policy	Robert F.Baker		John Wiley and Sons.

	Issues in Highway Safety"			
3	MORTH "Manual for Road Safety in Road Design"-Indian Roads Congress			
4	Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.			
5	Ministry of Surface Transport, "Accident Investigation and Prevention Manual for Highway Engineers in India, Government of India, 2001			

VII©: Web links and Video Lectures (e-Resources):
https://onlinecourses.nptel.ac.in/noc22_ce41
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
• Field Visits • Quiz/Assignments/Open book test to develop skills • Encourage collaborative learning in the class

Sl. No.	**BOS Member**	**Affiliation**	**Signature**
1			
2			
3			
			BOS Chairman (Sign & Seal)

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**OEC**		
Course Title: Green Buildings					
Course Code:	**23CVO613**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
- Apply cost effective Technologies and Methods in Construction
- Understand the Problems due to Global Warming
- State the Concept of Green Building
- Understand Green Buildings

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Introduction to the concept of cost-effective construction	8 Hrs

Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials. **Textbook**: Green Building Fundamentals.

Self-Learning: Application of waste materials in sustainable construction.

RBT Levels: L1 L2

Module-2: Earth Materials in Construction	8 Hrs

Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks – Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford -Nirmithi Kendra - Habitat

Textbook: Green Building Fundamentals

Self-Learning: Case studies.

RBT Levels: L1 L2 L3

Module-3: Global Warming	8 Hrs

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials, Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of

Buildings.

Textbook: Green Building: Principles & Practices.

Self-Learning: Soil Classification by Grain Size.

RBT Levels: L1 L2 L3

Module-4: Green Building rating Systems	8 Hrs

Green Building rating Systems- BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)

Textbook: Green Building: Principles & Practices

Self-Learning: Comparative study on Green Building rating Systems

RBT Levels: L1 L2 L3

Module-5: Utility of Solar Energy in Buildings	8 Hrs

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.
Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

Textbook: Green Building: Principles & Practices

Self-Learning: Advances in solar cells.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Use of different building materials for construction
CO2	Apply effective environmental friendly building technology
CO3	Analyze global warming due to different materials in construction
CO4	Analyse buildings for green rating
CO5	Use alternate source of energy and effective use water

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2					3	2					1				
CO2	3					2	2					1				
CO3	3				2	2	2					1				
CO4	3				2	2	2	2				1				

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	Green Building Fundamentals	HarharaIyer G	1st, 1993	Notion Press
2	Green Building: Principles & Practices	Dr. Adv. Harshul Savla	1st, 2021	Notion Press

VII(b): Reference Books:

1	Handbook of Green Building Design and Construction	Sam Kubba	1st, 2012	Butterworth-Heinemann
2	Green Building: Guidebook for Sustainable Architecture	Michael Bauer	2nd,2009	Springer-Verlag Berlin and Heidelberg Gmb

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=THgQF8zHBW8
- https://www.youtube.com/watch?v=DRO_rIkywxQ

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

Sl. No.	BOS Member	Affiliation	Signature
1			
2			
3	**(External)**		

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	OEC		
Course Title: Climate Change & Sustainability					
Course Code:	23CVO614			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			3:0:0:0	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Provides a general concept within the dimensions of climate changes and challenges to Sustainable Development
- To equip the learners with appropriate tools and techniques for interpreting the impacts of climate change, and evaluating & implementing measures that reduce vulnerability of systems.
- It offers an opportunity to interact with administrators, community leaders, NGOs and professionals helping the students to understand the broad framework of Climate Change in India

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Climate Change Science	8 Hrs

Climate Change Science: Concept, significance and causes. History of climate change. Greenhouse gases and greenhouse effect. Increase in atmospheric carbon dioxide concentration, increase in surface mean temperature, variability in precipitation, sea level rise, melting of ice and glaciers.
Impacts of Climate Change on Various Sectors: Health, agriculture, forestry, water resources, coastal areas, species & natural areas, industry, settlements and society.
Textbook: Climate Change Biodiversity and Green Economy
Self-Learning: Greenhouse gases and greenhouse effect
RBT Levels: L1 L2

Module-2: Legal and Policy Framework	8 Hrs

Efforts towards climate change: UN Conference on the Human Environment 1972, Rio Earth Summit 1992, National Action Plan on Climate Change (NAPCC), Agenda 21, Kyoto Protocol 1997, Paris Agreement – Nationally Determined Contributions (NDCs) towards climate justice. India's NDCs. The United Nations Framework Convention on Climate Change (UNFCCC), Intergovernmental Panel on Climate Change (IPCC) and World Meteorological Organization (WMO).
Textbook: Climate Change Biodiversity and Green Economy
Self-Learning: UN Conferences, World Meteorological Organization
RBT Levels: L1 L2

Module-3: Climate Change Mitigation and Adaptation	8 Hrs

Climate change mitigation: Definition, Factors to be considered for climate change mitigation - renewable energy; energy efficiency; sustainable transportation; carbon capture & storage; afforestation &reforestation; low carbon development; waste reduction & management; sustainable

agricultural practices; low carbon tech; building codes & standards; education and awareness. The United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation. Clean Development Mechanism, Carbon emission trading, Carbon pricing, Carbon credits, Carbon offsets and Carbon markets.

Textbook: Climate Change Biodiversity and Green Economy

Self-Learning: Renewable energy, sustainable agricultural practices

RBT Levels: L1 L2

Module-4: Concepts in Sustainable Development	8 Hrs

Origins of Sustainable Development: Definition, Evolution and Principles, Strategies for Sustainable Development, Sustainability and Human Development, Green Politics and Sustainable Development, UN Sustainable Development Knowledge Platform, Tools for Sustainable Development, Sustainable Development Goals, Communicating the Sustainable Development Goals Cultural Elements in Sustainable Development Frameworks, Human Cantered Designs in Sustainability, The 2030 Agenda for Sustainable Development

Textbook: Environment and Sustainable Development

Self-Learning: Sustainability and Human Development

RBT Levels: L1 L2

Module-5: Environmental Conservation and Sustainability	8 Hrs

Technical Skills in Environment and Sustainability, Vulnerability, Adaptation and Livelihoods, Preservation of Biological Diversity, Sustainable Forest Management, Environmental Governance and Sustainability, Environmental Economics and Sustainability, Water Conservation and Sustainable Development, Urbanization and Sustainable Cities, Challenges in Energy, Food and Agriculture**,** Success Stories of Strategies in Sustainability, Sustainability in Policy Design.

