Government College of Engineering Jalgaon

"Globally Accepted Engineers with Human Skills"

(An Autonomous Institute of Government of Maharashtra)

Civil Engineering Department

Third Year BTech Syllabus (Option I)

2020-21

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for Semester I of B. Tech. (Elect/Comp/Civil) with effect from academic year 2018-19

Course Code	Name of the Course	Group	Teaching Scheme* Hrs /Week				Evaluation Scheme						Credits
							Theory			Practical		Total	
			L	T	P	Total	MSE	ISA	ESE	ICA	ESE		
SH100AU	**Induction Program**	**Mandatory audit course of three weeks duration as per AICTE model curriculum**											**AU**
SH101U	Differential Calculus	BS	3	1	--	4	30	10	60	--	--	100	4
SH102U	Engineering Chemistry	BS	3	--	--	3	30	10	60	--	--	100	3
EE101U	Elements of Electrical Engineering	BE	2	--	--	2	30	10	60	--	--	100	2
CO101U	Programming for Problem Solving	BE	3	--	--	3	30	10	60	--	--	100	3
SH104U	Communication Skills	HM	1	--	--	1	15	05	30	--	--	50	1
SH105U	Communication Skills Lab	HM	--	--	2	2	--	--	--	50	--	50	1
ME101U	Mechanical Workshop Practices	BE	--	--	2	2	--	--	--	50	--	50	1
SH103U	Engineering Chemistry Lab	BS	--	--	2	2	--	--	--	50	--	50	1
EE102U	Elements of Electrical Engineering Lab	BE	--	--	2	2	--	--	--	50	--	50	1
CO102U	Programming for Problem Solving Lab	BE	--	--	2	2	--	--	--	50	--	50	1
		Total	**12**	**1**	**10**	**23**	**45**	**135**	**270**	**250**	**--**	**700**	**18**

*** Commencement of first semester of UG engineering program is generally delayed by 4 - 5 weeks as compared with higher semesters due to admission procedure. In addition, as per AICTE directives there is Induction Program of three weeks at the beginning of first semester. Thus the effective teaching in first semester may be only for 8 – 9 weeks. Therefore, one hour per week theory / laboratory teaching should be added in the regular load shown in the curriculum structure so that the syllabus can be completed in 8 - 9 weeks available in first semester of UG program.**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1. ESE (TH) duration for SH104U is two hours and that for all other theory courses is three hours.
2. MSE (TH) duration for SH104U is one hours and that for all other theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for Semester II of B. Tech. (Elect/Comp/Civil) with effect from academic year 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /Week				Evaluation Scheme						Credits
							Theory			Practical		Total	
			L	T	P	Total	MSE	ISA	ESE	ICA	ESE		
SH151U	Integral Calculus	BS	3	1	--	4	30	10	60	--	--	100	4
SH152U	Engineering Physics	BS	3	--	--	3	30	10	60	--	--	100	3
ME151U	Engineering Drawing and Drafting	BE	3	--	--	3	30	10	60	--	--	100	3
ET151U	Basic Electronics and Measurement Techniques	BE	3	--	--	3	30	10	60	--	--	100	3
CE151U	Engineering Mechanics	BE	3	1	--	4	30	10	60	--	--	100	4
ME152U	General Workshop Practices	BE	--	--	2	2	--	--	--	50	--	50	1
SH153U	Engineering Physics Lab	BS	--	--	2	2	--	--	--	50	--	50	1
ME153U	Engineering Drawing and Drafting Lab	BE	--	--	2	2	--	--	--	50	--	50	1
ET152U	Basic Electronics and Measurement Techniques Lab	BE	--	--	2	2	--	--	--	50	--	50	1
CE152U	Engineering Mechanics Lab	BE	--	--	2	2	--	--	--	50	--	50	1
SH150AU	**Environment Science**		**-**	**--**	**--**	**--**	**NA**	**NA**	**60**	**--**	**--**	**60**	**AU**
Total			**15**	**2**	**10**	**27**	**150**	**50**	**400**	**250**	--	**810**	**22**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1. ESE (TH) duration for ME151U is four hours and that for all other theory courses is three hours.

2. MSE (TH) duration for all theory courses is two hours

3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM III of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Credit
							Theory			Practical		Total	
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE201U	Introduction to Civil Engineering	HM	2	--	--	2	10	30	60	--	---	100	2
CE202U	Basic Surveying	PC	3	--	---	3	10	30	60	---	---	100	3
CE203U	Concrete Technology	PC	3	--	---	3	10	30	60	---	---	100	3
CE204U	Building Planning and Construction	PC	3	--	---	3	10	30	60	---	---	100	3
CE205U	Strength of Materials	PC	3	--	---	3	10	30	60	---	---	100	3
CE206U	Engineering Geology	BS	3	--	---	3	10	30	60	---	---	100	3
CE207U	Basic Surveying Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE208U	Concrete Technology Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE209U	Building Planning and Construction Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE210U	Computer Aided Civil Engineering Drawing Lab	PC		--	2	2	--	--	--	50	--	50	1
CE211U	Engineering Geology Lab	BS	--	--	2	2	--	--	--	25	25	50	1
SH200AU	Essence of Indian Traditional Knowledge	HM	--	--	--	--	NA	NA	60	0	0	60	AU
Total			**17**	**--**	**10**	**27**	**60**	**180**	**420**	**150**	**100**	**910**	**22**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1.ESE (TH) duration for CE204U is four hours and for all other theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM IV of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Credit
							Theory			Practical		Total	
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
SH296U	Advanced Engineering Mathematics	HM	3	--	---	3	10	30	60	---	---	100	3
CE251U	Fluid Mechanics	PC	3	--	---	3	10	30	60	---	---	100	3
CE252U	Water Treatment and Processes	PC	3	--	-	3	10	30	60	---	---	100	3
CE253U	Basic Theory of Structures	PC	3	-	---	3	10	30	60	---	---	100	3
CE254U	Hydrology and Irrigation	PC	3	--	--	3	10	30	60	---	---	100	3
CE255U	Civil Engineering- Societal and Global Impact	HM	2	--	---	2	10	30	60	---	---	100	2
CE256U	Fluid Mechanics Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE257U	Water Treatment and Processes Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE258U	Testing of Materials Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE259U	Hydrology and Irrigation Lab	PC	--	--	2	2	--	--	--	25	25	50	1
SH299U	Effective Technical Communication	HM		--	2	2	--	--	--	25	25	50	1
SH250AU	Introduction to the Constitution of India	CM	--	--	--	--	NA	NA	60	--	--	60	AU
		Total	**17**	**-**	**10**	**27**	**60**	**180**	**420**	**125**	**125**	**910**	**22**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1.ESE (TH) duration for all theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.
4. Professional Internship of minimum 6 week duration (minimum 2 weeks in one visit) shall be completed during summer and winter vacation after the IV semester onward and will be asses in VIII semester.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM V of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Credit
							Theory			Practical		Total	
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE301U	Dams and Hydraulic Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE302U	Design of RCC Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE303U	Transportation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE304U	Professional Elective -I	PE	3	--	---	3	10	30	60	---	---	100	3
CE305U	Open Elective-I	OE	3	--	---	3	10	30	60	---	---	100	3
CE306U	Construction Management	PC	3	--	--	3	10	30	60	--	--	100	3
CE307U	Design of RCC Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE308U	Dams and Hydraulic Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE309U	Transportation Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE310U	Professional Elective I Lab	PE	--	--	2	2	--	--	--	25	25	50	1
	Total		18	--	8	26	60	180	360	100	100	800	22

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -I

A. Hydraulic Engineering
B. Construction Practice
C. Earthquake Engineering
D. Architectural Planning and Interior Designing

Open Elective I

X. Building Construction Practice
Y. Repair and Rehabilitation of Buildings

Note: 1. ESE (TH) duration for CE302U is four hours and for all other theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VI of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE351U	Advance Theory of Structures	PC	3	--	--	3	10	30	60	---	---	100	3
CE352U	Geotechnical Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE353U	Design of Steel Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE354U	Professional Elective -II	PE	3	--	---	3	10	30	60	---	---	100	3
CE355U	Open Elective - II	OE	3	--	---	3	10	30	60	---	---	100	3
CE356U	Disaster Preparedness & Planning Management	HM	3	--	---	3	10	30	60	---	---	100	3
CE357U	Geotechnical Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE358U	Design of Steel Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE359U	Professional Elective –II Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE360U	Software Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE361U	Minor Project	PS	--	--	2	2	--	--	--	50	--	50	1
		Total	**18**	**--**	**10**	**28**	**60**	**180**	**360**	**150**	**100**	**850**	**23**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -II

A. Advanced Surveying,
B. Rehabilitation of Structures
C. Prestressed Concrete
D. Irrigation Systems

Open Elective II

X. Industrial Pollution and Control
Y. Safety and Disaster Management

Note: 1. ESE (TH) duration for CE353U is four hours and for all other theory courses is three hours
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VII of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Credit
							Theory			Practical		Total	
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE401U	Environmental Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE402U	Foundation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE403U	Engineering Economics, Estimate and Costing	PC	3	--	--	3	10	30	60	--	--	100	3
CE404U	Professional Elective -III	PE	3	--	---	3	10	30	60	---	---	100	3
CE405U	Open Elective - III	OE	3	--	---	3	10	30	60	---	---	100	3
CE406U	Environmental Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE407U	Foundation Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE408U	Engineering Economics, Estimate and Costing Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE409U	Professional Elective-III Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE410U	Industrial Lectures	PS	1	--	--	1	--	--	--	50	--	50	1
CE411U	Project Phase I	PS	---	--	2	2	--	--	--	25	75	100	3
		Total	**16**	**--**	**10**	**26**	**50**	**150**	**300**	**175**	**175**	**850**	**23**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -III

A. Pavement Design
B. Advanced Reinforced Cement Concrete
C. Air and Noise Pollution
D. Building Systems and Services

Open Elective III

X. Interior Design
Y. Metro System and Engineering

Note: 1.ESE (TH) duration for all theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VIII of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme						Credit
							Theory			Practical		Total	
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
SH496U	Organizational Behavior	HM	3	--	---	3	10	30	60	---	---	100	3
CE451U	Professional Elective -IV	PE	3	--	---	3	10	30	60	---	---	100	3
CE452U	Professional Elective -V	PE	3	--	---	3	10	30	60	---	---	100	3
CE453U	Professional Elective -VI	PE	3	--	--	3	10	30	60	--	--	100	3
CE454U	Seminar	PS	---	---	2	2	--	--	--	25	--	25	1
CE455U	Project Phase II	PS	---	--	4	4	--	--	--	75	125	200	5
CE456U	Professional Internship	PS	--	--	--	--	--	--	--	50	--	50	2
CE457AU	Basics of Entrepreneurship	HM	--	--	--	--	--	--	60	--	--	60	AU
CE458AU	E-4 Skills	HM	--	--	--	--	--	--	60	--	--	60	AU
	Total		12	--	6	18	40	120	360	150	125	795	20

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -IV
A. Railway, Tunnel and Airport Engineering
B. Geo-synthetic Engineering
C. Environmental Geo-Technology
D. Construction Equipment and Automation

Professional Elective -V
A. Bridge Engineering
B. Advanced Foundation Engineering
C. Advance Design of Steel Structures
D. Solid and Hazardous Waste Management

Professional Elective -VI
A. Structural Health Monitoring and Auditing
B. Ground Improvement Techniques
C. Finite Element Analysis
D. Formwork and Support System Design

Note: 1.ESE (TH) duration for all theory courses is three hours.
2. MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

Open Elective List				
Sr No	**BoS**	**Open Elective-I**	**Open Elective-II**	**Open Elective-III**
1	Mechanical Department	Heating Ventilation and Air Conditioning	Mechatronics and Applications	Operations Research and Project Management
		Electric and Hybrid Vehicle	Power Station Engineering	Industrial Robotics
2	E&TC Department	Principles of Communication Systems	Electronics Instruments and Measurements	Biomedical Electronics
		Consumer Electronics	Microprocessor and Microcontroller	Power Devices and Applications
3	Instrumentation Department	Programmable Logic Controller and Distributed Control System	Automotive Instrumentation	Building Automation
		Virtual Instrumentation	Industrial Measurement	Agricultural Instrumentation
4	Electrical Department	Renewable Energy Systems	Energy Audit and Conservation	Electrification of Buildings
		Wind and Solar Power	Electrical Engineering Materials	Industrial Automation
5	Computer Department	Professional Ethics and Cyber Security	Internet and Communication Technology	Internet of Things
		Android Programming	Data Structures and Algorithms	Web Design
6	Civil Department	Building Construction Practice	Environmental Laws and Polices	Interior Design
		Repair & Rehabilitation of Structures	Safety and Disaster Management	Metro System and Engineering
7	Applied Science Department	Biology	Foreign Language-I	Finance and Accounting
		Foreign Language-II	Entrepreneurship Higher Development	Higher Mathematics

CE301U DAMS AND HYDRAULIC STRUCTURES

Teaching Scheme: 03L **Total: 3Hr** **Credit: 03**
Evaluation Scheme:30 MSE + 10 ISA + 60 ESE **Total Marks:100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION

In this course students are introduced with the topics such as dams, their types and basic design basics of Gravity dams & Earth dams along with study of Spillways & Diversion Head works and irrigation canals

COURSE OBJECTIVES

1. To understand design principles of earth and gravity dam.
2. To Know about the basics of design of canals, spillway and weir.
3. To provide knowledge on various types of energy dissipaters.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. compute various stresses developed in gravity dam
2. analyze stability of slopes of earth dams
3. evaluate the essential requirements of the most widely used spillways and design of efficient stilling basins by following U.S.B.R. and I.S. recommendations.
4. analyze stability of weirs on permeable foundation using Khosla's theory

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3														2
2	3														3
3		2												3	
4	3														2

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Dams: Introduction and scope of the subject, types of dams, reservoir storage zones, selection of site for dam, choice of a dam.

