

DeenbandhuChhotu Ram University of Science & Technology, Murthal (Sonepat) SCHEME OF STUDIES & EXAMINATIONS B.Tech. 3rd YEAR (SEMESTER – VI: CIVIL ENGINEERING) Tentative Choice Based Credit Scheme w.e.f. 2020-21

S.			Tea Sch	ichi edi	ng ıle	Marks of	Examin Marks	ation			Durati	
No	Course No.	Course Title	L	Т	P	Class work	Theory	Practi cal	Total	Credit	on of Exam	
1	CE302C	ESTIMATING AND COSTING	2	-	2	25	75	-	100	3	3	
2	CE304C	DESIGN OF STEEL STRUCTURES - II	3	1		25	75	-	100	4	3	
3	CE 306C	REINFORCED CONCRETE DESIGN –II	3	0		25	75	-	100	3	3	
4	CE 308C	FOUNDATION ENGINEERING	3	0		25	75	-	100	3	3	
5	CE310C	ENVIRONMENTAL ENGINEERING - I	3	-		25	75	-	100	3	3	
6	CE	DE-I	2	1		25	75	-	100	3	3	
7	CE	DE-II	3	1		25	75	-	100	3	3	
8.	CE	DE-II(SP)	4	1		25	75	-	100	4	3	
9	CE312C	FOUNDATION ENGINEERING LAB	_	-	2	25		75	100	1	3	
10	CE314C	ENVIRONMENTAL ENGINEERING – I LAB	-	_	2	25	1	75	100	1	3	
11	CE316C CE318C	MATERIAL TESTING LAB** HIGHWAY MATERIAL TESTING LAB	-	_	4	25	1	75	100	2	3	
12	GFCE302 C	GENERAL FITNE <mark>SS FOR CIVIL</mark> ENGINEERING	-	-	_			75	75	-	3	
		Total PURA	23	2	10	275	600	30 0	1175	30		
		MOOC]	Rei	nforc	ed Conci	ete Road	Bridge	s			

Note:

- 1. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 2. Electronics gadgets including Cellular phones are not allowed in the examination.
- 3. Each students has to undergo Professional Training of at least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carries out in the VII semester.
- 4. Students will be permitted to opt for any one elective from each group run by the Department. However, the Department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the Department to offer, if the Department does not have expertise. The minimum strength of the students should be 20 to run an elective.
- 5. DE-II (SP) and ** labs are for only those students opting for degree with specialization
- 6. Student can undertake 20% of the courses of this scheme (Hons./Minor Degree with Specialization in the listed emerging areas) through online platforms SWAYAM/MOOCS/NPTEL etc. with due permission of the chairperson.
- 7. Any students of the B. Tech. of the University can opt for this scheme (Hons./Minor Degree with Specialization in the listed emerging areas), however, minimum 10 students are required for running a particular specialization.



	Code	OPEN ELECTIVE I
1	HUM-402C	SOFT SKILLS AND INTER PERSONAL COMMUNICATION
2	HUM-405C	INTRODUCTION TO FRENCH LANGAUAGE
2	HUM –	INTRODUCTION TO GERMAN LANGUAGE
5.	406C	
4	MGT-401 C	HUMAN RESOURCES MANAGEMENT
5.	MGT 402C	HUMAN VALUES, ETHICS AND IPR
		OPEN ELECTIVE II
1	CSE 451C	CYBER SECURITY
2.	CSE 201C	COMPUTER NETWROK
3.	CH-	INDUSTRIAL SAFETY
4.	CE 406C	DISASTER MANAGEMENT
5	ECE327C	CONSUMER ELECTRONICS
		OPEN ELECTIVE III
1	CSE 409C	ARTIFICIAL INTELLIGENCE
2.	EE	ELECTRICAL AND HYBRID VEHICLES
3.	MGT 404C	ENTREPRENURSHIP
4	EE	SMART GRID
5	СН	NANO SCIENCE AND NANO TECHNOLOGY

List Of Departmental Elective I(SP), II(SP), III(SP)