Textbook: Environment and Sustainable Development

Self-Learning: Water Conservation, Urbanization and Sustainable Cities

RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Identify the environmental, social, and economic impacts of anthropogenic activities and required sustainability framework for mitigation
CO2	Discuss the anthropogenic and natural drivers of climate change and future development aspects for sustainability.
CO3	Compare different policies and agreements regarding climate change and developmental goals.
CO4	Evaluate the impacts of climate change and sustainability by appropriate tools and techniques.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2					2	3					2				
CO2						2	3					2				
CO3	2					2	3					2				
CO4					2	2	3					2				

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Climate Change Biodiversity and Green Economy	H.S. Sharma S. Padmaja and Ganesh Sharma,	2013	Concept Publishing Company Pvt. Ltd
2	Getting the Climate Science Facts Right: The Role of the IPCC.	Bhandari, M. P.	2022	CRC Press.
3	Environment and Sustainable Development	M.H. Fulekar, Bhawana Pathak, R K Kale	2013	Springer Nature
VII(b): Reference Books:				
1	Climate India 2022: An assessment of extreme weather events	Richard Mahapatra	2022	Centre for Science and Environment Publication, New Delhi.
2	Sustainable Development in Digital Era	Dr. Aparna Mishra, Dr. Vikas Dahiya, Dr. Kamini Tandon	2019	JSR Publishing House
3	Climate Change	Joseph Romm	2018	Oxford University Press

VII(c): Web links and Video Lectures (e-Resources):

- Website:

https://climateactiontracker.org/
https://ghgprotocol.org/
https://ksdma.karnataka.gov.in/
https://mausam.imd.gov.in/
https://ndma.gov.in/
https://public.wmo.int/en
https://unfccc.int/

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**ETC**		
Course Title: URBAN TRANSPORT PLANNING					
Course Code:	**23CVE641**			**Credits:**	3
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	3

I. Course Objectives:

- Understand and apply basic concepts and methods of urban transportation planning.
- Apprehend to develop, perform, and administer surveys to get the necessary data for transportation planning.
- Understand the process of developing an organized mathematical modelling approach to solve select urban transportation planning problem.
- Excel in use of various types of models used for travel forecasting, prediction of future travel patterns

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, power point presentation, animations

III. COURSE CONTENT

Module-1: Urban transport planning	08

Urbanization, urban class groups, transportation problems and identification, impacts of transportation, urban transport system planning process, modelling techniques in planning. Urban mass transportation systems: urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails, capacity, merits and comparison of systems, coordination, types of coordination.

Textbook: L.R. Kadiyali, Traffic Engineering and Transport Planning

RBT Levels: L1 L2

Module-2: Data Collection and Inventories	08

Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

Textbook: L.R. Kadiyali, Traffic Engineering and Transport Planning

RBT Levels: L1 L2 L3

Module-3: Trip Generation & Distribution	08

UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution by Growth Factor Methods. Problems on above.

Textbook: L.R. Kadiyali, Traffic Engineering and Transport Planning

RBT Levels: L1 L2 L3

Module-4: Trip Distribution	08

Gravity Models, Opportunity Models, Time Function Iteration Models. Travel demand modelling: gravity model, opportunity models, Desire line diagram. Modal split analysis. Problems on above.
Textbook: L.R. Kadiyali, Traffic Engineering and Transport Planning
RBT Levels: L1 L2 L3

Module-5: Traffic Assignment	08

Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment. Numerical problems on Traffic Assignment. Introduction to land use planning models, land use and transportation interaction.
Textbook: L.R. Kadiyali, Traffic Engineering and Transport Planning
RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Identify urban transport problems and conduct necessary surveys to provide data required for transportation planning.
CO2	Estimate urban travel demand to develop trip generation rates for specific types of land use developments.
CO3	Plan urban transport networks based on modal choice.
CO4	Identify urban transport corridors and prepare urban transportation plans.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	1				1								1		
CO2	3	3	1			1								1		
CO3	3	3	1			1								1		
CO4	3	3	1			1								1		

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Traffic Engineering & Transport Planning	L.R. Kadiyali,	2001	Khanna Publishers, New Delhi
2	Transportation Engineering	Khisty C.J. and B Kent Lall	2012, Third Edition	Prentice Hall of India Pvt. Ltd.
3	Introduction to Transportation Planning	Bruton M.J	2001	Hutchinson of London
4	Fundamentals of Transportation Planning	Papacostas	2022, 3rd Edition	Prentice Hall India Learning Private Limited

VII(b): Reference Books:

1	Introduction to Transportation Engineering, & Planning	Hutchison, B.G	1985, 3rd Edition	McGraw Hill Book Co.
2	Principles of Urban Transportation System Planning	Hutchinson BG	1974	McGraw Hill

3	Metropolitan Transportation Planning	Dicky, J.W	2018, 2nd Edition	McGraw Hill

VII(c): Web links and Video Lectures (e-Resources):
http://www.nptelvideos.in/2012/11/urban-transportation-planning.html https://nptel.ac.in/courses/105107067/ https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-252j-urban-transportation-planning-fall-2016/
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Sl. No.	BOS Member	Affiliation	Signature
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**VI**	**Course Type:**	**ETC**		
Course Title: Quality Control and Safety					
Course Code:	**23CVE642**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand the elements of quality planning and the implication.
- Become aware of objectives and advantage of quality.
- Study the relationship between quality and safety management.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1: Overview of Quality	8 Hrs

Quality History, Quality Definition, Quality Inspection, Quality Control, Quality Assurance, Quality Engineering, Quality Management, Quality Gurus: Philip B. Crosby, W. Edwards Deming etc, PDCA Cycle, Costs associated with Quality, Reasons for Poor Quality

Textbook: D S Rajendra Prasad

Self-Learning: Quality

RBT Levels: L1 L2

Module-2: Quality Management	8 Hrs

Management Practices: TQM, Vision and Quality policy, Quality Function Deployment, Bench marking and performance evaluation, ISO 9000 Quality Management System, ISO 14000 Environmental Management System

Textbook: D S Rajendra Prasad

Self-Learning: Quality Management

RBT Levels: L1 L2

Module-3: QA and QC in Construction	8 Hrs

Errors in concrete construction; Frequency of material testing and reporting of basic construction materials (cement, sand, coarse aggregate, bricks, steel), Norms for accepting and rejecting criteria of basic construction materials as per relevant IS codes.