Gravity Dams: Introduction, cross section, forces acting on dam, load combinations as specified by IS 6512-1984, stresses in dam (normal, principal and shear stresses), modes of failures, stability analysis and design of gravity dam, elementary and practical profile, low and high dam, galleries, Joints and keys.

Principle and types of Arch and Buttress dams.

Earth Dams : Introduction, types, elements of earth dam, basic design considerations, causes of failures, piping and its prevention, control of seepage, drainage in earth dams, phreatic line

– its uses and characteristics, equation, procedure of construction phreatic line for various cases, stability of upstream and downstream slopes of earth dam under various situations,

Spillways: - Introduction, spillway capacity, different types of spillways and their principles and suitability, design principles of Ogee spillway, working of siphon spillway. Energy dissipation below spillway, types of hydraulic jump, jump height curves and tail water rating curves, various types of energy dissipaters: Indian Standard stilling basins and buckets.

Gates: Uses, types of spillway crest gates.

Diversion Head Works : Introduction, selection of site, layout of diversion headwork and its components and functions, types of weirs and barrages, causes of failures of weirs on permeable foundations and remedies, hydraulic design of weir with respect to subsurface flow, safety against piping and uplift, Khosla's theories.

Canal systems: **Types of canals,** alignment of canals, canal losses, estimation of design discharge, Kennedy's and Lacey's theory of regime channels.

Text Books:

1. Irrigation, Water Resources and Water Power Engineering, Modi P.N., Standard Book House, Delhi, 8th edition, 2012
2. Irrigation Engineering and Hydraulic Structures, Garg S.K., Khanna Publishers, Delhi, 1998

Reference Books:

1. Engineering Hydrology, Subramanya K, Tata McGraw-Hill Publishing Company Limited, New Delhi, 3rd edition, 2008
2. Irrigation and Water Power Engineering, Punmia B. C., Pande B. B., Lal, Ashok Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi, 1999
3. Fundamentals of Irrigation Engineering, Bharat Singh, Nem Chand & Bros, India; 6th revised edition, 1979
4. Irrigation and Water Resources Engineering, Asawa, G. L, New Age International Publisher, 1st edition, 2005
5. Theory and Design of Irrigation Structures, Varshney, Gupta & Gupta, Nem Chand & Bros

CE302U: DESIGN OF RCC STRUCTURES

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 04 Hrs

COURSE DESCRIPTION

The primary aim of this course is to provide an introduction to the analysis and design of reinforced concrete structures, by limit state method conforming to IS 456:2000. The course covers design of various elements viz. beams, slabs, columns, and footing in RCC. It equips the students with the tools necessary for designing RCC structures and to familiarize them with the relevant national design code.

COURSE OBJECTIVES

1. To understand behavior of structural members under various loadings.
2. To understand concept of RCC structural design
3. To conceive elementary deign of different structural elements.

COURSE OUTCOMES

After successful completion of this course; student will be able to

1. understand conceptually the difference between Working stress method, Ultimate load theory method & Limit state Design method.
2. design the structural elements like RCC beam, slab, column, and footings by limit state design method as per I.S.456-2000.
3. design two way slab & one way continuous slabs
4. design columns & footings for eccentric loads.
5. design RCC Retaining walls & design of water tanks.

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	2	1					1		1		1		
2	1	2	2	3							2	1		2	
3	2	2	1	3					2				2	2	
4	2	2	2						2		2	1	3		
5	1	2	1	2					1		2			2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Limit state Design Concept:, Partial safety factors, load factors, stress-strain relationship, stress block parameters, failure criteria, Use of I.S. 456-2000, Limit state of collapse in flexure : Design of one way single span and continuous slabs, canopies and two way slabs

with various end conditions using IS code coefficients Design of Singly and Doubly reinforced Beams, “T” and “L” beams.

Design of fixed beams, propped cantilever, two span symmetric continuous beams. Limit State of collapse in shear, Bond and Torsion, Design for Interaction between Bending moment, Torsional moment and Shear. Limit state of serviceability: Deflection and moment curvature relationship, for beams and one-way slabs.

Limit state of collapse under compression axially loaded short and long column, column with axial load, uniaxial and biaxial moment, Interaction diagram / Charts. Isolated footing for axially loaded columns, Uniaxial bending, combined footing: Rectangular footing, Strap beam and Trapezoidal etc.

Design of portal frames (single bay single storey) hinged or fixed at base. Design of Cantilever Retaining Walls

Design of Dog legged staircase

Design of Circular and Rectangular water tank with roof slab resting on ground

Text books:,

1. Limit State Design of Reinforced Concrete Structures, Ramchandra, Standard Book House, 3rd edition, 2014
2. Limit State Theory and Design of Reinforced Concrete, Structures, Karve S. R. and Shah V. L, Structured Publications, 9th edition, Pune, 2019
3. Reinforced Concrete Structures, Dr. B. C. Punmia and A. K. Jain, Laxmi Publications, 10th edition, New Delhi, 2015

Reference:

1. Limit state design of Reinforced Concrete Structures , Varghese P. C., Prentice Hall of India, 2008
2. Limit State Analysis and Design, P. Dayaratnram, Wheeler Publishing Company, Delhi, 12th edition, 2017
3. Reinforced Concrete Design, Pillai Menon, Tata McGraw Hill, New Delhi, 3rd edition, 2017
4. I.S. 456- 2000: Plain and Reinforced Concrete, Code of Practice, Bureau of Indian Standards, 2000
5. I.S. 3370-1967: Part I, II and Part IV, Code of Practice for Concrete Structures for Storage of Liquids, Bureau of Indian Standards, 2009
6. S.P. (16): Design Aids for Reinforced Concrete. (Interaction Charts Only) Bureau of Indian Standards, 1980

CE303U: TRANSPORTATION ENGINEERING

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The student will understand the importance & characteristics of road transport for geometric design of various roads with proper alignment based on planning principles and survey data. This course will gave the knowledge of highway materials & construction of various types of roads and identify the problems associated with roads & remedies for same. The purpose of this course is to provide knowledge on highway planning, geometric design of highways, highway maintenance and public transportation.

COURSE OBJECTIVES

1. To give the knowledge of planning, design and the fundamental properties of highway materials in highway engineering
2. To acquire the knowledge of geometric design
3. To expose the concept of different methods in design, construction, inspection and maintenance of the pavement
4. Undertake various Traffic studies and apply the knowledge to control the traffic
5. Understanding advance urban transport technology

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. be able to plan highway network and perform testing on highway material
2. design highway alignments and geometrics
3. analyze and design flexible and rigid pavements
4. design intersections and prepare traffic management plans
5. understand the principles of construction and maintenance of highways

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3			2			1						3		
2	3	3	3											3	
3	3	2	3		2									2	
4	3		3										3		
5	2	2												2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Highway Planning and Development: Different modes of transportation, role of highway transportation, Highway planning in India, 20 year road development plans and its salient

features, determination of road lengths departments in India, road classification, road authorities i.e. IRC, CRRI, NHAI, PMGSY Program etc., planning surveys, preparation of plans, final report, master plan, Current road projects in India, Financing of road projects,

Highway Alignment and Geometric Design: highway alignment, cross section, formation width, land width, design of vertical and horizontal alignment including curves, super elevation, sight distance, gradients, alignment and geometrics of hill roads.

Road Materials: Aggregates and their types, physical and engineering properties, fillers, bitumen, characteristics, emulsions and cutbacks, bituminous paving mixes; Portland cement and cement concrete: soil investigation and test on soil; CBR, plate load test for modulus of subgrade reaction.

Construction of Roads: Types of highway construction, construction of earth roads, gravel roads, WBM roads. Bituminous pavements, types, surface dressing, penetration macadam, built up spray grout, bitumen bound macadam, bituminous carpet, bituminous concrete. Cement concrete pavements.

Pavement Analysis: Standard axle load and wheel assemblies for road vehicles under carriage system for aircraft, tire and contact pressure, contact area imprints, computations of ESWL, flexible pavements-factors affecting design and performance; stresses in flexible pavements; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements;

Pavement Design: Design of flexible pavements as per IRC 37-2001 or revised and rigid pavements by IRC58-2002 or revised.

Traffic Engineering and Control: Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies-definition, purpose, types, survey methods, design of parking facility, highway lighting, Accident studies-purpose, types, causes, collision diagram, condition diagram, preventive measures, Pavement marking, signs, signals, traffic management, various types of intersection and its design criteria

Highway Maintenance: Pavement failures, causes, failures in flexible pavements and rigid pavements. Maintenance of highways, routine maintenance, periodic maintenance, special repairs. Strengthening of existing pavements, evaluation, overlay design. Highway drainage, surface and sub-surface drainage.

Advanced Urban Transport Technology: Classification, mass and rapid transit system, introduction to Intelligent Transportation system (ITS), electronic toll collection.

Text books:

1. Highway Engineering, Khanna S. K. CEG Justo and A. Veeraragavan, Nem Chand & Bros. Roorkee, 10th edition, 2015
2. Principles of Transportation Engineering, Das A. and Chakroborty P., Prentice Hall of India, 2nd edition, 2012
3. Highway Engineering, Kadiyali L. R., Khanna Books Publishing Co. New Delhi, 1st edition, 2019

Reference books:

1. Guidance of Design of Flexible pavement, Second Revision- IRC-37-2018
2. Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, 3rd Revision,IRC:58–2011
3. Highway Material & Pavement Testing, Khanna S. K. and CEG Justo, Nem Chand & Bros. Roorkee, 5th edition, 2015
4. Highway Engineering, Wright P. H. and Dixon C., John Willey, 7th Edition, 2015
5. Pavement Design and Materials, Papagiannakis A. T. and Masad E. A., John Willey, 1st edition, 2008
6. Principles of Highway Engineering & Traffic Analysis, Mannering F. L., Walter P. K. And Scott John, 3rd edition, Willey, 2011

CE304U(A) HYDRAULIC ENGINEERING

Teaching Scheme: 03L **Total:3Hr** **Credit:** 03
Evaluation Scheme:30 MSE + 10 ISA + 60 ESE **Total Marks:**100
Duration of ESE: 03Hrs

COURSE DESCRIPTION

This course provides the knowledge of fluid mechanics which includes, study of boundary layer and fluid flow around submerged bodies. Analysis of turbulent flow in pipes and pipe flow systems. Analysis of open channel flows: Uniform, critical, gradually and rapidly varied flows.

COURSE OBJECTIVES

1. To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
2. To make able to relate the theory and practice of problems in hydraulic engineering

COURSE OUTCOMES: Upon successful completion of this course the students will:

1. apply their knowledge of fluid mechanics in addressing problems in open channels.
2. solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
3. apply their knowledge to select suitable energy dissipater
4. able to calculate the efficiency of pumps

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2												2		
2	2						2							3	
3	3												3		
4	2													2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.

Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient, most economical section of channel. Computation of Uniform flow, Normal depth.

Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method.

Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, Moody diagram, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem.