List Of Departmental Elective I, II, III & IV

		$\alpha (SP)$	/		
S.	Code	Subject	S.	Code	Subject
no.			no		* •
			•		
	STRUCT	URAL ENGINEERING	1	CE	WATER AND AIR QUALITY
				352C	MODELING
1	CE 351C	CONCRETE TECHNOLOGY	2	CE354	ROCK MECHANICS
		пстин	11	С	
2	CE 361C	MASONARY STRUCTURES	3	CE356	GROUNDWATER ENGINEERING
		CAM	1	C	
3.	CE 372C	STRUCTURAL ANALYSIS BY	4	CE358	CONSTRUCTION COST ANALYSIS
		MATRIX METHOD		С	
4	CE474C	EARTHQUAKE RESISTANT	5	AR318C	BUILDING STANDARDS AND
4		STRUCTURES			OFFICE MANAGEMENT
~	CE476C	DESIGN OF BRIDGES		CE360	LOW VOLUME ROADS
5			6	С	
6	CE480C	DYNAMICS OF STRUCTURES	7	CE	GEOTECHNICAL DESIGN
6			/	362C	
7	CE484C	ADVANCED STRUCTURAL	0	CE364	BUILDING CONSTRUCTION
		DESIGN AND DETAILING	8	С	PRACTICE
	EARTHQ	UAKE ENGINEERING	0	CE366	TRANSPORTATION ECONOMICS
	-		9	С	
1	CE 351C	CONCRETE TECHNOLOGY	10	CE368	CONSTRUCTION ENGINEERING
			10	С	MATERIALS
2	CE 372C	STRUCTURAL ANALYSIS BY	11	CE450	BASICS OF COMPUTATIONAL
		MATRIX METHOD	11	С	HYDRAULICS
3.	CE474C	EARTHQUAKE RESISTANT	10	CE452	DESIGN OF PRESTRESSED
		STRUCTURES	12		CONCRETE STRUCTURES
4	CE480C	DYNAMICS OF STRUCTURES	12	CE454	CONTRACTS MANAGEMENT
4			15	С	
5	CE484C	ADVANCED STRUCTURAL	14	CE456	ASSET MANAGEMENT
3		DESIGN AND DETAILING	14	С	
	TRANSPO	ORTATION ENGINEERING	15	CE458	GROUND IMPROVEMENT
			15	С	



A Unit of Puran Murti Educational Society Approved by AICTE, Recognized Under Section 2 (f) by UGC Affiliated to Deenbandhu Chhotu Ram University of Science And Technology, Murthal, Sonipat

1	CE353C	TRAFFIC ENGINEERING AND	16	CE460	RURAL WATER SUPPLY AND
		MANAGEMENT	10	С	ONSITE SANITATION SYSTEMS
2	CE363C	ENVIRONMENTAL IMPACT		CE462	INFRASTRUCTRE PLANING AND
		ASSESSMENT AND LIFE CYCLE	17	С	DESIGN
		ANALYSES			
3.	CE365C	HIGHWAY CONSTRUCTION AND	18	CE464	SOLID AND HAZARDOUS WASTE
		MANAGEMENT	10	С	MANAGEMENT
1	CE374C	DOCK AND HARBOUR	10	CE466	CONSTRUCTION EQUIPMENT &
4		ENGINEERING	19	С	AUTOMATION
5	CE376C	AIRPORT PLANNING AND DESIGN	20	CE468	WATER POWER ENGINEERING
5		OF AIRFIELD PAVEMENTS	20	С	
6	CE472C	TRANSPORT PLANNING	21	CE470	ENERGY EFFICIENT BUILDINGS
0			21	С	
7	CE482C	ROAD SAFETY AND	22	CE478	PUBLIC TRANSPORTATION
		ENVIRONMENT	22	С	SYSTEMS
8	CE486C	APPLIED STAISTICS TO			
		TRANSPORTATION ENGINEERING			



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Subject: ESTIMATING AND COST

Subject Code: CE302C

: 25 Marks
: 75 Marks
: 100 Marks
: 3 hours

Course Outcomes:

Students will be able to:

1: Calculate Cash flow using different methods.

2: Determine specifications of buildings.

3: Calculate quantities and cost of different components of civil engineering structure.

4: Understand about tendering.

5:Perform Rate analysis of different components of a structure.

1. Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

Unit-I

Topic no 1 Cost & Cost Control–Techniques, Types of Costs, Lifecycle costs, Budgets, Break even Analysis, Capital Budgeting

Topic no 2 Investment Analysis – NPV, ROLIRR, Payback Period, Depreciation, Time value of money (present and future worth of cash flows).

Topic no 3 Business Forecasting - Elementary techniques. Statements - Cash flow, Financial Case Study Method.

Topic no 4 Specifications-Types, requirements and importance, detailed specifications for buildings

Topic no 5 roads, minor bridges and industrial structures.

Unit-II

Topic no 6 Estimation / Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same

Topic no 7 Taking out quantities from the given requirements of the work, comparison of different alternatives, Bar

Topic no 8 bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations

Topic no 9 Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding Equipment costs; labour costs; rate analysis

Topic no 10 Material survey-Thumb rules for computation of materials requirement for different materials for buildings

Topic no 11 percentage breakup of the cost, cost sensitive index, market survey of basic materials

Topic no 12 Use of Computers in quantity surveying.

Unit-III

Topic no 13 Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification

Topic no 14 general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill

Topic no 15 Payment of advance, insurance, claims, price variation, etc.

Topic no 16 Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads

Topic no 17 Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management.