Textbook: David Gold Smith

Self-Learning: QC in Construction

RBT Levels: L1 L2

Module-4: Safety in Construction	8 Hrs

Safety in Construction: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings Safety lacuna in Indian scenario

Textbook: David Gold Smith

Self-Learning: Safety programme for construction

RBT Levels: L1 L2

Module-5: Safety legislation	8 Hrs

Third Party Certification: Construction Safety-meaning and scope, Safety in construction-Technological aspects, organizational aspects and behavioural aspects, Safety legislation and Standards, Contract conditions on safety in Civil Engineering project

Textbook: David Gold Smith

Self-Learning: Construction Safety

RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Explain the importance of quality in construction
CO2	Identify safety measures in construction.

V. CO-PO-PSO MAPPING(mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2				1	1				2			2		
CO2	2	2				1	1							2		

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE):Refer Annexure section 1

Semester End Examination (SEE):Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Quality Management System in Civil Engineering	D S Rajendra Prasad	2016	Sapna Book House, Bangalore
2	Total Quality Management	Break Joseph and Susan Joseph	1995	Excel Books , New Delhi
3	Construction Safety Management	K N Vaid	2000	NICMAR, Bombay

VII(b): Reference Books:

1	Safety Management in construction and Industry	David Gold Smith		Mc Graw Hill
2	Quality Planning and Analysis	Juran Frank, J.M. and Gryna, F.M	2002	Tata McGraw Hill

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=XvdgUcajn6c&list=PLOUzVj6nXC KdsqCzHwJvQgDS7shfzy6
- https://www.youtube.com/watch?v=dCUwmqXn22E&list=PLOUzVj6nXC KdsqCzHwJvQgDS7shfzy6&index=3

- https://www.youtube.com/watch?v=Bh_LYZh3KH4
- NPTEL materials

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class

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Civil Engineering

Semester:	VI	**Course Type:**	**ETC**		
Course Title: IOT in Civil Engineering					
Course Code:	**23CVE643**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	03
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To introduce students to the fundamentals of the Internet of Things (IoT) and its applications in Civil Engineering.
- To develop the ability to integrate IoT with civil infrastructure for monitoring, automation, and data-driven decision-making.
- To enhance skills in sensor deployment, data analytics, and cloud computing for smart infrastructure solutions.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation

III. COURSE CONTENT

Module-1: Introduction to IoT and Its Role in Civil Engineering	8 Hrs

Basics of IoT: Concepts, Architecture, and Components, IoT Communication Protocols: MQTT, HTTP, LoRa, Bluetooth, Zigbee, Sensors and Actuators: Types and Selection for Civil Applications. IoT in Smart Cities: Traffic Monitoring, Waste Management, and Water Distribution. Case Studies: IoT in Smart Construction and Infrastructure

Textbook: Internet of Things for Smart Cities, Rashid Mehmood, Richard Chbeir

Self-Learning: Research and present a real-world IoT-based infrastructure project

RBT Levels: L1 L2

Module-2: IoT for Structural Health Monitoring (SHM)	8 Hrs

Introduction to SHM using IoT, Types of Sensors for Structural Monitoring: Strain, Vibration, Temperature, Crack Sensors, Wireless Sensor Networks for Structural Monitoring, IoT-Based Real-Time Data Acquisition & Processing, Case Study: Smart Bridges and Dams Monitoring

Textbook: Internet of Things for Smart Cities, Rashid Mehmood, Richard Chbeir

Self-Learning: Simulate real-time structural data collection using an Arduino and accelerometer.

RBT Levels: L1 L2 L3

Module-3: IoT in Construction Management and Safety	8 Hrs

IoT for Project Monitoring and Automation, Wearable Technology for Worker Safety (Smart Helmets, Sensors), Smart Equipment Tracking and Fleet Management, IoT-Based Site Surveillance and Security, Case Study: IoT Applications in Construction Safety.

Textbook: Internet of Things for Smart Cities, Rashid Mehmood, Richard Chbeir

Self-Learning Explore BIM-IoT integration for site management and automation.

RBT Levels: L1 L2 L3

Module-4: IoT in Smart Transportation and Water Management	8 Hrs

IoT for Intelligent Transportation Systems: Smart Traffic Lights, Vehicle Tracking, IoT-Based Water Distribution Monitoring, Smart Stormwater and Flood Management Systems, IoT for Wastewater Treatment Plants, Case Study: Smart Roads & Water Networks
Textbook: Smart Infrastructure: The Impact of IoT on Civil Engineering, John G. Voeller
Self-Learning: Explore cloud-based dashboards for real-time water quality monitoring.
RBT Levels: L1 L2

Module-5: Cloud Computing, AI, and IoT Integration in Civil Engineering	8 Hrs

Basics of Cloud Computing and IoT Data Storage, AI and IoT for Predictive Maintenance, Edge Computing in Civil Engineering Applications, IoT Cybersecurity Challenges and Solutions, Case Study: Digital Twins in Smart Infrastructure
Textbook: Smart Infrastructure: The Impact of IoT on Civil Engineering, John G. Voeller
Self-Learning: Set up an IoT dashboard using Google Firebase or AWS IoT Core.
RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Explain the role of IoT in civil engineering applications, including infrastructure monitoring, construction management, and smart cities.
CO2	Apply IoT-enabled technologies for real-time data collection, analysis, and automation in civil engineering projects.
CO3	Analyze IoT-based solutions for optimizing structural health, transportation systems, and resource management.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2			3								2	2		
CO2	3	3			3								2	2		
CO3	3	3			3								2	2		