Pumps: Introduction, function and principles, working of centrifugal pump, efficiency of pumps

Text Books

1. Hydraulics and Fluid Mechanics Including Hydraulic Machines , Modi S.M. and Seth S.M, PHI Learning Pvt. Ltd. 20th edition, 2015
2. Fluid Mechanics and Machinery, C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 1st edition, 2010
3. Fluid Mechanics and Hydraulics Machines, K. Subramanya, 2nd edition, McGraw Hill, 2018

Reference Books

1. Engineering Fluid Mechanics Garde R.J. and Mirajgaokar A.G., Scitech Publication 3rd edition, 2011.
2. Introduction to Fluid Mechanics and Fluid Machines, Som S. K., Gautam Biswas and Suman Chakraborty, McGraw Hill Education, 3rd edition, 2011
3. Flow in Open Channel, K. Subramanya, 1st edition, McGraw Hill, 2019

CE304U (B): CONSTRUCTION PRACTICE

Teaching Scheme: 3L **Total: 3Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course makes a student familiar with the detailed features of various building, bridges components and appraises about construction practices. The course includes description of construction practices used for sub structure, super structure of buildings bridges and tunnels**.**

COURSE OBJECTIVES

1. The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
2. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. identify problems in construction process and find out solution for different field problems.
2. understand and apply knowledge of latest construction practices and processes for construction of substructure and superstructure of structural systems.
3. apply latest construction practices for construction of bridges and tunnel construction.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	1		1		2	1					3	1	
2	2	1	2		2		1	1					2	3	
3	2	2	1		1		1	1					1	3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Construction Techniques: Development of construction techniques, High rise Building Technology, Eco Building (Green Building) - Material used, Passive buildings, Intelligent (Smart) buildings – Meaning;

Construction Practices: Specifications, details and sequence of activities and construction co-ordination, Site Clearance, Marking, Earthwork, damp proof courses, construction joints - movement and expansion joints, pre cast pavements, Building foundations, basements, temporary shed, centering and shuttering- slip forms, scaffoldings, de-shuttering forms, Fabrication and erection of - steel trusses, frames, weather and water proofing, roof finishes, acoustic and fire protection;

Sub Structure Construction: Techniques of Box jacking, Pipe Jacking, under water construction of - diaphragm walls and basement, Piling techniques, well and caisson, sinking cofferdam , cable anchoring and grouting, sheet piles – shoring for deep cutting, well points, Dewatering and stand by Plant equipment for underground open excavation

Super Structure Construction: Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls); Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures;

Tunneling: Geotechnical investigations, selection of alignment, methods of tunneling in soft soils and in hard rock, sequence of operations for drilling and blasting method, mechanical moles, boomers, tunnel boring machines, mucking, ventilation of tunnels, dust control, types of tunnel supports, sequence of lining operation, lining with pneumatic placers and by pumpcrete method, shortcrete;

Bridge Construction: Geotechnical investigation, Site selection, Launching girders, bridge decks, launching of bridges by incremental launching, using false work, balanced cantilever construction method, Coffer dams types and applications;

Text books:

1. Building Construction, Planning Techniques and Method of Construction, Arora S.P. and Bindra S.P., Dhanpat Rai and Sons, 1997
2. Harbour dock and tunneling, R. Srinivasan, Charotar publishing house private limited, 2016
3. Building Construction, B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi publications, 11th edition, 2016
4. Bridge Engineering, S. C. Rangwala, Charotar Publishing House Pvt. Limited, 16th edition, 2015

Reference books:

1. Construction and Foundation Engineering, Jha J and Sinha S.K., Khanna Publishers, 7th Edition, 2008
2. Construction Equipment and Management, Sharma S.C., Khanna Publishers New Delhi, 2012.
3. Construction Equipment and Job Planning, Deodhar, S.V. Khanna Publishers, New Delhi, 2012.
4. Construction Planning, Equipment and Methods, Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., 8th edition, McGraw Hill, Singapore, 2010

CE304U(C): EARTHQUAKE ENGINEERING

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The students need to understand the behaviour of structures under earthquake loads. Also, they should be able to understand the philosophy behind earthquake resistant design. This course will give methodology to students for efficient design of structures.

COURSE OBJECTIVES

1. Understanding to the behaviour of structures during earthquake ground motion.
2. To introduce design philosophy for earthquake resistant structures.
3. Understanding earthquake tips for structures.
4. To introduce necessary field arrangements for efficient seismic design.

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. identify appropriate earthquake zone for a particular location.
2. identify critical mode of vibrations
3. calculate base shear and storey forces.
4. produce efficient seismic design of buildings.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			1										2		
2					1	2							2		
3						2							3		
4					2		1	1					3	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Earthquakes: Causes of Earthquakes, Nature and Occurrence, Seismic Waves, Effects of Earthquakes, Earthquake Damage, Measurements of Earthquakes, Strong Ground Motion, Seismic Zoning, Response of Structure, Seismic Design.

Dynamics of Structures Connections: Modelling of Structures, Lumped Mass Approach, Generalized Displacement Procedure, Equations of Motion, Hamilton's Principle, Systems with Single Degree of Freedom, Dynamic Response of Single-storey Structure, Seismic

Response of SDOF Structures, Response Spectrum, Systems with Multiple Degree of Freedom, Modes of Vibration, Damping.

Seismic Analysis: Seismic Design Requirements , Design Earthquake Loads, Seismic Methods of Analysis, Equivalent Lateral Force Method, Forces in Seismic Analysis, Fundamental Natural Period, Seismic Base Shear, Seismic Weight, Torsion, Soft and Weak Storeys

Masonry Buildings: Categories of Masonry Buildings, Behaviour of Unreinforced and Reinforced Masonry Walls, Box Action and Bands, Behaviour of Infill Walls, Confined Masonry Construction, Improving Seismic Behaviour of Masonry Buildings, Restoration and Strengthening of Masonry Walls.

Reinforced Concrete Buildings: Damage to RC Buildings, Ductile Failure, Concrete Detailing, Flexural Members in Frames, Columns subjected to Axial Load and Bending, Introduction to IS Code on Ductile Detailing, Special confining Reinforcement, Joints of Frames, Shear Walls.

Non-structural Elements: Failure Mechanisms, Effect of Non-structural Elements on Structural System, Prevention of Non-structural Damage, Isolation of Non-structural components.

Text books:

1. Earthquake-Resistant Design of Structures, S.K. Duggal, Oxford University Press, 2nd edition, 2013
2. Earthquake-Resistant Design of Building Structures, Vinod Hosur, Wiley India, 2013
3. Basics of Structural Dynamics and Aseismic Design, S.R. Damodarasamy and S. Kavitha, Prentice Hall of India, 2014

Reference books:

1. Basic Earthquake Engineering, Haluk Sucuoglu and Sinan Akkar, Springer, 2014
2. Earthquake-Resistant Design of Structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India, 2013
3. IS 1893-2016 Criteria for Earthquake-Resistant Design of Structures
4. IS 13920-2016 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces

CE304U D: ARCHITECTURAL PLANNING AND INTERIOR DESIGNING

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course provides the knowledge of architectural design, building aesthetics, landscaping and interior designing.

COURSE OBJECTIVES

1. To understand architectural design of residential and public/commercial buildings.
2. To know landscaping for residential buildings and public/ commercial buildings
3. To understand interior designing of small commercial buildings

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. apply the knowledge, techniques, skills, and applicable tools of the discipline for architectural design of residential buildings and public/commercial buildings.
2. apply the knowledge for landscaping of residential buildings and public/ commercial buildings.
3. apply the knowledge for interior designing of small commercial buildings.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2									1	3	2	3		
2	2												2		
3	3										2		2		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Architectural design: Review of Architecture, Site selection, climatic conditions, sun control, orientation of building & site, Building bye laws and its applications.

Building Aesthetics: Feeling for aesthetics and utility, composition, utility, mass composition, order, expression, proportion, scale, accentuation, order, expression, proportion, scale, accentuation & rhythm, contrast, balance, pattern, Character of building.

Design of Projects: A case study of residential building, A case study of public / commercial building, Aspect of working Drawing – Plan, Elevation and Section.

Landscaping: Soft and hard landscaping, Basic principles of landscaping, Assessment of land, Design procedure, A case study of landscaping for public / commercial building campus.

Elements & principle of Interior Design: Elements such as form, texture, light, colour, effect of light on colour and texture, organization of space in design, space pattern, Importance of colour as art element, Various colour scheme

Anthropometrics Data: Relation of human measurement to furniture and movement to circulation patterns.

Interior materials: Different interior materials, paneling, partitions, finishing materials, furniture, False ceiling, Flooring, Paints.

Interior of Residential Building: Use of space, circulation, standard size of furniture, Plans and elevation of interior with furniture for living space, dining space, kitchen, bed room, guest room etc.

Interior of small commercial building: Planning of interior of small commercial units such as offices, consulting chambers, shops etc. Furniture details such as executive table, architectures table etc. used in commercial units

Text books:

1. Interior Design and Decoration, Premavathy Seetharaman and Parveen Pannu, CBS Publishers & Distributors Pvt. Ltd., 2013
2. Interior Design Illustrated, Frank Ching, Wiley, 3rd edition, 2012
3. Time Saver Standard for Interior Design and Space Saving, J.D. Chiara, J. Panch, M. Zelnik, McGraw Hill, 2001

Reference books:

1. SP7:2016 : National Building Code of India, Vol. 1 & Vol. 2, 2016
2. Architectural Graphic Standards, Dennis J. Hall, Nina M. Giglio, Wiley, 12th Edition, 2012
3. Human Dimension & Interior space: A Source Book of Design Reference Standards, Julius Panero, Whitney Library of Design, 11th edition, 1979
4. India: Decoration, Interiors, Design, Henry Wilson, Watson-Guptill Publications, 2001

CE305U (X) : BUILDING CONSTRUCTION PRACTICE

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The construction of buildings is everyone's need. The students admitted in other than Civil Engineering discipline are not conversant with building as a structure. Even though everyone understands building in general, but it is necessary to introduce these students engineering aspect in the construction, maintenance and safety of the building as a structure. This course will introduce students building as civil engineering structure which is important in every human being.

COURSE OBJECTIVES

1. To give an understanding to the students about building
2. To know planning aspect of a building
3. To expose to various principles involved in building construction, finishing, painting and plumbing.
4. To know routine methods of fire proofing, damp proofing and thermal insulation.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. be able to plan building and develop the building plans.
2. understand various parts of building.
3. adopt standard building provisions for natural ventilation and lighting.
4. able to identify effective measures for fire proofing, damp proofing, and thermal insulation.
5. able to understand routine building maintenance procedure

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1							2				3		
2	2	1	1											2	
3			3											2	
4			3											2	
5		1	2											2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Building planning, site selection, orientation from environmental and other factors, principles of planning buildings, open air spaces, requirement of parts of buildings, lighting and ventilation, requirements of various rooms, Building bye laws.

Components of building and their purpose and types; foundations, walls, columns, beams, roofs, lintel, arches, doors, windows; Bands and openings in the buildings;

Foundation of buildings, Different type of foundations and their details, suitability of different type, Piles, Type and their details

Brick masonry: Bonds in brick work, Types, junctions & pillars of different sizes, Requirements of good brick masonry

Building finishes: Plaster, properties of good plaster, preparation of surface, methods of plastering, Defects of plaster, Painting, preparation of surface & types, White washing, Colour washing, distemper, washing with snow-cem Painting

Doors and windows, - Location, function, various types.

Staircases: Location, function, various terms used, requirement of good stair, type of stairs, dimensioning of stair case, lift, escalators

Roofs: Necessity, pitched & flat roof, terms used in roofs, various types

Plumbing works in buildings;

Damp proofing; causes and effect of dampness, materials and methods of damp proofing;

Termite proofing: pre and post construction treatment;

Thermal insulation, methods of thermal insulation, thermal insulation of roofs and exposed walls;

Fire protection- fire hazards, characteristics of fire-resisting materials and common building materials;

Cracks in walls, floors and ceilings-causes and repairs techniques; Routine maintenance of buildings and structures.

Text books:

1. Building Construction, Punmia B. C., Jain A. K. and Jain Arun K., Laxmi Publications (P) Ltd., New Delhi, 11th edition, 2016
2. Building Construction, Sushilkumar, Standard Publishers Distributors, Delhi, 10th edition, 2010
3. Building Construction Material and Techniques, Purushothama Raj P., Pearson India Education Services Pvt., Ltd, Noida, 1st edition, 2017

Reference books:

1. Building Construction, Rangawala, Chaarotar Publishing House Pvt. Ltd., Delhi, 10th edition, 2010
2. Building Construction, Varghese P. C., PHI Learning Pvt. Ltd., 10th edition, 2012
3. SP7:2016 : National Building Code of India, Vol. 1 & Vol. 2, 2016

CE305U (Y): REPAIR AND REHABILITATION OF BUILDINGS

Teaching Scheme: 3L **Total: 3Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course deals with the repair and rehabilitation of structures and covers, introduction to the assessment of deterioration of concrete and masonry structures; repair and materials and strategies; compatibility aspects; durability and repair audits; methods and materials for rehabilitation of structures.