Unit-IV

Topic no 18 Rate analysis-Purpose, importance and necessity of the same

- Topic no 19 factors affecting, task work, daily output from different equipment/ productivity.
- Topic no 20 Introduction to Acts pertaining to-Minimum wages

Topic no 21 Workman's compensation, Contracts, Arbitration, Easement rights.

Text/Reference Books:

- 1. M Chakravarty, Estimating, Costing Specifications & Valuation
- 2. Joy P K, Handbook of Construction Management, Macmillan
- 3. B.S. Patil, Building & Engineering Contracts
- 4. Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- 5. Typical PWD Rate Analysis documents.
- 6. UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016.
- 7. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

Practical work will include:

- 1. Deriving an approximate estimate for a multistoried building by approximate methods.
- 2. Detailed estimate for the following with the required material survey for the same.
- a. Ground plus three storied RCC Framed structure building with block work walls
- b. bridge with minimum 2 spans
- c. factory building
- d. road work
- e. cross drainage work
- f. Ground plus three storied building with load-bearing walls
- g Cost of finishes, MEP works for (f) above
- 3. Preparation of valuation report in standard Government form.
- 4. Assignments on rate analysis, specifications and simple estimates.
- 5. Detailed estimate of minor structure.
- 6. Preparation of Bar bending schedule.

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2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.



Subject: DESIGN OF STEEL STRUCTURES II

Subject Code: CE 304C

L	Т	Р	Credits
3	1		4

Class Work	: 25 Marks
Examination	: 75Marks
Total :	100 Marks
Duration of Exa	amination:3 Hours

Course Outcomes :

At the end of the course, the student will be able to:

CO1	Design the members using plastic analysis
CO2	Analyze wind forces as per IS codes on various structures
CO3	Analyze and design the various tubular steel structures, roof trusses based on latest Indian standards
CO4	Develop Conceptual knowledge about cold form sections.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

UNIT I

Topic no 1 Elementary Plastic Analysis and Design

Topic no 2 Introduction, Scope of plastic analysis

Topic no 3 shape factor, mechanisms, plastic collapse

Topic no 4 plastic analysis of beams

Topic no 5 portal frames, design of beams

UNIT II

Topic no 6 Design of Steel Stacks: Introduction, various loads to be considered

Topic no 7 the design of steel stacks, design of steel stacks including foundation

Topic no 8 Cold formed Sections: Introduction and brief description of various types of cold formed sections.

UNIT III

Topic no 9 Design of round tubular structures - Introduction, sectional properties, permissible stresses, grades of steel tubes Topic no 10 tubular tension members, tubular compression members, tubular flexural members,

Topic no 11 combined bending and axial stresses

Topic no 12Tubular Light Poles: calculation for wind loads, design and analysis of tubular street light poles.

Topic no 13 Towers: Basic introduction to transmission and telecommunication towers.

UNIT IV

Topic no 14Roof trusses: Introduction, types, components

Topic no 15 design considerations, design of roof trusses

Topic no 16 Water Tank: Analysis and design of rectangular water tank

Text Books

- 1 Design of Steel Structures, A.S. Arya and J.L. Ajmani, Nem Chand Brothers, Roorkee
- 2 Design of Steel Structures, Ram Chandra, Vol. I & II, Standard Book House
- 3 Design of Steel Structures, P. Dayaratnam, Wheeler Publishing, New Delhi.

Reference Books

- 1 BIS Codes IS 800:2007, IS 801:1975, IS 875
- 2 Design of Steel Structures, B.C. Punmia, Laxmi Publication, Delhi



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Subject: REINFORCED CONCRETE DESIGN II Subject Code:CE306C

L	Т	Р	Credits	Class Work	:	25 Marks
3	0		3	Examination Total	:	75Marks 100 Morks
				Duration of Examination	:	4 Hours

USE OF RELEVANT INDIAN STANDARD IS ALLOWED IN THE EXAMINATIONS. ONLY LIMIT STATE DESIGN METHOD IS TO BE USED IN THIS COURSE.

Course Outcomes :

At the end of the course, the student will be able to DESIGN:

CO1	Continuous flexural members such as beams and design of stair cases.
CO2	Domes and Curved beams.
CO3	Different types of water tanks.
CO4	Different types of retaining walls with different end conditions.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

UNIT I

Topic no 1 Continuous Beams: Basic assumptions, Moment of inertia, settlements, Modification of moments

Topic no 2 maximum moments and shear, redistribution of moments for single and multi-span beams, design examples.