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Internet of Things for Smart Cities	Rashid Mehmood, Richard Chbeir	2020 Edition	Springer
2	Smart Infrastructure: The Impact of IoT on Civil Engineering	John G. Voeller	2019 Edition	CRC Press
3	IoT in Civil Engineering	Salim Al-Harthi, Ahmed Al-Sulaimani	2022 Edition	Elsevier

VII(b): Reference Books:

1	Internet of Things: Principles and Paradigms	Rajkumar Buyya, Amir Vahid Dastjerdi	2016 Edition	Morgan Kaufmann
2	Structural Health Monitoring with IoT	F. Casciati, G. Magonette	2021 Edition	Springer
3	Cyber-Physical Systems and IoT	Dimitrios Serpanos	2018 Edition	Elsevier

VII(c): Web links and Video Lectures (e-Resources):

https://ocw.mit.edu

https://www.coursera.org/specializations/iot

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- IoT Sensor Deployment: Install vibration and temperature sensors on a building model and collect real-time data.
- Smart Traffic System Simulation: Use IoT kits (NodeMCU, Raspberry Pi) to create a real-time traffic management prototype.
- IoT for Water Quality Monitoring: Develop an IoT-based pH and turbidity monitoring system for water bodies.

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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	VI	**Course Type:**	**ETC**		
Course Title: Fire Safety in Buildings					
Course Code:	**23CVE644**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To understand the importance fire safety
- To learn various techniques involved in fire safety
- To design fire resistant buildings using proper materials and methods

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1	8 Hrs

Fire: Introduction, Basic concepts of fire protection, Fire as a process of combustion, planning for fire protection, fire resistance Ventilation and fuel controlled fire, process of combustion: flashover condition, effect of fire on construction material, design of fire resistance steel structure, concrete structure

Textbook:. J A Purkiss

RBT Levels: L1 L2

Module-2	8 Hrs

Fire safety: urban planning, escape and refuge, internal planning, detection and suppression Introduction to lift design, design of lift system, expected stop and floor of reversal, different cases, simulation, arrangements and escalators

Textbook: J A Purkiss

RBT Levels: L1 L2 L3

Module-3	8 Hrs

Introduction to flow system: water supply, constant demand, variable demand and diversity factor, control systems Flow in pipe networks and fixture units, design of water supply distribution system, flow in waste water pipes

Textbook: J A Purkiss

RBT Levels: L1 L2 L3

Module-4	8 Hrs

Introduction to HVAC: governing equations to HVAC process, numerical problem on HVAC system, psychometric chart, equation based approach Electrical systems: design of electrical systems, intelligent building, life cycle cost and basics of building maintenance, stages of maintenance management, planning for building maintenance, periodicity of maintenance management, estimation of repair cycle, cost profile of maintenance, lamp replacement, building inspection, planned and Ad-hoc maintenance

Textbook: V K Jain

RBT Levels: L1 L2 L3

Module-5	8 Hrs

Condition survey and health evaluation of buildings, diagnosis of building by visual survey, case studies of visual survey, effect of corrosion and alkali aggregate reaction, sampling and choice of test location Non-destructive testing, core strength test, carbonation and chloride measurement, electrical method of progress measurement Repair, rehabilitation, retrofit, periodicity and economics of condition survey, interpretation of test results

Textbook: V K Jain

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Understand types of fire, combustion process and fire resistance
CO2	Plan for fire safety and design of lifts
CO3	Design flow network in buildings
CO4	Design of electrical systems and maintenance
CO5	Perform health evaluation of buildings and suggest remedies

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2				1										
CO2	3	2				2										
CO3	3	2				2										
CO4	3	2				2										
CO4	3	2				2										

VI. **Assessment Details (CIE & SEE)**

General Rules: Refer Annexure section 1

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Fire Safety Engineering	J A Purkiss	2009	Elsevier,
2	Fire Safety in Buildings	V K Jain	Third edition, 2020	New Age International Private Limited
3	Air conditioning and ventilation of buildings	Croome,J.D .& Roberts,B.M	1975	Pergamon Press

VII(b): Reference Books:

1	Fire Safety in Buildings	V K Jain	Third edition, 2020	New Age International Private Limited

2	Fire Safety Engineering	J A Purkiss	2009	Elsevier,

VII(c): Web links and Video Lectures (e-Resources):

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	VI	**Course Type:**	AEC		
Course Title: Research Methodology & IPR					
Course Code:	**23RMAE61**		**Credits:**		03
Teaching Hours/Week (L:T:P:O)			3:0:0:@	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	03

I. Course Objectives:

- To Understand the knowledge on basics of research and its types.
- To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
- To learn Ethics in Engineering Research.
- To Discuss the concepts of Intellectual Property Rights in engineering.

II. Teaching-Learning Process :

- Chalk and talk method
- Power point presentation / keynotes
- Videos

III. COURSE CONTENT

III(a). Theory PART

Module-1: Introduction — 08Hrs

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem.

Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.

Textbook 1 : Chapter1 : sections: 1.1,1.2,1.3,1.4
Textbook 1 : Chapter5 : sections: 5.1,5.2,5.3

Self Learning : Case Studies

RBT Levels: L2

Module-2: Literature Review and Technical Reading — 08Hrs

Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.

Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.

Textbook1: Chapter2: sections: 2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9,2.10

Textbook1: Chapter3: sections: 3.1,3.2,3.3,3.4

Self Learning : Case Studies

RBT Levels: L2

Module-3: Introduction To Intellectual Property	08Hrs

Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.

Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting.

Process of Patenting. Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition.