COURSE OBJECTIVE

1. To understand the process of rehabilitation of buildings
2. To know the methods and materials for rehabilitation of structures
3. To understand methods of testing the material properties
4. To understand methods of repair and rehabilitation

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. understand the causes for distress and deterioration of structures.
2. select materials and techniques for repairing and rehabilitation of deteriorated structures.
3. prepare a plan for repair and rehabilitation works.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			2												
2					2	1									
3	1				1										

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction to Rehabilitation of Buildings: An overview of present repair practices for buildings, distress identification and repair management, Causes of distress in concrete and masonry buildings, Permeability of concrete, aggressive chemical agents, durability aspects, Condition Survey- Definition, objectives, different stages-Preliminary inspection, planning stage, visual inspection, field laboratory testing stage, consideration for repair strategy.

Non Destructive and Destructive Testing Methods: Non-Destructive evaluation tests - Concrete strength assessment - Rebound hammer test - Ultrasonic pulse velocity tests, penetration resistance, pull out tests, core sampling and testing, Chemical tests, Carbonation tests and chloride content, Corrosion potential assessment.

Evaluation of Properties of Building: structural integrity and soundness assessment, interpretation and evaluation of results, Evaluation of reserve strength of existing structures, identifying critical sections, active and passive repairs;

Materials for Repair Selection of repair materials for masonry and concrete buildings-Essential parameters for repair materials-Strength and durability aspects, cost and suitability aspects, Materials for repair-Premixed cement concrete and mortars, polymer modified mortars and concrete, epoxy and epoxy systems including epoxy mortars and concrete, polyester resins, coatings,

Repairs and Rehabilitation methods : Rehabilitation and retrofitting methods-repair options, performance requirements of repair systems, important factors to be considered for selection of repair methods, Repair stages, Guniting, shotcreting, polymer concrete system, reinforcement replacement, strengthening concrete by surface impregnation, polymer and epoxy overlays, Resin/polymer modified slurry injection, plate bonding technique, ferro-cement jacketing, RCC jacketing, propping and supporting, fiber wrap technique, foundation rehabilitation methods, chemical and electrochemical method of repair, Repair/Rehabilitation strategies- Stress reduction technique, repair and strengthening of columns and beams, base isolation.

Planning for repair and rehabilitation works: Preparing work plan for repair and rehabilitation works, execution of work, post repair inspection

Text books:

1. Maintenance Repair and Rehabilitation & Minor works of Building, Varghese P.C., Prentice Hall India, 2014
2. Repair and Rehabilitation of Concrete Structures, Modi P.I., and Patel C. N., Prentice Hall India, 2016
3. Rehabilitation of Concrete Structures, Vidivelli B., Standard Publishes Distribution, 1st edition, 2009

Reference books:

1. Structural Health Monitoring, Ravishankar K. , Krishnamoorthy T.S, Allied Publishers, 2004
2. CPWD Handbook on Repair and Rehabilitation of RCC buildings, Govt. of India Press, New Delhi

CE306U CONSTRUCTION MANAGEMENT

Teaching Scheme: 3L **Total: 3Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course introduces the students about concepts in Project Management such as: Scope of Project Management civil Engineering society, Importance of Project Management for large scale works, Principles of Project Management and its techniques and Application of CPM and PERT techniques for project management with special applications to civil engineering.

COURSE OBJECTIVES

1. To understand the project management techniques in various civil engineering fields.
2. To know the concept of critical path methods and project evaluation and research techniques.
3. To understand scheduling of projects by CPM and PERT.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. apply advanced techniques and methods in project management of civil engineering work
2. plan, control and monitor construction projects with respect to time and cost
3. apply the financial concepts relating to construction industry for achieving economy and reducing project duration
4. use different equipment's in construction industry

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2					1	1					3	1	
2	1	1					1						3	1	
3	1	1					1							2	
4	1												2	1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Construction organization: Construction industry, construction team, construction activities, classification of construction, stages in construction, need of management in construction. Job layout and value engineering. Leadership and its quality, organization, meaning and function, forms of organization-line, line and staff, functional, Type A, Type B and Type C.

Construction project planning: Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail, Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations,

sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion;

Construction equipment: Selection of equipment for earth work – earth moving operations , types of earthwork equipment -tractors, motor graders, scrapers, front end waders, earth movers, Equipment for foundation and pile driving, Equipment for material handling and erection of structures, types of cranes, Equipment for dredging, trenching, tunneling, Equipment for Dewatering; transportation of materials, Concrete mixing, transporting & placing;

Planning and organizing construction site and resources at Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation;

Cost Analysis: Cost analysis, cost curve, optimization and crashing of networks. Updating of network during monitoring, resource levelling, allocation, levelling and smoothening, Line of balance-Concept and uses, Materials management: Functions and objective, materials procurement and delivery Inventory control, BOQ techniques;

Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses, Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters, Delays, penalties and liquidated damages, Force Majeure, Suspension and Termination.Changes & variations, Dispute Resolution methods.

Text books:

1. Construction Planning, Equipment's and Methods, R. L. Peurifoy, 7th edition, Tata McGraw-Hill, 2002
2. Construction Project management, Theory & Practice, Kumar Neeraj Jha, Pearson Education India, 2nd edition, 2015
3. Project Planning with PERT and CPM, Punmia, B.C., Khandelwal, K.K., Laxmi Publications, 4th edition, 2016

Reference books:

1. Construction Equipment and Job Planning, S. V. Deodhar, Khanna publishers, 4th edition, 2012
2. PERT and CPM Principles and Applications, L. S. Srinath, Affiliated East West Press Pvt. Ltd., 3rd edition, 2012
3. Principles of Construction Management, Roy Pilcher, McGraw-Hill, 3rd edition, 1992
4. Project Management: Techniques in Planning and Controlling Construction Projects, Hira N. Ahuja, S. P. Dozzy, S. M. Abourizk, John Wiely, New York, 1994

CE307U: DESIGN OF RCC STRUCTURES LAB

Teaching Scheme:2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

The primary aim of this course is to analysis and design of reinforced concrete structures, by limit state method conforming to IS 456:2000. The course covers design of various elements viz. beams, slabs, columns, and footing in RCC. It equips the students with the software tools necessary for designing RCC structures.

COURSE OBJECTIVES

1. To prepare detailing of reinforcement of members under various loading conditions
2. To prepare schedule of the reinforcement
3. To practice the elementary design of different structural elements

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. implement the concepts of structural design procedure
2. design the individual members and hence building as a whole
3. implement the concept of detailing of reinforcement

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	2	2							1	1	3		
2	1	1	2	2			1				2		2		
3	2	2	1	3			1		2				2	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Following assignments shall be performed to cover entire curriculum of course CE302 U. List given below is just a guideline.

1. Design of beams and slabs and prepare detailed drawing of beams and slab with reinforcement detailing.
2. Design of columns and footings and prepare detailed drawing of columns and footings
3. Design of staircase.
4. Project: Design of G+1 Building with detailed drawing of designs should be completed with AutoCAD software
5. A report on at least one site visit shall be submitted in ICA

Note:

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The

performance shall be assessed experiment wise using internal continuous assessment format..

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be outside the institute.

CE308U DAMS AND HYDRAULIC STRUCTURES LAB

Teaching Scheme: 02P **Total: 02Hr** **Credit: 01**

Evaluation Scheme:25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This course provides the knowledge of stability analysis of gravity dam and earth dams. Design of ogee spillway and analysis of weir using Khosala's theory will also learned.

COURSE OBJECTIVES

1. To do the stability analysis of gravity and earth dam
2. To design of ogee spillway
3. To do analysis of weir on permeable foundation.

COURSE OUTCOMES:

Upon successful completion of this course the students will:

1. understand different levels in reservoir
2. able to design practical profile of gravity dam & ogee spillway
3. able to analyze the weir on permeable foundation
4. able to do the stability analysis of earth dam, gravity dam and weir

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			2										2		
2	3												3		
3	3												3		
4							2						3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE301U. List given below is just a guideline.

1. Fixing the control levels of reservoir from the given data
2. Determination of elementary and practical profile of gravity dam, Stability analysis of a gravity dam considering all major forces and plotting the section on drawing sheet
3. Construction of phreatic line for earth dam under various conditions
4. Stability analysis of downstream slope of earth dam for steady seepage condition
5. Design of ogee shape spillway with stilling basin and plotting its section on drawing sheet
6. Design and plotting of various types of energy dissipaters
7. Analysis of weir on permeable foundation by using Khosla's charts.
8. Design and plotting typical cross section of canals in cutting, partial cutting and banking, fully banking
9. Drawings of diversion headwork, weirs and barrages,
10. Site visit to any dam and submission of detailed report based on visit including photos and drawings.

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE309U TRANSPORTATION ENGINEERING -LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

The student will be able to determine the engineering characteristics of highway material viz. soil, aggregate and bitumen. It will helpful to understand design and analysis of flexible and rigid pavement. The site visit will enhance the actual field experience about construction of highway.

COURSE OBJECTIVES

1. To study the identification of good highway material.
2. To study the different physical properties of aggregates by performing different test on road aggregates
3. To understand the various properties of bitumen material and mixes by performing various tests on it.
4. To able to design highway pavement.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. able to characterize the pavement materials soil, aggregate and bitumen
2. able to design bitumen mix
3. perform quality control tests on pavements and pavement materials.
4. able to design flexible and rigid pavement

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2											2		
2	2													3	
3		3												2	
4			3											3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE303U. Minimum three from group A, two from group B, one from group C and two from group D to be performed.

A. Test on Bitumen

1. Penetration test
2. Ductility of Bitumen
3. Softening point of Bitumen
4. Flash & fire point
5. Specific gravity of Bitumen
6. Viscosity of Bitumen
7. Bitumen extraction test (on premix sample)

B. Tests on Aggregates

8. Stripping value of road aggregates.

9. Crushing test
10. Abrasion test
11. Impact test
12. Shape Test

C. Test on Soil

13. CBR test
14. Plate load test (for modulus of subgrade reaction)
15. Dynamic cone penetration test

D. Design

16. Bituminous mix design Marshal Stability test
17. Numerical / software based on Flexible Pavement Design
18. Numerical / software based on Rigid Pavement Design
19. A report on at least one site visit for major road projects or hot mix plant

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE310U(A) HYDRAULIC ENGINEERING LAB

Teaching Scheme: 02P, Total: 02Hr Credit: 01
Evaluation Scheme:25 ICA + 25 ESE Total Marks: 50

COURSE DESCRIPTION

This laboratory covers experiments related to measurement of drag and lift, characteristics curve for wind tunnel, determination of manning's constant, coefficient of discharge and study of hydraulics jumps.

COURSE OBJECTIVES

1. To measure the pressure distribution by using wind tunnel
2. To determine Manning's Chezy's constant
3. To study of hydraulic Jumps
4. To study velocity distribution in open channel

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. able to determine the Manning's and Chezy's coefficients for smooth and rough channels
2. able to calculate the discharge through venturiflume
3. able to determine the discharge over wier
4. able to understand velocity distribution in open channel

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					1									2	
2							2							2	
3					2									1	
4			2											2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE304U(A). List given below is just a guideline.

1. Determination of Manning's and Chezy's coefficients for smooth and rough channels by gradually varied flow method.
2. Determination of Energy loss in Hydraulic jump.
3. Determination Velocity distributions in open channels
4. Measurement of lift and drag to determine characteristics of aerofile
5. Calibration of static pitot tube
6. Study of Uniform Flow – Determination of Manning's constant
7. Calibration of Venturiflume- Determination of coefficient of discharge
8. Calibration of Broad crested weir- Determination of coefficient of discharge
9. Flow through orifice meter
10. Measurement of Velocity of flow by current meter / Floats / Hot-wire anemometer
11. Flow through pipes in series and pipes in parallel
12. A site visit to canal or pipe network to understand the application

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE310U (B): CONSTRUCTION PRACTICES LAB

Teaching Scheme: 2P **Total: 2Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This is a basic course which makes a student familiar with the detailed features of various building, components and appraises about construction practices. The course includes description of construction practices used for sub structure, super structure of buildings and tunnels**.**

COURSE OBJECTIVES

1. The main objective of this course is to make the student aware of the various construction techniques, practices needed for different types of construction activities.
2. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. Set foundation plan of load bearing and framed structures on drawing sheets and on ground.
2. Through field visit students will aquire knowledge of various construction practices adopted at site.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2				2	2	1					3	1	
2	2	1				1	1	1					1	3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum Six experiments shall be performed to cover entire curriculum of course CE310U(B). The list given below is just a guideline.

1. Preparation of foundation plan of load bearing structure from the given plan and section consisting of minimum four rooms and toilet block on drawing sheet / Auto CAD and its Setting out on ground.
2. Preparation of foundation plan of framed structure from the given plan and section consisting of minimum four rooms and toilet block on drawing sheet / Auto CAD and its Setting out on ground.
3. Study of various formworks with case study
4. Study of erection of steel trusses with case study
5. Study by market survey for various weathering and water proofing materials
6. Study of construction of pile foundation
7. Study of equipment’s for dewatering and open excavation

8. Field visits to construction sites of building for studying various construction activities and preparing the report.
9. Field visits to construction sites of culvert/bridge for studying various components and construction details and preparing the report.
10. Preparation of case study of construction of tunnel including various aspects of construction techniques/ procedure.