Topic no 3 Stair- Cases: Type of stair-cases, Effective span of stairs

Topic no 4 Distribution of loads on different types of stair cases, Design examples

UNIT II

Topic no 5 Water Tanks: Estimation of Wind and earthquake forces

Topic no 6 design requirements, rectangular and cylindrical

Topic no 7 under ground, Intze tanks

Topic no 8 design considerations, design examples

UNIT III

Topic no 9 Design of curved beams in plan: Analysis and Design of curved beams fixed at both ends

Topic no 10 ring beams

Topic no 11 Design of Domes: Meridional and hoop

Topic no 12 stress in spherical and conical domes

UNIT IV

Topic no 13 Retaining walls: Design of cantilever and counter fort type retaining walls.

Topic no 14 Introduction to Bridge Engineering: Definition, components of a bridge

Topic no 15, classifications, importance of bridges

Topic no 16 Need for investigations, selection of bridge site, I.R.C. loadings



Text Books

- 1. Reinforced Concrete Structures, P. C. Varghese, Tata McGraw Hill
- 2. Advanced Reinforced Concrete Structures, P. C. Varghese, Tata McGraw Hill
- 3. Reinforced Concrete Design, M.L. Gambhir, Macmillan India Ltd., New Delhi
- 4. Limit State Design of Reinforced Concrete, A.K. Jain, Nem Chand and Bros., Roorkee
- 5. Behaviour, Analysis and Design of R.C.C. Structural Elements, I.C. Syal and Ummat, A.H. Wheelers, New Delhi
- 6. Elements of Bridge Engineering, D. Johnson Victor, Oxford and IBH Publishers, New Delhi.

Reference Books

- 1. IS:456 2000
- 2. IS 3370 2009
- 3. Plain and Reinforced concrete, Vol. 2, O P Jain and J. Krishna, Nem Chand and Bros., Roorkee
- 4. Reinforced Concrete Design, S U Pillai and D Menon, Tata McGraw Hill

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Subject: FOUNDATION ENGINEERING Subject Code:CE308C

L	Т	Р	Credits	Class Work	:	25 Marks
3	0	-	3	Examination	:	75 Marks
				Total	:	100 Marks
				Durationof Examination	:	3 Hours

Course Outcomes: Upon successful completion of the course, the students will be able to:

CO1	Analyze and determine earth pressure behind a retaining structure.
CO2	Develop the conceptual knowledge in stability of slopes, Pile Foundations and Cassions and Wells.
CO3	Exercise soil exploration and Analyze and determine the Bearing Capacity of soil.
CO4	Understand Drainage and Dewatering of Soil, Soil Stabilisation Techniques and use of Geotextiles.

CO-PO/PSO Articulation Matrix :

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

UNIT I

Topic no 1 Introduction to soil exploration: Scope, Methods of soil exploration, spacing, significant depth, boring and sampling techniques, types of samples, sample disturbances

Topic no 2 penetration tests (Standard Cone Penetration Test and Standard Penetration Test), and Geophysical methods (Seismic Refraction Method & Electrical Resistivity Method

Topic no 3 Earth Pressure: Earth Pressures at rest condition, states of plastic equilibrium, Rankine's theory for active and passive conditions

Topic no 4 Influence of surcharge, water table, wall friction, Numerical Problems for the determination of Active and Passive Earth Pressure diagrams

AMPUS

Topic no 5 Critical height of an Unsupported Vertical Cut.

UNIT II

Topic no 6 Stability of Slopes: Infinite slopes, Critical Depth of a cohesive Infinite Slope, types of failure, Swedish Slip Circle Method

Topic no 7 Taylor's stability Number and Stability Curves, Concept of factors of safety

Topic no 8 Bishop's Method of slices, Effect of sudden draw down and submergence

Topic no 9 Design of Shallow Foundation: Bearing Capacity, Definitions, depth of foundation, Terzaghi's general

Topic no 10 bearing capacity equation, IS code equation, factors affecting bearing capacity. Bearing capacity by penetration tests

Topic no 11 Plate load test, Design Criteria for Shallow Foundations, Stability, Shear, and Settlement Failures

UNIT III

Topic no 12 Pile Foundations: Types, function, selection of piles, pile driving formulae, point, bearing and friction piles

Topic no 13 Load carrying capacity of single pile, group action, spacing of piles

Topic no 14 Negative skin friction, Concept of under reamed piles.

Topic no 15 Caissons and Wells: Introduction, components, shapes

Topic no 16 stability of well foundation, sinking of well, tilts and shifts.