Textbook2: Chapter1: sections:1.1,1.2,1.3,1.4,1.6
Textbook2: Chapter2: sections:2.1 (2.1.1 to 2.1.9)

Self Learning : Case Studies

RBT Levels: L2

Module-4: Copyrights and Related Rights	08 Hrs

Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases.

Trademarks: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.

Textbook2: Chapter2: sections: 2.2 (except 2.2.6)
Textbook2: Chapter2: sections:2.3 (2.3.1 to 2.3.10, 2.3.14)

Learning : Case Studies

RBT Levels: L2

Module-5: Industrial Designs	08Hrs

Industrial Designs: Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co.

Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India.

Textbook2: Chapter2: Sections : 2.4, 2.5 (2.5.1 – 2.5.13)

Self Learning : Case Studies

RBT Levels: L2

IV. COURSE OUTCOMES

CO1	Understand the importance of engineering research and its ethics.
CO2	Interpret the fundaments of Literature Review and Technical Reading.
CO3	Outline the fundamentals of patens laws and drafting procedure.
CO4	Illustrate the copyright laws and basic principles of design rights.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2							2		1		2				
CO2	2							3		3		2				
CO3				2				3	2	2		3				
CO4								3	2	2		3				

VI. Assessment Details (CIE & SEE)

General Rules: Refer to – Academic regulations

Continuous Internal Evaluation (CIE):
Refer to Annexure, SL #5
Rubrics: Refer to Annexure, SL #5

Semester End Examination (SEE):
Refer to - Annexure, SL #5
Rubrics: Refer to - Annexure, SL #5

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Engineering Research Methodology	Dipankar Deb, Rajeeb Dey, Valentina E. Balas	ISSN 1868- 4394 ISSN 1868-4408 (electronic)	Intelligent Systems Reference Library, ISBN 978-981-13-2946-3 ISBN 978-981-13-2947-0 (eBook),
2	Intellectual Property A Primer for Academia	Prof. Rupinder Tewari Ms. Mamta Bhardwaj	2021	Publication Bureau, Panjab University Chandigarh-160014, India

VII(b): Reference Books:

1	Research Methods for Engineers	David V. Thiel	978-1-107-03488-4	Cambridge University Press
2	Intellectual Property Rights	N.K.Acharya	ISBN: 978-93-81849-30-9	Asia Law House 6th Edition

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=5fvpsqPWZac
http://kcl.digimat.in/nptel/courses/video/109106137/L68.html
http://kcl.digimat.in/nptel/courses/video/109106137/L72.html
http://acl.digimat.in/nptel/courses/video/109106137/L04.html

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Quizzes, Assignments, Seminars

Sl. No.	BOS Member	Affiliation	Signature
1	Dr. K. Somashekar (Convener)	Professor, Dept. of ECE, SJBIT, Bengaluru-560060.	
2	Dr. Dilip R (Member)	Associate Professor, Dept. of ECE, SJBIT, Bengaluru-560060.	
3			

BOS Chairman (Sign & Seal)

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	VI	**Course Type:**	HSMC		
Course Title: Social Connect Responsibility					
Course Code:	**23SCRH08**	**Credits:**			01
Teaching Hours/Week (L: T: P: O)		1:0:0:0		**Total Hours:**	15
CIE Marks:	50			**Total Marks:**	50

I. Course Objectives:

- This course aims to familiarize students with the dynamics of society and importance of conscious participation in the formation of an ideal society
- The course enables students to critically analyze the social processes of globalization, modernization and social change, and its impact on the socio-cultural system.
- The course aims to develop socially responsible engineers by engaging them in real-world social issues, analyzing their impact, proposing innovative solutions, and effectively documenting their findings.
- The course enables students to create a responsible connection with the society.

II. Teaching-Learning Process (General Instructions):

This course is designed to provide students with hands-on learning experiences that foster social awareness, critical thinking, and problem-solving skills. Teachers play a crucial role in guiding students through real-world issues and encouraging innovative, ethical solutions.

1. Foster an Experiential Learning Approach
   - Encourage field visits, case studies, and real-world problem analysis rather than relying solely on theoretical lectures.
   - Use problem-based learning (PBL) where students actively engage with a community issue and work towards solving it.
2. Facilitate Active Student Engagement
   - Conduct brainstorming sessions to help students identify and understand societal problems.
   - Promote group discussions and debates on contemporary social issues.
3. Encourage Innovative & Feasible Solutions
   - Help students explore technology-driven solutions using engineering principles.
   - Promote a multi-disciplinary approach, integrating environmental, social, and economic aspects.
4. Promote Community Interaction & Implementation
   - Guide students to collaborate with NGOs, local communities, or government agencies.
   - Ensure that students test their solutions in real-world settings and collect feedback.
   - Emphasize the importance of ethical considerations in community engagement.
5. Train Students in Documentation & Reporting
   - Teach students how to prepare structured reports on their findings, solutions, and implementation outcomes.
   - Encourage presentations, digital storytelling, and video documentation for effective communication.
   - Provide constructive feedback on student projects and ensure continuous improvement.

III. COURSE CONTENT

Module-1:Introduction to Social Connect Responsibility — 03Hrs

1. Identify the factors comprising the socio-cultural system and its impact on society
2. The concept of inter-relatedness of society and culture, socio-cultural dimensions, factors contributing to socio-cultural evolution.
3. Identifying problems in areas such as education, healthcare, environment, and infrastructure.

Module-2: Understanding Social Issues — 03 Hrs

1. Understanding societal challenges in local and global contexts.
2. Role of engineers in addressing these issues.
3. Conducting preliminary field surveys and interviews

Module-3: Analyzing the Social Problem — 03 Hrs

1. Understanding the economic, environmental, and societal impact of the problem
2. Ethical and moral considerations in problem-solving by Interaction with stakeholders (community members, NGOs, government bodies)
3. Root cause analysis using tools like SWOT, Fishbone Diagram, and Case Studies.