Note:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE310U(C): EARTHQUAKE ENGINEERING LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**
Evaluation Scheme: 25 ICA + 25ESE **Total Marks: 50**

COURSE DESCRIPTION

The students admitting in Civil Engineering discipline have to understand behaviour of structures under Earthquake strong ground motions. Also, they should be able to enhance seismic performance of structures. This course will give exposure to students to understand earthquake engineering for building structures.

COURSE OBJECTIVES

1. Understanding earthquake loadings coming on the structures.
2. To apply ductile design philosophy for Reinforced Concrete building structures.
3. To make use of relevant IS codes for Earthquake Resistant Design of Structures.

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. identify Earthquake Zones for a particular location.
2. calculate Earthquake loads for various structures.
3. understand suitable ductile detailing.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1					2								2		
2						2		1					3		
3			1			2							2		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE304U(C). List given below is just a guideline.

1. Identifying Earthquake Zone for a particular location.
2. Collection of the data for past Earthquakes.
3. Collection of Time-History for important Indian Earthquakes in the past.
4. Calculation of dynamic properties for Single Degree of Freedom system.
5. Determining natural frequency for SDOF system.
6. Determining natural frequency and modes shapes for two DOF system.
7. Calculation of design seismic loads for building frames (Static analysis).
8. Calculation of design seismic forces for building frames (Response Spectrum).
9. Applying Earthquake tips for a typical masonry building.
10. Drawing ductile detailing for a typical RC Beam.
11. Drawing ductile detailing for a typical RC Beam-Column joint
12. Drawing special confining reinforcement for a typical RC Column and Footing.

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill

acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE310U(D): ARCHITECTURAL PLANNING AND INTERIOR DESIGNING LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This course provides the knowledge of architectural design, building aesthetics, landscaping and interior designing.

COURSE OBJECTIVES

1. Architectural design of residential and public/commercial buildings.
2. Landscaping for residential buildings and public/ commercial buildings
3. Interior designing of small commercial buildings

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. apply the knowledge, techniques, skills, and applicable tools of the discipline for architectural design of residential buildings and public/commercial buildings.
2. apply the knowledge for landscaping of residential buildings and public/ commercial buildings.
3. apply the knowledge for interior designing of small commercial buildings.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2									1	3	2	3		
2	2												3		
3	3										2		3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Minimum Six experiments shall be performed to cover entire curriculum of course CE310 U (D). The list given below is just a guideline.

1. Planning of multistoried residential building considering site conditions, climatic conditions, building rules and bye laws, principles of planning, building aesthetics and drawing its Plan, Elevation and Section on sheet / AutoCAD / Revit
2. Planning of multistoried commercial building considering site conditions, climatic conditions, building rules and bye laws, principles of planning, building aesthetics, mass composition and drawing its Plan, Elevation and Section on sheet / AutoCAD / Revit
3. Design of landscaping for public / commercial building campus and its drawing
4. Interior of Residential Building: Plans/ elevation /isometric of interior with furniture for living space, dining space, kitchen, bed room, guest room etc

5. Interior of small commercial building: Planning of interior of small commercial unit such as office/ shops with furniture details such as executive table, architectures table etc. used in commercial units and its drawings
6. Market survey for interior material available in the market
7. Site visit to a interior of residential building / commercial building

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute

CE351U: ADVANCED THEORY OF STRUCTURES

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

Structural analysis is an important aspect of civil engineering. The determinate structures are covered by the previous courses. However this course covers the statically indeterminate structures, which emphasis on the analysis of statically indeterminate beams and rigid frames. Methods included are moment area method to calculate slope and deflection, and matrix analysis.

COURSE OBJECTIVES

1. To understand analysis of curved members
2. To understand approximate methods of analysis
3. To study Unsymmetrical Bending and Shear Center, analysis of space trusses
4. To understand basics of theory of elasticity

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. formulate equilibrium and compatibility equations for structural members
2. analyze one dimensional indeterminate problems using classical methods
3. analyze indeterminate structures using energy methods
4. analyze structures for gravity loads and moving loads

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	2	2			1		1		1		3		
2	2	1	2				1		1		2		2	1	
3	2	2	1	3			1		2		1		2	2	
4	2	3	2				1		2		1	1	3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Basic Concepts of Structural Analysis: Types of skeletal structures, static and kinematics indeterminacy, equilibrium and compatibility conditions, stress-strain relations, force displacement relations, concept of linear/non- linear structures. Energy theorem, Muller Breslau principle, concept of complementary energy, fundamental concept of force and the displacement method of analysis.

Slope Deflection Method: Applied to continuous and rigid jointed frames, transverse and rotational yielding of supports.(up to three unknown),Sway and non-sway problems.

Moment Distribution Method: Applied to continuous beams and rigid jointed rectangular frames, transnational and rotational yielding of supports.

Kani's, moment distribution for framed structures

Approximate Analysis of Multistory Frames: Vertical and lateral loads, substitute frame, portal frame and cantilever method.

Fundamental Concept of Flexibility: Method for structural analysis, flexibility coefficient, matrix formulation for flexibility methods, degree of freedom. Influence coefficients, physical significance, choice of basic determinate structure and redundant forces, compatibility equations, effect of settlement and rotation of supports, temperature and lack of fit, hand solution of simple problems on beams, pin jointed plane truss and rigid jointed frames (Up to three unknowns)

Fundamental Concept of Stiffness: Method of structural analysis, stiffness coefficient, matrix formulation for stiffness methods, degree of freedom. Influence coefficients, physical significance effect of settlement and rotation of trusses and rigid jointed plane frames (Upto three unknown)

Text Books:

1. Basic Structural Analysis, Reddy C. S., 3rd edition, Tata – McGraw Hill, New Delhi, 2012.
2. Theory of structures, S. Ramamrutham, Dhanpat Rai Books Publishers New Delhi, 9th edition, 2014

Reference Books:

1. Structural Analysis, Bhavikatti S. S., New Age Publication, 4th edition, 2013
2. Theory of Structures, Stephen P. Timoshenko and D. H. Young, 2nd edition, McGraw-Hill, 1965
3. Structural Analysis, G. S. Pandit and S. P. Gupta, Tata McGraw Hill, Pub. Co. Ltd., New Delhi, 2nd edition, 2008

CE352U: GEOTECHNICAL ENGINEERING

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The course applies and extends the fundamental understanding of soil mechanics to the design of geotechnical engineering systems. This course will introduce student importance of soil with respect to civil engineering structures. The student will acquire the knowledge of index and different engineering properties, its method of determination and usefulness.

COURSE OBJECTIVES

1. To introduce the formation of soil
2. To understand soil as an engineering material.
3. To expose students to various index and engineering properties of soil.
4. To make aware about the behavior of soil with structural load.
5. To understand the process of ground improvement.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. be able to identify index, engineering properties of soil and its classification.
2. understand the effective stress principle under various field conditions
3. be able to evaluate the permeability and compaction characteristics & its application.
4. determine the stress distribution under applied loads.
5. understand shear strength parameters, consolidation settlement and ground improvement.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1									3		
2	3												3		
3	3		2										3		
4	3	1		2									2		
5	3	3											2		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction: Soil formation- Development of soil mechanics- Importance of soil engineering- Major soil deposits of India.

Basic Definitions and Relationships: 3-phase soil system, volumetric relationships and weight volume relationships.

Determination of Index Properties: Water content, Specific gravity, Grain size distribution by sieve and hydrometer analysis, Relative density, Atterberg's limits and indices.

Classification of Soils: Classification of soil systems – Particle size classification, Textural classification, AASHTO classification, Unified soil classification and Indian soil classification- Field identification of soils.

Soil Water: Types of soil water, Capillarity in soils, Permeability of soils, Darcy's law, Determination of permeability of soils by laboratory and field methods, Permeability of stratified soils, Seepage velocity, Absolute coefficient of permeability, Factors affecting permeability- Effective stress principle- Effective stress under different field conditions- Seepage pressure-Quick sand condition.

Compaction of Soils: Definition and importance of compaction – Standard Proctor compaction test, Modified compaction test- Factors affecting compaction- Influence of compaction on soil properties – Field compaction and its control.

Stress distribution in Soils: Importance of estimation of stresses in soils – Boussinesq's and Westergaard's theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal planes – Newmark's influence chart.

Consolidation: Types of compressibility – Immediate settlement – Primary consolidation and secondary consolidation – Stress history of clay, normally consolidated soil, over consolidated soil and under consolidated soil- preconsolidation pressure and its determination- Estimation of settlements -Terzaghi's 1-D consolidation theory – Coefficient of consolidation and its determination.

Shear Strength: Definition and use of shear strength - Source of shear strength- Normal and Shear stresses on a plane – Mohr's stress circle- Mohr-Coulomb failure theory- Measurement of shear strength, Drainage conditions -Direct shear test, Tri-axial shear test, Unconfined compression test and vane shear test – Factors affecting shear strength of granular soils and cohesive soils.

Ground Improvement : Need and objectives, Classification of Ground Modification Techniques – suitability and feasibility, methods of compaction, shallow and Deep compaction techniques, Vibro-floatation, Blasting, Dynamic consolidation, vacuum consolidation, pre-compression and compaction piles

Text books:

1. Geotechnical Engineering, Dr. C. Venkatramaiah, New Age International Publishers, 6th edition, 2018
2. Soil Mechanics and Foundation Engineering, K. R. Arora, Standard Publishers and Distributors, New Delhi, 7th edition, 2018.
3. Textbook of Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS Publishers & Distributors, 1st edition, 2018

Reference books:

1. Soil Mechanics and Foundations, B. C. Punmia, Ashok Kumar Jain, Laxmi Publication (P) Ltd., 16th edition, 2005

2. Geotechnical Engineering, Gulhati and Datta , Tata McGraw Hill, 4th edition, 2006.
3. Geotechnical Engineering: A Practical Problem Solving Approach, Nagaratnam Sivakugan and Braja M. Das, J. Ross Publishing, 2010
4. Soil Mechanics and Foundations, Muniram Budhu, John Wiley and Sons, 3rd edition, 2010
5. Basic and Applied Soil Mechanics, Gopal Ranjan and A. V. S. Rao, New Age International Publishers, 2nd edition, 2005

CE353U: DESIGN OF STEEL STRUCTURES

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 4 Hrs

COURSE DESCRIPTION

The students admitting in Civil Engineering discipline have to understand the behaviour of various steel structural components. Also, they should be able to understand the philosophy behind design of steel structures. This course will give methodology to students to design of steel structural components.

COURSE OBJECTIVES

1. To give an understanding to the behaviour of steel structural components.
2. To introduce design philosophy for steel structures.
3. Understanding drawings of steel structures.
4. To introduce necessary field arrangements for steel structures.

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. calculate design loads for various steel structural components.
2. design simple steel structures.
3. design simple steel connections.
4. understand details of steel structural drawings.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2											2		
2	1		3		2				..				3	2	
3	1		3		2								3	2	
4	1		3		2								3	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction: Principles of structural design, Structural systems, Role of the designer, Advantages of steel as a structural material, Types of structural steel, Mechanical properties of steel, various rolled steel sections (including cold-formed sections, structural pipe (tubes)) sections and their properties. Design philosophies: Introduction to working stress method, Limit state method. Introduction to Plastic theory: Plastic hinge concept, Plastic moment, Shape factor, Plastic section modulus. Types of loads acting on structure, Introduction to IS Codes and specifications: IS 875, IS 800

Connections:
Bolted connections: Types of bolts, Behaviour of bolted joints. Strength of joint, efficiency of joint, Analysis and Design of connections, Beam to beam, beam to column.
Welded connections: Types and properties of welds, Types of joints, Design of connections, Beam to beam, beam to column.
Analysis and design of moment resisting bolted and welded connection

Tension Members: Identification of tension members in various types of Structures;
Behaviour of tension members; Mode of failures; Design of single and double angle sections.

Compression Members: Identification of compression members in various types of Structures; Behaviour of compression members ; Mode of failures; Classification of cross section; Effective length , slenderness ratio, Design strength ,Compression members in roof trusses.

Beams and Columns: Behaviour of beams; simply supported beams; Laterally restrained and unrestrained, Design of Beams; Welded Plate Girder; Curtailment of flange plates.