UNIT IV

Topic no 17 Drainage and Dewatering of Soil: Methods of Ditches and Sump, Well Point System, Shallow Well System, Deep Well Drainage, Vaccum Method

- Topic no 18 Electro Osmosis Method, Seepage Analysis for various conditions of Fully penetrating slot and partially penetrating slot, Protective Filters.
- Topic no 19 Soil stabilization and Geotextiles: Need and advantages of Ground Improvement techniques, Stabilisation (Mechanical, Lime, Cement, bitumen, Chemical) of Soils and its advantages

Topic no 20 Geotextiles (Concept, Types, Functions, Use of Geotextiles in Earth Dam Construction

Topic no 21 Road Works, Railway works, Erosion Control and in Bearing capacity Improvement



Text Books:

- 1. Basic and Applied Soil Mechanics, by Gopal Ranjan Rao, ASR Rao, New Age Int. (P) Ltd. Pub., New Delhi.
- 1. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi.
- 2. Soils and Foundations, by Cheng Liu & Jack B Evett, Prentice-Hall Inc., USA.
- 3. A Text Book of Soil Mechanics Foundation Engg. by VNS Murthy U.B.S, New Delhi.
- 4. Modern Geotechnical Engineering Alam Singh.

References Books:

- 1. Foundation Analysis and Design, by J.E. Bowles McGraw Hill Book Company, NewYork.
- 2. Foundation Engineering by Peck, Wiley Eastern India Limited, New Delhi.
- 3. Soil Mechanics & Foundation Engineering, by K.R. Arora, Standard Publishers, New Delhi.
- 4. Soil Dynamics and Machine Foundations by Swami Saran, Galgotia Publishers, New Delhi.

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Subject : ENVIRONMENTAL ENGINEERING – 1 Subject Code: CE 310C

L	Т	Р	Credits	Class Work	:	25 Marks
3	0		3	Examination	:	75Marks
				Total Duration of Exam.	: :	100 Marks 3 Hours

1. Course outcomes:

Upon successful completion of the course students will be able to

CO1	Evaluate water sources, water quality and transportation of water.
CO2	Determine water quality parameters and design of water treatment units.
CO3	Calculate the water capacity reservoirs, water supply network design and treatment of
	water.
CO4	Understand the selection criteria of pumps and water fixtures in buildings.

3 Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, put "-"

Contents

UNIT – I

Topic no 1 Water Sources: Definition and Scope of Environmental Engineering, Surface and ground water sources

Topic no 2 Selection and development of sources

Topic no 3 Water Supply Systems: Municipal water demands and demand variations

Topic no 4, Population forecasting and water demand estimations; Intakes and transmission systems

Topic no 5 pipes for transporting water and their design

$\mathbf{UNIT} - \mathbf{II}$

Topic no 6 Water Quality: Physical, chemical and biological water quality parameters

Topic no 7 Water quality index; Water quality standards

Topic no 8 Water treatment - I: Water treatment schemes; Basic principles of water treatment

Topic no 9 Design of plain sedimentation, coagulation and flocculation, filtration - slow, rapid and pressure filter; Disinfection units.

UNIT – III

Topic no 10Water treatment - II: Fundamentals of water softening, fluoridation and deflouridation

Topic no 10 water desalinization and demineralization. Advanced treatments like adsorption, ion exchange, membrane processes.

Topic no 11 Design of Water Supply Systems: Water supply network design and design of balancing

Topic no 12 service reservoirs; operation and maintenance of water supply systems. Data and background information for the design of water

supply system;

UNIT – VI

Topic no 13 Pumps and pumping stations: Types of pumps and their characteristics and efficiencies;

Topic no 14 Pump operating curves and selection of pumps; pumping stations

Topic no 15 Small scale and household level water purification system and water fixtures

Topic no 16 Various valves used in W/S systems, Introduction to various types of home plumbing systems for water supply

Text Books



- 1. Manual on Water Supply and Treatment by Ministry of Urban Development, New Delhi.
- 2. Water Supply and Sewerage, McGhee, McGraw Hill.

3. Environmental Engineering, Vol. I, S.K. Garg, Khanna Publishers, New-Delhi.

- References Books
- 1. Environmental Engineering Peavy, Rowe and Tchobanglous, McGraw Hill.
- 2. Water and Waste Water Engineering (Vol. 1&2), Fair, Geyer &Okun, John Wiley, New York.
- 3. Water Supply Engineering P.N. Modi, Standard Book House New-Delhi.
- 4. Standard Methods for the Examination of Water and Waste Water, American Public Health Association.

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Subject: FOUNDATION ENGINEERING LAB Subject Code: CE 312C

L	Т	Р	Credits	

· - 2 1

Class Work Examination Total Durationof Examination : 25 Marks : 75 Marks : 100 Marks

: 3 Hours

<u>Course Outcomes</u>: Upon successful completion of the course, the students will be able to:

CO1	Determine and analyze various index properties of soils, by different methods and their comparison.
CO2	Understand and determine the Permeability and shear strength characteristics of soil, and applicability of
	various tests.
CO3	Understand and determine the Compaction characteristics of soil, under various compactive efforts.
CO4	Understand and determine the Consolidation characteristics of soil.
CO5	Exercise soil exploration and determine the Bearing Capacity of soil.