Module-4: Proposing Engineering Solutions — 03 Hrs

1. Application of engineering knowledge to develop feasible solutions.
2. Use of technology for social good (IoT, AI, Renewable Energy, Smart Systems, etc.).
3. Sustainable and cost-effective approaches.
4. Feasibility analysis and implementation strategies.

Module-5: Documentation & Reporting — 03 Hrs

1. Preparing a structured report with problem identification, analysis, proposed solutions, and implementation insights.
2. Creating presentations, videos, and other forms of project documentation.
3. Reflecting on personal learning and the social impact of the project.
4. Submission of a final report and group presentation.

IV.COURSE OUTCOMES

CO1	Students will be able to recognize and define real-world social issues, assessing their relevance and impact on communities.
CO2	Students will develop analytical skills to investigate the root causes of social problems and evaluate their economic, environmental, and ethical implications.
CO3	Students will apply engineering principles and innovative thinking to propose feasible, sustainable, and technology-driven solutions for identified social issues.
CO4	Students gain from stakeholder's interaction and develop presentation skills.

V.CO-PO-PSO MAPPING

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12
CO1			1			2	1	1	1			1
CO2			1			1	2	1	1			1
CO3			1			2	2	1	1			1
CO4			1			2	1	1	1			1

VI. Formative Assessment Details (CIE)

Continuous Internal Evaluation (CIE)& Rubrics: ***Refer to Annexure section -8***

VII. Learning Resources

VII (a). Reference Books :

1. C. N. Shankar Rao (2006) Sociology of Indian Society, 2nd, S. Chand publication
2. Nandan Nilekani, Imagining India: The Idea of a Renewed Nation, Penguin Books, 2009.
3. Gurcharan Das, India Unbound: From Independence to the Global Information Age, Anchor Books, 2002.
4. Raghuram G. Rajan, I Do What I Do, Harper Business, 2017.

VIII. Activity Based Learning
1. **Community Survey:** Students visit local communities (rural/urban) to identify real social issues (sanitation, education, healthcare, infrastructure) 2. **Collaboration with NGOs & CSR Units:** Partner with organizations working on social impact projects. 3. **Sustainability Planning:** Students draft plans for scaling up their solutions in a sustainable manner. 4. **Video Documentation:** Create short films showcasing their social project progress and community feedback.

Sl.No.	BOS Member	Affiliation	Signature
1			
2			
3			
BOS Chairman (Sign & Seal)			

|| Jai Sri Gurudev ||
SRI ADICHUNCHANAGIRI SHIKSHANA TRUST (R)
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ANNEXURE

CIE & SEE evaluation for Autonomous Scheme 2023 – UG

Note: Revised as per approvals of 4th Academic Council Meeting held on 05/02/2025

S. #	Course Type /Credits	Continuous Internal Evaluation (CIE)																					Semester End Examination (SEE)									Min. pass % (CIE + SEE)
		Total CIE marks	Min. Eligty.	I. Theory Component									II. Practical Component									Total CIE marks	Dur. In hrs.	Theory			Practical			Total SEE marks	
						A. Unit test			B. Formative Assessments			Tot. Theory marks (I)			C. Weekly Evaluation		D. Internal Test			E. Prj	Tot. marks (II)				Max. conducted marks	Max. considered marks	min. pass %	Max. conducted marks	Max. considered marks	min. pass %		
				Marks	Min. Eligty.	Nos.	Marks / Each	Tot.	Nos.	Marks / Each	Tot.		Marks	Min. Eligty.	Each week	Tot. marks	Nos.	Marks / Each	Total marks	Marks												
1	BSC/ESC/PCC/ETC /PEC/OEC (3 or 4 Credit courses)	50	40%	50	40%	2	50	50 (avg. of 2)	2	50	50 (avg. of 2)	50 (avg. of A & B)	--	--	--	--	--	--	--	--	--	50 (I)	03	100	50	35%	--	--	--	50	40%
2	IBSC/IESC/IPCC/ ETC (4 Credit courses)	50	40%	50	40%	2	50	50 (avg. of 2)	2	50	50 (avg. of 2)	50 (avg. of A & B)	50	40%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (Avg. of I & II)	03	100	50	35%	--	--	--	50	40%
3	IESC - CAED (4 credit course)	50	40%	--	--	--	--		--	--		--	50	40%	50	50 (Avg. of all)	1	50	50	--	50 (Avg. of C & D)	50	03	--	--	--	100	50	35%	50	40%
4	PCCL (1 Credit courses)	50	40%	--	--	--	--		--	--		--	50	40%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (II)	03	--	--	--	100	50	35%	50	40%
5	AEC- IDT, Skill Development courses (1 credit course)	50	40%	50	40%	1	50		1	50		50 (Avg. of 2)	--	--	--	--	--	--	--	--	--	50 (I)	02	50	50	35%	--	--	--	50	40%
6	HSMC- CIP, Env studies, SFH, UHV (1 credit course)	50	40%	50	40%	1	50		1	50		50 (Avg. of 2)	--	--	--	--	--	--	--	--	--	50 (I)	02	50	50	35%	--	--	--	50	40%
7	HSMC - English, Kannada (No credits)	50	40%	50	40%	1	50		1	50		50 (Avg. of 2)	--	--	--	--	--	--	--	--	--	50 (I)	--	--	--	--	--	--	--	--	40%
8	NCMC - Personality Development courses, PE, Yoga, NCC, NSS, IKS (No credits)	50	40%	50	40%	--	--		1	50		50	--	--	--	--	--	--	--	--	--	50 (I)	--	--	--	--	--	--	--	--	40%

 # Formative (Successive) Assessments: Assignments/quiz/ seminars/field survey and report presentation/course project/group discussions/etc. based on the faculty & dept. planning. **# Practical Conduction:** The conduction of each experiment/program per week should evaluate for 50 Marks and average of all shall be taken. **# In case of Integrated course,** minimum eligibility shall be attained as prescribed in both the theory and practical components.
 # Self Learning Courses (SLC) Courses, Internship, Mini project & Major Project: Rubrics & Methodology shall be defined seperately