Columns and Bases: Behaviour of Column members in various types of Structures; Load calculations for columns; Design of columns subjected to axial load and biaxial bending; Built-up column sections; Laced and Battened columns; Slab bases

Text books:

1. Design of Steel Structures- Limit State Approach, N. Subramanian, Oxford University Press, 2015
2. Limit State Design of Steel Structures, V.L. Shah and V. A. Gore, 1st edition, Structures Publications, 2009
3. Design of Steel Structures by Limit State Method, S. S. Bhavikatti, I.K International Publishing House Pvt. Ltd., 2012

Reference books:

1. Design of Steel structures, Edwin Gaylord and Charles Gaylord, Tata McGraw Hill, 2010
2. Steel Structures: Controlling behaviour through Design, Robert Englekirk, John Wiley and Sons, 2003
3. Limit State Design in Structural Steel, M. R. Shiyekar, PHI Learning Pvt. Ltd., 2nd edition, 2013
4. IS 800 (2007) General Construction in Steel — Code of Practice

CE354U (A): ADVANCED SURVEYING

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course provides the knowledge of surveying using advanced surveying equipment's such as digital level, EDM, Digital Theodolite and Total Station and advanced technology such as GIS, GPS and mobile apps.

COURSE OBJECTIVES

1. Carry out Leveling and Surveying using advanced surveying equipment's such as digital level, EDM, Digital Theodolite and Total Station
2. To understand basic concepts and terminology related with GIS and Remote Sensing for carrying out survey and preparation of 3D views of terrains
3. To have knowledge of GIS and GPS software and mobile apps for surveying applications

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
2. apply knowledge of GIS and Remote Sensing for carrying out survey and preparation of 3D views of terrains
3. apply the knowledge of photogrammetry for surveying and preparation of maps.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1				2					1	1	3		
2	2			2		2						1	2	3	
3	2			2								1	2	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Use of Advance Surveying and leveling equipment's:

Study and use of Digital level, transferring and storing leveling data in computers, preparing leveling pages through software

Study and use of Electronic Distance Meter, Principle of Electronic Distance Measurement, Prisms used, Field procedure of measuring distance between points with EDM, EDM without reflecting prism, error sources

Study and use of Digital Theodolite, Measuring distances, elevation, horizontal and vertical angles of an object and. between points

Study and use of Total Station – Parts of a Total Station, Accessories, Advantages and Applications, Field equipment, Setup, Measurements with total stations, Traversing, Recording angle and distance observations in the field, Calculating rectangular coordinate information from the field observation, Data retrieval, Data processing, Data plotting, Construction layout using Total station , Checking for sources of errors with Total Station, Maintenance

Land Surveys: Layouts, Measurements

Construction and Boundary Surveys: Equipment for construction surveys, Setting out pipe line, setting out buildings and structures, setting out a highway

Geographical Information system: Introduction, Objectives, GIS Architecture (subsystems), Components of GIS, GIS data types, Data models, Data acquisition in GIS, Data processing, Implementation of GIS, Airborne Laser Thematic Mapper (ALTM) LIDAR, Principles and methods of data collection, Digital Elevation Models, GIS Softwares

Global Positioning Systems: Earth surface datum, Coordinate systems, segments of GPS Systems, GPS receiver and its components, different methods of observations, Surveying with GPS, Co-ordinate transformation, accuracy considerations

Drone Surveying: Land mapping drones and their benefits, drone surveying applications, benefits of drone surveying, land surveying by drones, processing drone data, processing drone survey data, aerial surveying and mapping with drone images, drone softwares, drone regulations

Surveying using mobile apps: Mobile apps for surveying and their applications, **Property Surveying**

Text books:

1. Advanced Surveying: Total Station, GIS and Remote Sensing, Satheesh Gopi, R. Satishkumar and N. Madhu, Pearson India, 1st edition, 2008
2. Surveying and Leveling, Vol. I and II, Bhavikatti, S.S., I.K. International Publishing House Pvt. Ltd., 1st edition, 2010
3. Higher Surveying, Chandra, A.M., New Age International (P) Limited, 2nd edition, 2005
4. Surveying, Vol-I, II and III, Arora, K.R., Standard Book House, 2015

Reference books:

1. Geomatics Engineering, Manoj, K. Arora and Badjatia, Nem Chand & Bros., 2011
2. Remote sensing and Geographical information system, Anji Reddy, M., B.S. Publications, 2001.

CE354U(B): REHABILITATION OF STRUCTURES

Teaching Scheme: 3L **Total: 3Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course deals with the repair and rehabilitation of buildings, bridges pavements. It covers the following topics: introduction to the assessment of deterioration of concrete structures; repair and materials and strategies; compatibility aspects; durability and repair audits; methods and materials for rehabilitation of buildings.

COURSE OBJECTIVES

1. To understand rehabilitation of RCC structures
2. To know causes of deterioration, assessment of distressed building and other structures
3. To understand the rehabilitation methods and materials for.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. estimate causes for distress and deterioration of buildings.
2. apply Non Destructive Testing techniques to field problems
3. suggest materials and techniques for repairing and rehabilitation of deteriorated concrete structures.
4. prepare concrete investigation reports for repair and rehabilitation projects.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1			1		2	1					2	3	
2	1	2			1		1	1					3	2	
3	2	1			1		1	1					2	2	
4	1	2			1		1	1					1	3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction to Rehabilitation: An overview of present repair practices, distress identification and repair management, Causes of distress in concrete structures, Permeability of concrete, aggressive chemical agents, durability aspects, Condition Survey-Definition, objectives, different stages-Preliminary inspection, planning stage, visual inspection, field laboratory testing stage, consideration for repair strategy.

Non Destructive and Destructive Testing Methods: Non-Destructive evaluation tests - Concrete strength assessment - Rebound hammer test - Ultrasonic pulse velocity tests, penetration resistance, pull out tests, core sampling and testing, Chemical tests, Carbonation tests and chloride content, Corrosion potential assessment, cover meter survey, half-cell potentiometer test, resistivity measurement;

Evaluation of Structural properties: structural integrity and soundness assessment, interpretation and evaluation of results, Evaluation of reserve strength of existing structures, analysis necessary to identify critical sections;

Repair materials and Selection of repair materials for concrete-Essential parameters for repair materials-Strength and durability aspects, cost and suitability aspects, Materials for repair-Premixed cement concrete and mortars, polymer modified mortars and concrete, epoxy and epoxy systems including epoxy mortars and concrete, polyester resins, coatings,

Repair/ Rehabilitation methods and strategies: Rehabilitation and retrofitting methods-repair options, performance requirements of repair systems, important factors to be considered for selection of repair methods, Repair stages, Guniting, shotcreting, polymer concrete system, reinforcement replacement, strengthening concrete by surface impregnation, polymer and epoxy overlays, Resin/polymer modified slurry injection, plate bonding technique, ferrocement jacketing, RCC jacketing, propping and supporting, fiber wrap technique, foundation rehabilitation methods, chemical and electrochemical method of repair, Repair/Rehabilitation strategies- Stress reduction technique, repair and strengthening of columns and beams, base isolation, rehabilitation of bridges, pavements;

Demolition Techniques - Engineered demolition methods - case studies

Text books:

1. Maintenance Repair and Rehabilitation & Minor works of Building, Varghese. P. C, Prentice Hall India Pvt. Ltd, 2014
2. Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Ravishankar K. Krishnamoorthy T. S, Allied Publishers, 2004
3. Rehabilitation of Concrete Structures, Vidivelli B, Standard Publishes Distribution.1st edition, 2009
4. Concrete Technology- Theory and Practice, Shetty. M. S., S. Chand and Company, 2008

Reference books:

1. CPWD Handbook on Repair and Rehabilitation of RCC buildings, Govt. of India Press, New Delhi
2. Learning from failures - Deficiencies in Design, Construction and Service, Raikar, R.N. R and D Centre (SDCPL), Raikar Bhavan, Bombay, 1987
3. Forensic Structural Engineering HandBook Robert T. Ratay, McGraw Hill, 2nd edition, 2010
4. Concrete Structures, Materials, Maintenance and Repair, Denison Campbell, Allen and Harold Roper, Longman Scientific and Technical UK, 2011
5. Concrete Bridge Practice: Construction, Maintenance and Rehabilitation, Shroff Publishers and Distributors Pvt. Ltd.; 1st edition, 2005
6. Handbook on seismic retrofit of buildings, A. Chakrabarti, Devdus Menon, Amlan K. Sengupta., Narosa Publishing House, 2010

CE354U(C): PRESTRESSED CONCRETE

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

This course is intended to provide the engineering student with the basic tools required to design and build prestressed concrete structures. Emphasis will be placed on the behavior of prestressed concrete under load along with potential failure mechanisms

COURSE OBJECTIVES

1. To prepare civil engineering graduates who can analyze and design prestressed concrete structures.
2. To study concept of pre-stressed concrete methods of pre-stressing along with its advantages
3. To study concept of analysis & design of Pre-stressed concrete sections
4. To understand various aspects of maintenance and rehabilitation of prestressed concrete structures

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. comprehend the concept of prestress and losses in prestress
2. appraise the prestressed flexure section for strength and deflection using limit state method
3. evaluate the losses in prestressed system
4. design the prestressed concrete beams and the pre-stressed and post-tensioned concrete slabs
5. understand maintenance and rehabilitation of prestressed concrete structures

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	2							1		3		
2	1	1	2	2			1				2			2	
3	2	2		3					2				2	2	
4	2	3	2						2			1	3		
5		2		2					1		2			2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction to prestressed concrete

Introduction to basic concept and general principle of prestressed concrete, materials used in prestressed concrete, prestressing systems, concepts of prestressing, losses in prestress, cable profile and cable zone.

Analysis of prestressed concrete

Analysis of prestressed concrete section for flexure, philosophy of limit state design for prestressed concrete members, efficiency of a section, permissible stresses in concrete and steel, deflections of prestressed concrete members, Anchorage zone stresses in prestressed concrete members

Losses in Prestressed systems

Introduction to prestressed losses and its Significance, Estimation of prestressed losses in pretensioned and post tensioned systems as per IS code.

Design of prestressed concrete beams

Design of post tensioned prestressed concrete simply supported rectangular and flanged sections for flexure, shear, bond and bearing including end block.

Design of prestressed concrete slabs

Design of one way and two way pre-tensioned and post tensioned slabs

Maintenance and rehabilitation of prestressed concrete structures

General aspects of maintenance and rehabilitation. Inspection of structures. Use of NDT equipment's in the inspection. Cracks in prestressed concrete structures- remedy and repair. Repair and rehabilitation of prestressed concrete structures. Strengthening of prestressed concrete structures.

Text books:

1. Prestressed Concrete, N. Krishna Raju, Tata McGraw Hill Publication Co., 6th edition, 2018
2. Prestressed Concrete, S. Ramamrutham, , Dhanpat Rai and Sons, 2003

Reference books:

1. Design of Prestressed concrete structures, T. Y. Lin, John Wiley Publishers, 1981
2. Prestressed Concrete, Y. Guyon, , Contractors Record Ltd.,1960
3. Prestressed Concrete, R. H. Evans and E.W. Bennett, , McGraw Hill Book Co, 1990
4. IS: 1343-2012: Indian Standard code of practice for Prestressed concrete, BIS, New Delhi.

CE354U(D) IRRIGATION SYSTEMS

Teaching Scheme: 03L **Total:3Hr** **Credit: 03**
Evaluation Scheme:30 MSE + 10 ISA + 60 ESE **Total Marks:100**
Duration of ESE: 03Hrs

COURSE DESCRIPTION

This course consists of irrigation scheduling, water allocation, water laws and various conveyance systems. It also cover design of head regulator, planning and design of lift, drip and sprinkler irrigation system.

COURSE OBJECTIVES

1. To know the irrigation scheduling, water lows.
2. To design water conveyance system.
3. To study design of head regulator
4. To design the various irrigation systems like drip, sprinkler and lift.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. able to apply laws related to water in field
2. able to design the cross drainage work.
3. able to identify the suitable irrigation method for various types of field

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			2										2	2	
2	3												3	1	
3							2						2	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Planning of an Irrigation System, Irrigation Scheduling, Groundwater Management, Conjunctive Use of Surface and Subsurface Water Resources, Principles of Law Applied to Water Rights and Water Allocation, Water Laws. Environmental Protection Law

Introduction to Bandhara, percolation tank, KT weir.

Water Conveyance System: Open channel, Lined and unlined channels, types of lining, economics of lined channels. Cross drainage works, Regulating structures, Types of CD works, Aqueduct, Super passage, siphon, culverts etc. Layout and design concepts

Head Regulator, Cross regulator, their layout, and hydraulic design, Conveyance through closed conduit system, elements, Controlling devices, general design concepts

Lift Irrigation: General concepts, Elements of lift irrigation system, Design considerations involved in Intake well, Jack well, rising main, and distribution system, Concepts and economics.

Drip irrigation, General concept, Advantages, limitations, elements of drip irrigation system, design.