<u>CO-PO/PSO Articulation Matrix</u>:

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

List of Experiments:

- 1. Determination of Permeability by constant head permeameter.
- 2. Determination of Permeability by variable head permeameter.
- 3. Determination of Specific Gravity of soil, by Density Bottle.
- 4. Determination of water content of soil, by Calcium Carbide Method.
- 5. Determination of water content of soil, by Proctor Needle Method.
- 6. Determination of Compaction properties by Standard ProctorTest.
- 7. Determination of Compaction properties by Modified ProctorTest.
- 8. Determination of MDD and OMC at different compactive effort by compaction test.
- 9. Determination of shear strength, by Direct shear test.
- 10. Determination of shear strength, by Tri-axial shear test.
- 11. Determination of shear strength, byUnconfined Compression Test.
- 12. Determination of Bearing capacity by Standard Penetration Test.
- 13. Determination of Bearing capacity by Plate Load Test.
- 14. Examine the Consolidation properties, by laboratory Consolidation Test.

References Books:

- 1. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi.
- Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.



Subject: ENVIRONMENTAL ENGINEERING – I LAB Subject Code: CE314C

L	Т	Р	Credits	Class Work	:	25 Marks
0	0	2	1	Practical	:	75Marks
				Total	:	100 Marks
				Duration of Exam.	:	3 Hours

1. Course objectives:

To analyze the physical and chemical characteristics of drinking water.

To study the test procedure and measurement of concentration of drinking water parameters.

2. Course outcomes:

On completion of the course, the students will be able to:

CO1	Recommend the degree of treatment required for the water.
CO2	Learn techniques for ensuring quality potable water.

3. Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO4	PO6	PO7
CO1	2	3	3	3	3
CO2	2	3	3	3	3

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High) If there is no correlation, put "-"

List of Experiments

- 1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
- 2. Analysis of solids content of water: Dissolved, Suspended Solids
- 3. Alkalinity and acidity,
- 4 Hardness: total hardness, calcium and magnesium hardness
- 5. Analysis of ions: chloride
- 6. Analysis of ions: sulfate
- 7. Optimum coagulant dose
- 8. Dissolved Oxygen (D.O)
- 9. Break point Chlorination, residual chlorine and chlorine dose.

10. Visit to a Water Treatment Plant

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

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AN MURTI

Subject: MATERIAL TESTING LAB

Subject Code: CE316C

Class Work 25 Marks Examinations 75 Marks Duration of Exam 3 Hrs

L P Credits

4 2

List of experiments:

- 1. Testing of bricks
- 2. Testing of paver blocks
- 3. Testing of HYSD bars
- 4. Testing of Concrete for workability
- 5. Concrete mix design using IS 10262
- 6. Concrete mix design using BS8110
- 7. Non destructive testing using rebound hammer
- 8. Non destructive testing using ultrasound
- 9. Study of testing of self compacting concrete

Notes:

- 1. Each Laboratory Class/Section shall not be of more than about 20 students.
- 2. To allow fair opportunity of practical hands-on experience to each student, each experiment may either be done by each student individually or in a group of not more than 3-4 students. Larger groups be strictly discouraged / disallowed.
- 3. Pre-experimental & post experimental quiz / questions may be offered for each Lab experiment to reinforce & aid comprehension of the experiment.

COURSE OUTCOMES

After completion of this students will be able to

- 1. Test various materials
- 2. Design bituminous mixes

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AN MURTI

Subject: HIGHWAY MATERIAL TESTING LAB

Subject Code: CE318C

Class Work25 MarksExaminations75 MarksDuration of Exam 3 Hrs

L P Credits

4 2

List of experiments:

- 1. Testing of paver blocks
- 2. Concrete mix design using IS 10262
- 3. Testing aggregate: abrasion test
- 4. Testing aggregates: polishing test
- 5. Preparation of Job mix formula for road works
- 6. Durability test on aggregates
- 7. study of rheology of bitumen
- 8. To design bituminous mix using Marshal stability method
- 9. Pavement evaluation using Benkelman beam method

Notes:

- 4. Each Laboratory Class/Section shall not be of more than about 20 students.
- 5. To allow fair opportunity of practical hands-on experience to each student, each experiment may either be done by each student individually or in a group of not more than 3-4 students. Larger groups be strictly discouraged / disallowed.
- 6. Pre-experimental & post experimental quiz / questions may be offered for each Lab experiment to reinforce & aid comprehension of the experiment.