Academic Dean 10/2/25

Principal 10.2.2025

Academic Director 10/2/25

ANNEXURE

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CIE and SEE guidelines for Autonomous Scheme 2023 –ಆ೬

Note: Revised as per approvals of 4th Academic Council Meeting held on 05/02/2025

Continuous Internal Evaluation (CIE)	Semester End Examination (SEE)	Final Passing requirement
1. BSC/ESC/PCC/ ETC/PEC/OEC – Theory Course (03 & 04 Credit courses)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). CIE will be conducted by the department and it will have only 01 component (I): **I. Theory component:** Theory Component will consist of A. Internal Assessment Test (IAT). B. Formative Assessments (FA). **A. Internal Assessment Test:** i) There are 02 tests each of 50 marks conducted during 8th week & 15th week, respectively. ii) The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. iii) The student must answer 2 full questions (one from 1st & 2nd questions and another from 3rd & 4th question).	**Semester-End Examination:** The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks). Duration of 03 hours and total marks of 100. i) The question paper will have ten questions. Each question is set for 20 marks. ii) There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. iii) The students have to answer 5 full questions, selecting one full question from each module. iv) Marks scored shall be proportionally reduced to 50 marks.	The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

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Principal 10.2.2025

Academic Director 10/2/25

iv) IAT QP shall be designed to attain the different levels of Bloom's taxonomy as per the outcomes defined for the course. **B. Formative assessments:** i) 02 formative assessments each of 50 marks shall be conducted by the course coordinator based on the dept. planning during random times. ii) One formative assessment shall be completed before 5th week and second shall be completed before 12th week. iii) The syllabus content for the formative assessment shall be defined by the course coordinator. iv) The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. v) The assignment QP or Quiz QP shall indicate marks of each question and the relevant COs & RBT levels. vi) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean. **The final CIE marks will be 50:** CIE = Avg. {Avg. of two tests + Avg. of two FA} **The documents of all the assessments shall be maintained meticulously.**		
2. IBSC/IESC/IPCC– Integrated with Theory & Practical (04 credit courses), ETC (if offered as integrated course)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). Minimum eligibility of 40% marks shall be attained separately in both the theory component and practical component. CIE will be conducted by the department and it will have 02 component: I. Theory Component. II. Practical Component. **I. Theory Component:** Theory component will consist of A. Internal Assessment Test (IAT). B. Formative assessments (FA).	The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks). **Semester-End Examination:** Only theory SEE for duration of 03 hours and total marks of 100. i) The question paper will have ten questions. Each question is set for 20 marks. ii) There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.	The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

A. Internal Assessment Test: i) There are 02 tests each of 50 marks conducted during 8th week & 15th week, respectively. ii) The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. iii) It is suggested to include questions on laboratory content in the Internal Assessment test Question papers. iv) The student must answer 2 full questions (one from 1st & 2nd questions and another from 3rd & 4th question). v) IAT QP shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. **B. Formative assessments:** i) 02 formative assessments each of 50 marks shall be conducted by the course coordinator based on the dept. planning during random times. ii) One formative assessment shall be completed before 5th week and second shall be completed before 12th week. iii) The syllabus content for the formative assessment shall be defined by the course coordinator. iv) The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. v) The assignment QP or Quiz QP shall indicate marks of each question and the relevant COs & RBT levels. vi) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean. **II. Practical Component:** **C.** Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/programs shall be taken. (rubrics will be published by the concerned committee) **D.** One laboratory Internal Assessment test will be conducted during the 14th week for 50 marks. (rubrics will be published by the concerned committee) **E.** If the course project / mini project is involved in the laboratory component. **The evaluation shall be completed by 14th week of the semester.** The rubrics required for the evaluation of the project shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean.	iii) The laboratory content must be included in framing the theory question papers. iv) The students have to answer 5 full questions, selecting one full question from each module. v) Marks scored shall be proportionally reduced to 50 marks. **No Practical SEE for Integrated Course.** **Note:** CAED Course shall not be considered here. It shall be considered as in sl. No. 3 in the next row	

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Note:

i) If component 'E' is involved in the course, either component 'D' or 'E' along with component 'C' shall be considered for average of item II.

ii) Otherwise, components 'C' & 'D' shall be considered for average of item II.

The final CIE marks will be 50:

CIE= Avg. {**I** [Avg. of two tests + Avg. of two FA] + **II** [Avg. of (C & (D or E))]}

The documents of all the assessments shall be maintained meticulously.

Note: CAED Course shall not be considered here, it shall be considered as in sl. no. 3 in the next row.

3. IESC: CAED Course (4 credits)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50).

i) CIE shall be conducted for max. marks of 100 and shall be scaled down to 50 marks

ii) CIE component should comprise of both Manual and computer drafting i.e. 50% manual and 50% computer drafting out of total 100 marks

iii) CIE component should comprise of Continuous evaluation of drawing work of students as and when the modules are covered based on below detailed weightage.

Module	Module Max. Marks	Evaluation Weightage in marks	
		Computer display and print out	Manual Sketching
Module 1	20	10	10
Module 2	20	10	10
Module 3	20	10	10
Module 4	20	10	10
Module 5	20	10	10
TOTAL	**100**	**50**	**50**

The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks).

Semester-End Examination:

SEE for duration of 03 hours and total marks of 100.

i) SEE shall be conducted and evaluated for maximum marks of 100 and shall be scaled down to 50 marks.

ii) Question paper shall be made available for each batch as per schedule.

iii) Evaluation shall be carried jointly by both the internal & external examiners.

iv) Scheme of Evaluation: To be defined by both the examiners jointly.

v) Maximum 3 questions shall be set as per the following pattern.

The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

Academic Dean

10.2.2025
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Academic Director

iv) At least one Test covering all the modules is to be conducted for 100 marks during 14th week and the same is to be scaled down to **25 Marks.**

v) Assignments = **10 Marks from each module. (50 marks scaled down to 25 Marks)**

vi) The final CIE 50 marks = Test (25 marks) + Assignment (25 marks).