Sprinkler irrigation, General concept, advantages and limitations, Components of the system, types of sprinklers, design concept.

Text Books

1. Irrigation: Theory and Practice, Michael, A. M., Vikas Publishing House Pvt. Ltd. New Delhi, 1990
2. Irrigation and Water Resources Engineering, Asawa, G.L, New Age International Pub. Co., New Delhi, 2005

Reference Books

1. Irrigation, Water Resources and Water Power Engineering, Modi P.N., Standard Book House, Delhi, 8th edition, 2010
2. Irrigation Engineering and Hydraulic Structures, Garg S.K., Khanna Publishers, Delhi. 1998
3. Irrigation and Water Power Engineering, Punmia B. C., Pande B. B., Lal, Ashok Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi, 1999

CE355U(X): INDUSTRIAL POLLUTION AND CONTROL

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**

Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The students will be elucidating latest developments in water and wastewater management practices in diverse pollution sources including industries. The rules and regulation for various pollution and standards will be understood by students. The characterization and classification of different types of wastes will be understood by student along with existing norms for waste disposal. It will also explain air pollution and its remedies of control.

COURSE OBJECTIVES

1. To give an understanding of different pollutant of various industry
2. To expose the student to various rules and regulation of pollutions.
3. To know treatment technologies for water/wastewater/solid waste
4. To know air pollution and its control methods.
5. To understand hazardous waste management

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. characterize and classify of different types of industrial waste.
2. know fundamentals treatment methods of specific pollutant arising out of industrial process.
3. be able to understand various concepts of water efficiency and waste minimization in industrial sectors.
4. understand air pollution control methods.
5. identify the waste management system for hazardous waste.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2												3		1
2		3					2						2		2
3				2										2	2
4		2											2		2
5		3					2							2	2

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Classification of Industries: Major industries responsible for water pollution across globe and in India, water uses in major industries, industrial wastewater survey, sampling procedures, characteristics of major industries like dairy, sugar, pulp and paper, dye, metal

plating, textile, petroleum, refineries, slaughterhouse, tannery, distillery etc. as per IS codes. Benefits of water pollution control by doing treatment of industrial waste.

Rules and Regulation: Treatment prescribed by IS codes for major industries like dairy, sugar, pulp and paper, dye, metal plating, textile, petroleum, refineries, slaughter house, tannery, distillery etc., importance of flow equalization, segregation of waste streams-specific applications. Environmental legislations in India, salient features of water pollution prevention act and air pollution control act, and Environmental protection act. Constitution of pollution control boards and their functioning.

Water Minimization Techniques: Concept of reduce, recover, reuse and recycle in industries, housekeeping and its importance, optimization of industrial processes keeping in view the waste water generation and treatment, integrated approach for industrial water and waste water management, concept of CETP, industrial ecology, water quality index and its application and industrial wastewater management, application of advance wastewater treatment technology- reverse osmosis(theory, application and design), adsorption- (theory, application and design including kinetic modeling), low cost sorbents.

Air Pollution: Parameters influencing air pollution, measurement of parameter plume behavior, transport and diffusion, stack height design and problems, Gaussian diffusion model for finding ground level concentration. Device and method used for sampling. Ambient air quality standards and emission standards. Effect of air pollution, cost/benefit ratio, Optimization.

Odors: Sources, measurement and control.

Hazardous Waste Management: Classification and their sources, health hazards, handling of toxic and radioactive wastes. Industrial solid waste sampling plan, characterization, disposal of waste from thermal power plant, disposal of solid organic industrial waste, toxic and hazardous waste. Disposal of waste by land filling, site selection, leachate and gas collection, lining; composting of waste, methods, factors affecting, Incineration, types, energy recovery and products of incineration, Processing of waste for useful products pyrolysis, RDF, TDF, Legislation and regulatory trends.

Text Book:

1. Industrial Waste Water Treatment, A. D. Patwardhan, Prentice Hall of India Private Limited, 2008
2. Environmental Pollution Control Engineering, C. S. Rao, New Age International (P) Ltd., 2nd edition, 2006
3. Waste Water Treatment, M. N. Rao and A. K. Datta, Oxford& IBH Publication, 3rd edition, 2009
4. Solid Waste Management, Collection, Processing and Disposal, A. D. Bhide and B. B. Sundaresan Mundrashilp Offset Printers, Nagpur, 2001

Reference books:

1. Introduction to Environmental Engineering and Science, G. M. Manster, P. E. Wendell, , Pearson Education Limited, 3rd edition, 2013
2. Air pollution, M. N. Rao and H. V. N. Rao, Tata McGraw Hill Publishing Company Limited New Delhi, 26th reprint, 2007
3. CPHEEO Manual on Municipal Solid Waste Management CPHEEO, MoUD GoI, New Delhi, May 2000
4. Pollution Control in Process Industries, S. P. Mahajan, Tata McGraw-Hill, 22nd reprint, 2008
5. Solid Waste Engineering, A. P. Vesilind, W. A. Worrell, Reinhart, Thomson Book Cole., 2nd edition, 2002
6. Integrated Solid Waste Management Engineering Principle and Management Issue, G. Techobanaglous, H. Theisen, S. A. Vigil, Tata McGraw Hill, New York, International Editions Civil Engg. Series, 1993
7. Industrial Wastewater Treatment: A Guide Book, Edwards Joseph D., CRC Press Publications, 1995
8. Air Pollution Control Theory, Crawford, M., TMH, 1976

Important Links:

1. www.cpcb.nic.in.
2. www.mpcb.gov.in.
3. www.moef.nic.in/legis/water/wat1.html.
4. www.moef.nic.in/legis/air/air1.html.
5. envfor.nic.in/legis/env/env1.html.

CE355U(Y): SAFETY AND DISASTER MANAGEMENT

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The overall aim of this course is to provide broad understanding about the basic concepts of safety and Disaster Management. Further, the course introduces the various natural hazards that can pose risk to property, lives, and livestock, etc. and understanding of the social responsibility as an engineer towards preparedness as well as mitigating the damages

COURSE OBJECTIVES

1. To understand different types of hazards and disaster
2. To understand the challenges posed by disasters
3. To know the policy, planning and institutions for disaster mitigation

COURSE OUTCOMES

Upon successful completion of this course the students will be able:

1. to understand categories of hazards and disasters
2. to understand the application of the policy, planning and institutions for disaster mitigation.
3. to understand management technique to make community awareness

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			2		3	2		3	2	3					3
2			2		3	2		3	2	3				2	3
3			2		3	2		3	2	3				2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Hazards and Disasters: Definition of hazards, disasters, difference between hazard and disaster, Concept of risk and vulnerability, Risk reduction: preparedness and mitigation, Disaster management cycle, Personal and community awareness, Types of disasters, earthquake, Tsunami, Landslide, cyclone, flood, drought, forest fire, Chemical and industrial accidents.

Earthquakes: Definition and concept, intensity, Richter's scale, Element of risk, Hazard Zones in India, Typical effects, Main mitigation strategies, safe Engineering practice, Indian Standard code and enforcement Bye-Laws.

Tsunami: Definition concept, Onset, type and cases, Warming, Elements at risk, Typical effects: Physical damage, environmental damage, casualties and Public health, Specific

preparedness: Hazard mapping, early warning systems, Community preparedness, Main mitigation strategies: Site planning and land management, Engineering structures, Flood management.

Landslides: Definition, concept, Onset time and warning, Causes, Elements at risk, Hazard zones and Indian landslides, Typical effects: Physical damage, casualties, Main mitigation strategies: Hazard mapping, Landslide practice, retaining walls, Surface drainage control works, Engineering structures, Community based mitigation.

Cyclones: Definition, concept, Onset type, Warning, Elements at risk, Typical effects, Indian Hazard Zones, Main mitigation strategies: Hazard mapping, Land use control, Engineering Structures, Flood management, improving vegetation cover, Community based mitigation.

Floods: Definition, concept, Onset type, Warning, Elements at risk, Hazard zones and Indian floods, Typical effects: Physical damage, Casualties and Public health, Crops and flood, Main mitigation strategies: Mapping of the flood prone areas, land use control, Flood control and management, Community based mitigation.

Droughts: Definition, concept, Onset type and warning, Elements at risk, Typical effects, Main mitigation strategies: drought monitoring, water supply augmentation and conservation, Drought Planning.

Forest Fire: Definition and concept, Forest fire damages in India, Operational fire management systems and organizations, Community involvement, Public policies concerning fire, the needs of fire management.

Other type of Hazards and disasters: Chemical and Industrial disasters: brief description, effects, preparedness, Epidemic: Onset type, warning, causes and effects, risk reduction measures,
Heat waves: definition, dangers and effects, Forecasts and warning, awareness.

Policy, Planning and Institutions for disaster mitigation: Role of policy makers in disaster risk reduction, course for specific action, Institutional arrangement in India: Central level, State Level, District and Block level, Major institutions in National and State level.

Text books:

1. Natural Hazards and Disasters, Donald and David Hyndman, Brooks /Cole Cengage Learning, 3rd edition, 2011
2. Disaster Management: Approaches & Strategies, Tej Singh, Akansha Publishing House, 2006
3. Towards Basics of Natural Disaster, D. K. Sinha, Researchco Book Centre/Star Educational Books Distributor Pvt. Ltd, 2006

4. Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006

Reference books:

1. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
2. Encyclopedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
3. Disaster Management Act 2005, Publisher by Govt. of India
4. Disasters in India Studies of grim reality, Anu Kapur, Neeti Meeta; Deeptima; Roshani and Debanjali, Rawat Publishers, Jaipur, 2005
5. BIS Codes:- I.S 1893, I.S.4326,I.S.13920,NBC

CE356U: DISASTER PREPAREDNESS & PLANNING MANAGEMENT

Teaching Scheme: 3L **Total: 3 Hr** **Credit: 3**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE **Total Marks: 100**
Duration of ESE: 3 Hrs

COURSE DESCRIPTION

The overall aim of this course is to provide broad understanding about the basic concepts of Disaster Management with preparedness as a Civil Engineer. Further, the course introduces the various natural hazards that can pose risk to property, lives, and livestock, etc. and understanding of the social responsibility as an engineer towards preparedness as well as mitigating the damages.

COURSE OBJECTIVES

1. To understand basic concepts in Disaster Management
2. To understand definitions and terminologies used in disaster management
3. To understand types and categories of disasters
4. To understand the challenges posed by disasters
5. To understand impacts of disasters key skills

COURSE OUTCOMES

Upon successful completion of this course the students will be able:

1. understand categories of disasters and realization of the responsibilities to society
2. apply knowledge of disaster concepts for planning management
3. analyze relationship between development and disasters.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			2	2	3	1			3	3	2	2	1		3
2			2	2	3	1			3	3	2	2		2	2
3		2	2	2	3	1			3	3	2	2		2	2

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Introduction: Concepts and definitions: disaster, hazard, vulnerability, risk severity, frequency and details, capacity, impact, prevention, mitigation

Disasters: Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); man-made disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

Disaster management: Financing relief expenditure, legal aspects, rescues operations, casualty management, risk management emergency management programme: administrative setup and organization. hazard analysis, training of personnel, information management, emergency facilities and equipment necessary

Public awareness & management: creation, preparation and execution of the emergency management programme, role of safety officers, awareness committee

Disaster Risk Reduction (DRR): Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Disasters, Environment and Development: Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery

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Text books:

1. Disaster Risk Reduction in South Asia, Pradeep Sahni, Prentice Hall India Learning Private Limited, 2004
2. Disaster Management, Ghosh G. K., , APH Publishing Corporation, 2006

Reference books

1. Handbook of Disaster Management: Techniques & Guidelines, Singh B.K., Rajat Publication, 2008
2. Disaster Preparedness and Management, Michael Beach, F.A. Davis Company, 1st edition, 2010

Important Links:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs)

CE357U GEOTECHNICAL ENGINEERING LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

The student will be able to determine the index and engineering properties of soil. It will helpful to understand soil classification and its engineering behavior. The student will able to understand the process of determining different engineering properties. The field visit will enhance the actual field experience about geotechnical engineering.

COURSE OBJECTIVES

1. To study geotechnical engineering practices for soil.
2. To perform and interpret laboratory tests for evaluating engineering properties of soil.
3. To carry out field investigations and to identify soils.
4. To able to collect the sample from field and conduct various laboratory tests on soil.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. identify and classify the soil
2. be able to perform laboratory compaction test and in-place density tests for quality control.
3. be able to determine permeability characteristics of soil.
4. determine the shear strength and compressibility characteristics of soil

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2	3	1												2	
3	3	1	1										3		
4	3	2	3										3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE352U. Any four from group A, three from group B and one from group C. List given below is just a guideline.