COURSE OUTCOMES

After completion of this students will be able to

- 10. Test various materials
- 11. Design bituminous mixes



L

4

Т

Subject: CONCRETE TECHNOLOGY Subject Code:CE351C

Class Work	:	25 Marks
Examination	:	75Marks
Total	:	100 Marks
Duration of Examination	:	3 Hours

USE OF RELEVANT INDIAN STANDARDS IS ALLOWED IN THE EXAMINATION

Course Outcomes :

At the end of the course, the student will be able to:

Р

Credits

4

CO1	Various properties of constituents of concrete on strength and durability of concrete
CO2	Properties of fresh and hardened concrete and various tests
CO3	Concrete Mix for the given data
CO4	Differences between various design methods
CO5	Requirements of special concrete and concrete in special environment

Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

UNIT – I

- Topic no 1 Constituents of Concrete: Properties of Cement, Tests on cement, Various types of cement & their applications, Bulking of Sand, properties of good sand
- Topic no 2 functions of sand in mortar and cement concrete, substitutes of sand, Classification of Aggregates, Properties of aggregates specific gravity, bulk density,
- Topic no 3 porosity, adsorption & moisture content of aggregates, deleterious substance in aggregate, Soundness of aggregate, Grading of coarse and fine aggregates
- Topic no 4 physical requirements of aggregates, and their tests, Admixtures: their purpose, their types, properties, dosages, effects and usages.

$\mathbf{UNIT}-\mathbf{II}$

- Topic no 5 Properties of Fresh and Hardened Concrete: Properties & Tests of Cement Concrete, Workability, factors affecting workability, measurement of workability by different tests
- Topic no 6; Strength of concrete and factors affecting it, Water Cement Ratio Abram's law, Degree of Compaction and Age of Concrete.
- Topic no 7 Development of Strength of Concrete, Methods of Curing, Influence of Temperature, Steam curing, Durability, shrinkage & Creep of Concrete,
- Topic no 8 Factors influencing Creep; Compression tests and Tension Tests, Flexural Tests & Splitting Tests, Freeze and Thaw in Concrete.

UNIT – III

- Topic no 9 Concrete Mix Design: Principles of Concrete Mix Design, Basic Considerations, Factors in the choice of mix design, outline of mix design procedure
- Topic no 10 Proportioning of Concrete mixes by various methods BIS Method of Mix Design,
- Topic no 11 American Concrete Institute, British Standard, Quality control and Acceptance Criterion. Grades of Concrete
- Topic no 12 stress strain curve, permissible stresses

$\mathbf{UNIT}-\mathbf{IV}$

- Topic no 13 Durability of Concrete: Sulphate attack of concrete, Corrosion of rebar wrt chloride
- Topic no 14 Sulphate attack, Alkali Silica Reaction, Freezing and Thawing, Carbonation of Concrete, Corrosion Measurement Techniques, Prevention of Corrosion
- Topic no 15 Special Circumstances of Concreting: Hot weather concreting,
- Topic no 16 Cold weather concreting, Underwater concreting
- Topic no 17 Heavy Concrete, Lightweight Concrete, Geo polymer concrete



Text Books:

- 1. Concrete Technology, by A. M. Neville & J.J. Brooks, Pearson.
- 2. Concrete Technology, by M.L. Gambhir, Tata McGraw Hill, New Delhi.
- 3. Concrete Technology, by M.S. Shetty, S. Chand & Co.

Reference Books:

- 1. Handbook of Mix Design, BIS, New Delhi.
- 2. Concrete Technology, by A.R. Santhakumar, Oxford University Press.
- 3. Concrete Microstructure and its Properties by P K Mehta and PJM Monterio
- 4. IS: 269 2015
- 5. IS:383 2016
- 6. IS:10262 2019

NOTE: 1.For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.





Subject: GROUND WATER ENGINEERING Subject Code:CE356C

				Subject Couctedeece			
L	Т	Р	Credits	Class Work	:	25 Marks	
3 -	-		3	Examination	:	75Marks	
				Total	:	100 Marks	

COURSE OUTCOMES

On completion of the course the student will be able to

1. Understand ground water role in hydrological cycle, ground water fluctuations and environmental influence, movement of ground water, flow rates and various method/theories related to the ground water.

Duration of Examination

3 Hours

- 2. Analyze causes of ground water pollution and physical/chemical/biological property, quality of ground water, various method of surface/sub-surface ground water investigation.
- 3. Understand Concept & methods of artificial ground water recharge and saline water intrusion in aquifers.
- 4. Understand advanced well hydraulics, modeling and management of ground water.

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

UNIT- I

Topic no 1 Introduction: Ground water utilization & historical background, ground water in hydrologic cycle, ground water budget and ground water level fluctuations & environmental influence

- Topic no 2 Occurrence and movement of ground water: Origin & age of ground water, rock properties affecting Ground water, groundwater column, zones of aeration & saturation
- Topic no 3 aquifers and their characteristics/classification, groundwater basins & springs, Darcy's Law, permeability & its determination, Dupuit assumptions
- Topic no 4 heterogeneity & anisotropy, Ground water flow rates & flow directions, Steady state flow, Unsteady state flow, Thesis method, Jacob method,
- Topic no 5 Slug test, Infiltration gallery, general flow equations through porous media.