From Module	Marks Allotted
Module 01 (Choice between Lines or Planes)	30
Module 02 (Compulsory question)	40
Module 03 or Module 04 or Module 05	30
TOTAL	**100**

Q. No.	Manual Sketching	Computer display and print out	TOTAL MARKS
1	15	15	30
2	20	20	40
3	15	15	30
TOT.	**50**	**50**	**100**

4. PCCL: Laboratory course (01 credit course)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50).

CIE will be conducted by the department and it will have only 01 component:

I. Theory Component. (Not required for Laboratory course)

II. Practical Component.

II. Practical Component:

C. Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/program shall be taken (rubrics will be published by the concerned committee).

D. One laboratory Internal Assessment test will be conducted for 50 marks (rubrics will be published by the concerned committee).

E. If the course project / mini project is involved in the laboratory component. **The evaluation shall be completed by 14th week of the semester.** The rubrics required for the evaluation of the project shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean.

The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks).

Semester-End Examination:

Only laboratory SEE will be conducted jointly by the internal examiner and external examiner appointed by COE as per the scheduled timetable for duration of 03 hours.

i) The examination shall be conducted for 100 marks and shall be reduced to 50 marks proportionately.

ii) All laboratory experiments/programs are to be included for practical examination.

iii) Breakup of marks (Rubrics) and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners (OR) based on the course

The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

Academic Dean

Principal 10.2.2025

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Note: **i)** If component 'E' is involved in the course either component 'D' or 'E' along with component 'C' shall be considered for average of item II. **ii)** Otherwise, components 'C' & 'D' shall be considered for average of item II. **The final CIE marks will be 50** = Avg. of (C & [D or E]) **The documents of all the assessments shall be maintained meticulously.**	requirement evaluation rubrics shall be decided jointly by examiners. iv) Students can pick one question (experiment/program) from the questions lot prepared by the internal /external examiners jointly. v) Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners. vi) General rubrics suggested for SEE: writeup-20%, Conduction procedure and results-60%, Viva-voce 20% of maximum marks. vii) Change of experiment is allowed only once and shall be assessed only for 85% of the maximum marks.	

5. AEC: Ability Enhancement Courses (01 credit courses)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test (IAT). B. Formative Assessments (FA). **A. Internal Assessment Test:** i) 01 test of 50 marks conducted during 15th week. ii) The question paper will be of Multiple-Choice Questions (MCQ). iii) The student must answer all questions. iv) IAT QP shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.	The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks). **Semester-End Examination:** Theory SEE will be conducted by COE as per the scheduled timetable for duration of 02 hours and total marks of 50. i) Multiple choice Question paper. ii) The students have to answer all questions.	The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

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B. Formative assessments: i) 01 formative assessment of 50 marks shall be conducted by the Course coordinator based on the dept. planning during 12th week. ii) The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. iii) The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. iv) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs. **The final CIE marks will be 50:** CIE = Avg. of 02 events (01 IAT and 01 FA). **The documents of all the assessments shall be maintained meticulously.**		

6. HSMC: (01 credit course)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). CIE will be conducted by the department and will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test (IAT). B. Formative Assessments (FA). **A. Internal Assessment Test:** i) 01 test of 50 marks conducted during 15th week. ii) The question paper will be of Multiple-Choice Questions (MCQ). iii) The student must answer all questions. iv) IAT QP shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course **B. Formative assessments:** i) 01 formative assessment of 50 marks shall be conducted by the faculty based on the dept. planning during 12th week. ii) The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc.	The minimum passing mark for SEE is 35% of the maximum marks (18 out of 50 marks). **Semester-End Examination:** Theory SEE will be conducted by COE as per the scheduled timetable for duration of 02 hours and total marks of 50. i) Multiple choice Question paper. ii) The students have to answer all questions	The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together.

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iii) The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. iv) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs. **The final CIE marks will be 50:** CIE = Avg. of 02 events (01 IAT and 01 FA). **The documents of all the assessments shall be maintained meticulously.**		
7. HSMC: (0 credit courses)		
The weightage is only for Continuous Internal Evaluation (CIE).		
Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test (IAT). B. Formative assessments (FA). **A. Internal Assessment Test:** i) 01 test of 50 marks conducted during 15th week. ii) The QP will be of Multiple-Choice Questions (MCQ). iii) The student must answer all questions. iv) IAT QP shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course **B. Formative assessments:** i) 01 formative assessment of 50 marks shall be conducted by the faculty based on the dept. planning during 12th week. ii) The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. iii) The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. iv) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs. **The final CIE marks will be 50:** CIE = Avg. of 02 events (01 IAT and 01 FA). **The documents of all the assessments shall be maintained meticulously.**	No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 40% (20 marks out of 50) in the CIE.

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8. NCMC: (0 credit course)		
The weightage is only for Continuous Internal Evaluation (CIE).		
Continuous Internal Evaluation: The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of only 01 assessment A. Internal Assessment Test (not required for NCMC course). B. Formative Assessment (FA). **B. Formative assessments:** i) 01 formative assessment of 50 marks shall be conducted by the faculty based on the dept. planning during random times during 12th week. ii) The formative assessments include Quiz/Assignments/seminars/case study/field survey/ report presentation/course project/etc. iii) The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. iv) The rubrics required for the other type of formal assessments shall be defined by the departments along with mapping of relevant COs & POs. **The final CIE marks will be 50.** **The documents of all the assessments shall be maintained meticulously.**	No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 40% (20 marks out of 50) in the CIE.

Academic Dean
Dr. Babu N V

Principal
Dr. K V Mahendra Prashanth

Academic Director
Dr. Puttaraju

Academic Dean

Principal 10.2.2025

Academic Director

|| Jai Sri Gurudev ||
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Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Program Outcomes (POs)- Graduate Attributes

Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

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

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

|| Jai Shree Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

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Accredited by NBA

Accredited by NAAC with A+

Recognized by UGC, New Delhi with 2(f) and 12(B)

Certified by ISO 9001 – 2015

ATAL Ranking:
Band Performer

Band of 151 to 300 in
Innovation Category