1. **Physical / Index Property Tests on Soils**
    a. Determination of water content by various methods
    b. Determination of the particle size distribution for a given soil
    c. Determination of specific gravity by pycnometer method
    d. Determination of liquid limit , plastic limit and shrinkage limit
    e. Determination of field dry density by core cutter method, sand replacement method and clod method
    f. Determination of free swell index

2. **Engineering Property Tests on Soils**
    a. Determination of compaction characteristics of soils by Standard & Modified Proctor's test
    b. Determination of co-efficient of permeability by constant head and falling head permeability test.
    c. Determination of shear strength parameters of soil by direct shear test
    d. Determination of shear strength parameters of soil by triaxial test
    e. Determination of shear strength parameters of soil by unconfined compression test
    f. Determination of shear strength parameters of soil by vane shear test.
    g. Determination of coefficient of consolidation by one dimensional consolidation test
3. **Mini Project work**
    a. A visit to construction site of road, foundation, embankment, earth dam etc.
    b. Use of virtual laboratory tool for various tests.
    c. Collection of soil sample from field by augur, sampling tube or boring and its preparation as soil sample for different tests.

Note:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE358U: DESIGN OF STEEL STRUCTURES LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25ESE **Total Marks: 50**

COURSE DESCRIPTION

The students admitting in Civil Engineering discipline have to understand the different loadings coming on steel structural components. Also, they should be able to design of steel structures. This course will give exposure to students to design of steel structural components.

COURSE OBJECTIVES

1. To understand various loadings coming to on the steel structures.
2. To apply design philosophy for steel structures.
3. To understand drawings of steel structures.
4. To make use of relevant IS codes for Design of Steel Structures.

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. calculate design loads for various steel structures.
2. design simple steel structures.
3. design simple steel connections.
4. draw details of steel structures.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2					2							3		
2		3		1									3	2	
3		3											3	2	
4		3			1	1							3	2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

The experiments shall be performed to cover entire curriculum of course CE353U. The list given below is just a guideline.

A. **Design of following structures** as per IS 800- 2007

1. G+1 Industrial building with roof supported by steel trusses (Angle sections / Tubular Sections).
   a. Design of primary and secondary beams
   b. Design of columns and footing
2. Design of Roof Truss :
   a. Loading on Roof Truss
   b. Analysis for Member Forces
   c. Design of Truss Members
   d. Design of Column and Column footing

B. Design of Welded Plate Girder

a. Analysis of girder due to various loading

b. Design of girder.

C. A Report on Site visit.

The Term work should include

1. Brief Technical design project report involving: Introduction, assumptions, load calculations, analysis, preferably using suitable software and detailed design.
2. Drawings: Structural plan and detailed structural drawings
3. Report of a site visit mentioning structural details with relevant sketches of structural connections.

Note:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359U(A): ADVANCED SURVEYING LAB

Teaching Scheme: 2P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This course provides the skill of using advanced surveying equipment such as digital level, digital theodolite, and Total station for leveling, surveying and using software for storing data and developing maps by using software.

COURSE OBJECTIVES

1. Setting out curves by various methods
2. Apply the knowledge and skills of advanced surveying equipments for leveling and surveying for preparation of plans/maps.
3. Use of a current widely-used GIS computer software system. for geographic data entry and editing, spatial analysis, and map development and display

COURSE OUTCOMES

Upon successful completion of this course the students will be able to:

1. acquire the skill of using advanced surveying equipments such as digital level, digital theodolite and total station
2. apply the knowledge of photogrammetry GIS and Remote Sensing for surveying and preparation of plans/maps.
3. use of a current widely-used GIS computer software system for geographic data entry and editing, spatial analysis, and map development and display.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2					2							2		
2	3					2					2	2		3	
3	2					3					2	2		3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

The experiments shall be performed to cover entire curriculum of course CE354U(A). The list given below is just a guideline. All surveying equipment's should be introduced and used before experiments.

SETTING OUT CURVES:

1. Setting out a simple circular curve by offsets from long chord
2. Setting out a simple circular curve by Rankine's method of tangent angle (Deflection angles)

DIGITAL LEVEL:

1. Conduct profile leveling along the given alignment for a road using digital level and Plotting the profile of the alignment surveyed
2. Transferring leveling data to computers and developing and printing leveling pages using software.

DIGITAL THEODOLITE:

1. Traversing and plotting : Setting out a closed traverse with minimum 6 sides and entering the field data using Total station, Plotting the traverse and checking the error of closure
2. Setting out an open traverse with minimum 5 sides using total station and entering the field data and Plotting the traverse

TOTAL STATION:

1. Measuring horizontal and vertical angles, Prolonging a given straight line, Determination of magnetic bearing of given straight lines
2. Traversing and plotting : Setting out a closed traverse with minimum 6 sides and entering the field data, Transferring the data to computers using software, Plotting the traverse using software

USE OF GIS & GPS SOFTWARE:

1. Use of any one GIS/GPS software for various surveying applications etc.

USE OF MOBILE APPS:

1. Use of mobiles apps for various surveying applications

Note:

2. **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).
3. **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359U(B): REHABILITATION OF STRUCTURES LAB

Teaching Scheme: 02P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This course deals with the repair and rehabilitation of buildings and covers the following topics: introduction to the assessment of deterioration of concrete structures; repair and materials and strategies; compatibility aspects; durability and repair audits; methods and materials for rehabilitation of buildings.

COURSE OBJECTIVES

1. To acquire the knowledge on Quality of concrete, durability aspects
2. To understand causes of deterioration
3. To know assessment of distressed building structures
4. To understand rehabilitation methods and materials for rehabilitation of buildings

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. understand, suggest and apply different methods of rehabilitation for improving structural performance
2. analyze a building and prepare an investigation report for repair and rehabilitation of buildings.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		1					2	1					2	2	
2		2					1	1					2	1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum eight experiments / demonstration shall be performed to cover entire curriculum of course CE CE354U (B). The list given below is just a guideline.

1. Concrete strength assessment by Rebound hammer test / Ultrasonic pulse velocity tests
2. Carbonation tests and chloride content
3. Half-cell potentiometer test
4. Corrosion potential assessment
5. Condition assessment of deteriorated/dilapidated building and preparing report for suggesting repair and rehabilitation methods and materials
6. Tests on concrete repaired by using FRP wrapping.
7. Tests on fiber reinforced concrete.
8. Case study of repairs and rehabilitation of buildings bridges
9. Visit to site of rehabilitation / retrofitting of buildings and preparing report.

Note:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359U (C) PRESTRESSED CONCRETE LAB

Teaching Scheme : 02P, Total: 02 Hr Credit: 01
Evaluation Scheme : 25 ICA + 25 ESE Total Marks: 50

COURSE DESCRIPTION

The students will learn how to perform various tests to be used at construction site. They will also learn how to conduct various type of prestressed concrete materials and methods to be used at site. At the end they will learn prestressed concrete design.

COURSE OBJECTIVES

1. To prepare civil engineering graduates who can analyze and design prestressed concrete structures
2. To use IS: 1343 in the design of prestressed concrete structures.
3. To study concept of pre-stressed concrete methods of pre-stressing along with its advantages
4. To study concept of analysis & design of Pre-stressed concrete sections
5. To study various types of losses.
6. To understand various aspects of maintenance and rehabilitation of prestressed concrete structures

COURSE OUTCOMES

1. understand the concepts of pre-stressing in concrete structures and identify the materials for prestressing
2. analyses a Pre-stressed Concrete section
3. estimate losses of pre-stressing
4. design pre-tensioned and post tensioned girders for flexure and shear
5. design continuous pre-tensioned and post tensioned beams

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	2	2	1						1		3		
2	1	2	2	1	1		1				2			2	
3	2	2	1	3					2		1		2	2	
4	2	3	2						2		1	1	3		
5		2	1	2							2		3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum five designs / experiments shall be performed to cover entire curriculum of course CE354U(C). List given below is just a guideline.

1. Design of prestress concrete beam (Neglecting losses and Allowing losses)
2. Design of pre tensioned / post tensioned prestressed concrete beam (T beam and rectangular beam)

3. Design and detailing of post tensioned bridge girder.
4. Design of End block with detailing.
5. Design and detailing of prestress concrete cylinder/ non cylinder pipe
6. Design and detailing of post tensioned slab
7. Design and detailing of composite prestress concrete beam
8. Design and detailing of composite prestress concrete slab
9. At lest one site visit to prestressed concrete plant with reports

Note:

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359U(D) IRRIGATION SYSTEMS LAB

Teaching Scheme: 02P **Total: 02Hr** **Credit: 01**
Evaluation Scheme:25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

This course gives idea for the students about the selection of suitable irrigation method like lift irrigation, drip irrigation and sprinkler irrigation and design of various cross drainage work and head regulator.

COURSE OBJECTIVES

1. To design of Cross drainage work
2. Design of head regulator
3. Design of irrigation system like lift, drip and sprinkler.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. design suitable cross drainage work for the field.
2. design of head regulator.
3. apply the knowledge of design and selection of irrigation system in field

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												2		
2	3		2										3		
3	1		2										3		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum six experiments shall be performed to cover entire curriculum of course CE354U(D). List given below is just a guideline.

1. Design of Bandhara / KT weir from the given data
2. Design of Aqueduct
3. Design of culverts
4. Design of head regulators
5. Design of closed conduit system
6. Design of lift irrigation system
7. Design of drip irrigation system
8. Design of sprinkler irrigation system
9. Field visit to any of the above structure/system

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The

performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE 360U: SOFTWARE ENGINEERING LAB

Teaching Scheme: 02P **Total: 2 Hr** **Credit: 1**

Evaluation Scheme: 25 ICA + 25 ESE **Total Marks: 50**

COURSE DESCRIPTION

Use of the computer for both analysis and design is an integral part of the curriculum. This course is aimed in providing hands-on work using analytical tools contained in common software programs to solve civil engineering problems.

COURSE OBJECTIVES

1. To teach the students to understand the details of different structural analysis and design softwares such as STAAD-Pro, SAP2000, ETABS etc.
2. To enable students to understand and used different softwares used in Civil Engineering.

COURSE OUTCOMES

Upon successful completion of this course the students will:

1. understand and apply knowledge for analysis and design of structures using different structural analysis and design softwares such as STAAD-Pro, SAP2000, ETABS etc.
2. understand and apply knowledge for using different softwares used in Civil Engineering.

Relevance of Program Outcomes (POs)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2		3			3	1			1	1	3	2	
2	2	1		2			2				1		1	3	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Minimum two software from each group shall be performed. The list given below is just a guideline.

Group A

Analysis and design of structure using any one software listed below or otherwise

i) STAAD-Pro
ii) STRUDS
iii) SAP-2000
iv) ETABS
v) ANSYS
vi) Build master
vii) SAFE

Group B:

Solution of problems in any one different areas using software listed below or otherwise

i) Geotechnical Engineering: GEO5/ OYASYS Slope - 2D slope stability analysis/ MIDAS GTS
ii) Estimating and Surveying- QE-Pro/any other advanced software
iii) AutoCivil
iv) Project Management Software: Microsoft Project/ PRIMAVERA/Contractor
v) Transportation Engineering: Road Master
vi) Remote Sensing and GIS: ArcGIS/GEOMATICA/ERDAS
vii) Environmental Engineering: WaterGEMS, SewerGEMS
viii) Fluid Mechanics: Flowmaster

Note:

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).

ESE – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE361U: MINOR PROJECT

Teaching Scheme: 2P **Credit: 1**
Evaluation Scheme: 50 ICA **Total Marks: 50**

Course Description

The students admitting in Civil Engineering discipline have to understand working with team members. Also, they should be able to understand the philosophy behind planning and execution of the project work. This course will introduce methodology to students for undertaking and working on project.

Course Objectives

1. Understanding formulation for solving real-life problems.
2. To introduce various strategies for solving real-life problems.
3. Understanding methodology to plan and execute projects.
4. To introduce necessary communication skills for documentation of the solution of the problem.

Course Outcomes

Upon successful completion of this course the students will be able to:

1. formulate the problem statement.
2. identify resources for solution of the problem.
3. identify appropriate methodology for solving engineering problems.
4. find suitable solution of the problem.
5. communicate solution of the problem.

Relevance of Program Outcomes (POs) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2						1						2		
2			1	1									2		
3				1	2								3		
4						2	2	1					3		
5									1		2		2		

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Content

Each student shall work on an approved project, a group of 05 students (maximum). The group shall be allotted for the each minor project in the beginning of semester. Minor project may involve fabrication, design or investigation of a technical problem that may involve design, experimental or analytical work. The project work shall involve the activities to get students acquainted with different aspects of surveying, fabrication, design or analysis. Each group of students is required to maintain separate log book for documenting various activities of minor project

Note:

ICA – Assessment of the minor project for award of ICA marks shall be done jointly by the guide and departmental committee upon presentation by student along with model / prototype / solution of the problem defined.