UNIT- II

- Topic no 6 Pollution and quality analysis of ground water: Municipal/industrial/agricultural/miscellaneous sources & causes of pollution, attenuation/ underground distribution
- Topic no 7 potential evaluation of pollution, physical /chemical /biological analysis of ground water quality, criteria & measures of ground water quality
- Topic no 8 ground water salinity & samples, graphical representations of ground water quality.
- Topic no 9 Based methods for surface investigation of ground water, test drilling & ground water level measurement, sub-surface ground water investigation
- Topic no 10 through geophysical / resistivity /spontaneous potential /radiation / temperature / caliper / fluid conductivity / fluid velocity /miscellaneous logging

UNIT-III

Topic no 10 Artificial ground water recharge: Concept & methods of artificial ground water recharge mounds

- Topic no 11 induced recharge, wastewater recharge for reuse, water spreading.
- Topic no 12 Saline water intrusion in aquifers: Ghyben-Herzberg relation between fresh & saline waters, shape & structure of the fresh
- Topic no 13 saline water interface, upcoming of saline water, fresh-saline water relations on oceanic islands

Topic no 14 seawater intrusion in Karst terrains, saline water intrusion control.

UNIT-IV

Topic no 15 Advanced well hydraulics: steady/ unsteady, uniform/ radial flow to a well in a confined/ unconfined /leaky aquifer, well flow near aquifer boundaries/ for special conditions

- Topic no 16 partially penetrating/horizontal wells & multiple well systems, well completion/ development/ protection/ rehabilitation/ testing for yield.
- Topic no 17Modeling and management of ground water: Ground water modeling through porous media /analog / electric analog / digital computer models
- Topic no 18 ground water basin management concept, hydrologic equilibrium equation, ground water basin investigations, data collection & field work

Topic no 19 dynamic equilibrium in natural aquifers, management potential & safe yield of aquifers, stream-aquifer interaction.



References/Books

- 1. D. K. Todd and L. F. Mays, "Groundwater Hydrology", John Wiley and sons.
- 2. K. R. Karanth, "Hydrogeology", TataMcGraw Hill Publishing Company.
- 3. S. Ramakrishnan, "Ground water", S. Ramakrishnan.

Additional readings

1. Literature of the Central Ground Water Board (CGWB); Relevant National/International Journal and/or Conference publications.

NOTE: 1.For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

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Subject: CONSTRUCTION ENGINEERING MATERIALS Subject Code: CE368C

: 25 Marks
: 75 Marks
: 100 Marks
: 3 Hours
a

Course Outcomes :

At the end of the course, the student will be able to:

CO1	sound understanding about the properties of the various binding materials like cement, lime etc.
CO2	knowledge about various pozzolanic materials and their importance in construction industry.
CO3	knowledge about mix design methods of concrete.
CO4	knowledge about modern construction materials and their applications

Prepare CO-PO/PSO Articulation Matrix, e.g.:

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

Unit I

Topic no 1 Lime – Preparation of lime mortar – Cement. Ingredients – Manufacturing process – Types and Grades – Properties of cement Topic no 2 Cement mortar – Hydration - Compressive strength – Tensile strength – Soundness and consistency

Topic no 3 Setting time – Aggregates – Natural stone aggregates – Industrial byproducts

Topic no 4 Crushing strength - Impact strength - Flakiness - Abrasion Resistance - Grading - Sand - Bulking - Code Practices

Unit II

Topic no 5 Pozzolanic materials, Importance of Pozzolanic materials

- Topic no 6 Types and Use of Pozzolanic materials in construction industries
- Topic no 7 Effects of pozzolanic materials on the properties of fresh and hardened concrete
- Topic no 8 Cement and Concrete hollow blocks Light-weight concrete blocks Code Practices

Unit III

Topic no 9 Concrete - Ingredients - Manufacture - Batching plants - RMC

Topic no 10 Properties of fresh concrete – Slump – Flow and compaction

Topic no 11 Principles of hardened concrete - Compressive, Tensile and shear strength

Topic no 12 Modulus of rupture - Tests - Mix specification

Topic no 13 Mix proportioning and Mix Design Methods - IS method

Unit IV

Topic no 14 Glass - Ceramics - Sealants for joints - Fibre glas

Topic no 15 reinforced plastic-Fibre textiles - Geosynthetics for Civil Engineering applications

Topic no 16 Fibre Reinforced Concrete-High Strength Concrete-High Performance

Topic no 17 Concrete-Light Weight Concrete-Heavy Weight

Topic no 18 Concrete-their production, properties and applications

TEXT BOOKS

1.R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.

2.M. S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003.

3. A. R. Santhakumar, Concrete Technology, Oxford press

NOTE: 1.For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type



questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

