2 Electronics gadgets including Cellular phones are not allowed in the examination

3 * Assessment of survey camp held after fourth semester.

4 DE-I (SP) For only those students opting for degree with specialization

5 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.

6 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.

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. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
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

B. Tech. 3rd Year (V & VI semester only)Civil Engg.: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students. The Scheme & Syllabi of VII & VIII semester shall be put up in 16th meeting of Academic Council.

6th

5	CE310C	ENVIRONMENTAL ENGINEERING - I	3	-		25	75	-	100	3	3
6	CE	DE-I 1	2	1		25	75	-	100	3	3
7	CE	DE-II 2	3	-		25	75	-	100	3	3
8.	CE	DE-II(SP)	4	-		25	75	-	100	4	3
9	CE312C	FOUNDATION ENGINEERING LAB	-	-	2	25		75	100	1	3
10	CE314C	ENVIRONMENTAL ENGINEERING – I LAB	-	-	2	25		75	100	1	3
11	CE316C CE318C	MATERIAL TESTING LAB** HIGHWAY MATERIAL TESTING LAB	-	-	4	25		75	100	2	3
12	GFCE302C	GENERAL FITNESS FOR CIVIL ENGINEERING	-	-	-	-	-	75	75	-	3
Total			23	2	10	275	600	300	1175	30	

MOOC Reinforced Concrete Road Bridges

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 ... platforms SWAYAM/MOOCS/NPTEL etc. with due permission of**

Unit-III

Tender- Preparation of tender documents, importance of inviting tenders, contracttypes, relative merits, prequalification. general and special conditions, termination ofcontracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes,R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc.

Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct &IndirectOverheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management.

Unit-IV

Rate analysis-Purpose, importance and necessity of the same, factors affecting,task work, daily output from different equipment/ productivity.

Introduction to Acts pertaining to-Minimum wages, 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), UBSPublishers, 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.

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

CE302C ESTIMATING AND COSTING

B. Tech. 3rd Year (Semester-VI)

L	T	P	Credits
2	--	2	3

Class Work	: 25 Marks
Examination	: 75 Marks
Total	: 100 Marks
Duration of Examination	: 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.:**

	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

Cost & Cost Control–Techniques, Types of Costs, Lifecycle costs, Budgets, Break even Analysis, Capital Budgeting. Investment Analysis – NPV, ROI,IRR, Payback Period, Depreciation, Time value of money (present and future worth of cashflows). Business Forecasting – Elementary techniques. Statements – Cash flow, Financial Case Study Method.

Specifications-Types, requirements and importance, detailed specifications forbuildings, roads, minor bridges and industrial structures.

Unit-II

Estimation / Measurements for various items- Introduction to the process ofEstimation; Use of relevant Indian Standard Specifications for the same, taking out quantitiesfrom the given requirements of the work, comparison of different alternatives, Bar bendingschedules, Mass haul Diagrams, Estimating Earthwork and Foundations,

Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipmentcosts; labour costs; rate analysis; Material survey-Thumb rules for computation of materialsrequirement for different materials for buildings, percentage breakup of the cost, costsensitive index, market survey of basic materials. Use of Computers in quantity surveying.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE 304C: DESIGN OF STEEL STRUCTURES II

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits
3	1	--	4

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

Elementary Plastic Analysis and Design: Introduction, Scope of plastic analysis, shape factor, mechanisms, plastic collapse, plastic analysis of beams and portal frames, design of beams.

UNIT II

Design of Steel Stacks: Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

Cold formed Sections: Introduction and brief description of various types of cold formed sections.

UNIT III

Design of round tubular structures - Introduction, sectional properties, permissible stresses, grades of steel tubes, tubular tension members, tubular compression members, tubular flexural members, combined bending and axial stresses.

Tubular Light Poles: calculation for wind loads, design and analysis of tubular street light poles.

Towers: Basic introduction to transmission and telecommunication towers.

UNIT IV

Roof trusses: Introduction, types, components, design considerations, design of roof trusses.

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

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.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE 306C: REINFORCED CONCRETE DESIGN II

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				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

Continuous Beams: Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, redistribution of moments for single and multi-span beams, design examples.

Stair- Cases: Type of stair-cases, Effective span of stairs, Distribution of loads on different types of stair cases, Design examples.

UNIT II

Water Tanks: Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground,Intze tanks, design considerations, design examples.

UNIT III

Design of curved beams in plan: Analysis and Design of curved beams fixed at both ends, ring beams

Design of Domes: Meridional and hoop stress in spherical and conical domes.

UNIT IV

Retaining walls: Design of cantilever and counter fort type retaining walls.

Introduction to Bridge Engineering: Definition, components of a bridge, classifications, importance of bridges. 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

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.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE308C: FOUNDATION ENGINEERING

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits
3	0	-	3

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

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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

Introduction to soil exploration: Scope, Methods of soil exploration, spacing, significant depth,boring and sampling techniques, types of samples, sample disturbances, penetration tests (Standard Cone Penetration Test and Standard Penetration Test), and Geophysical methods (Seismic Refraction Method & Electrical Resistivity Method).

Earth Pressure: Earth Pressures at rest condition, states of plastic equilibrium, Rankine's theory for active and passive conditions, Influence of surcharge, water table, wall friction, Numerical Problems for the determination of Active and Passive Earth Pressure diagrams, Critical height of an Unsupported Vertical Cut.

UNIT II

Stability of Slopes: Infinite slopes, Critical Depth of a cohesive Infinite Slope, types of failure, Swedish Slip Circle Method, Taylor's stability Number and Stability Curves, Concept of factors of safety, Bishop's Method of slices, Effect ofsudden draw down and submergence.

Design of Shallow Foundation: Bearing Capacity, Definitions, depth of foundation, Terzaghi's general bearing capacity equation, IS code equation, factors affecting bearing capacity.Bearing capacity by penetration tests, Plate load test.

Design Criteria for Shallow Foundations, Stability, Shear, and Settlement Failures.

UNIT III

Pile Foundations: Types, function, selection of piles, pile driving formulae, point, bearing andfriction piles. Load carrying capacity of single pile, group action, spacing of piles, Negative skin friction, Concept of under reamed piles.

Caissons and Wells: Introduction,components, shapes, stability of well foundation, sinking of well, tilts andshifts.

UNIT IV

Drainage and Dewatering of Soil: Methods of Ditches and Sump, Well Point System, Shallow Well System, Deep Well Drainage, Vaccum Method, Electro Osmosis Method, Seepage Analysis for various conditions of Fully penetrating slot and partially penetrating slot, Protective Filters.

Soil stabilization and Geotextiles: Need and advantages ofGround Improvement techniques, Stabilisation (Mechanical, Lime, Cement, bitumen, Chemical) of Soils and its advantages, Geotextiles (Concept, Types, Functions, Use of Geotextiles in Earth Dam Construction, 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.
2. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain &Arun Kumar Jain, Laxmi Publications, New Delhi.
3. Soils and Foundations, by Cheng Liu & Jack B Evett, Prentice-Hall Inc., USA.
4. A Text Book of Soil Mechanics Foundation Engg. by VNS Murthy – U.B.S, New Delhi.
5. 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.

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.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE 310C: ENVIRONMENTAL ENGINEERING – 1

B. Tech. 3rd Year (Semester – VI)

L	T	P	Credits
3	0	--	3

Class Work	:	25 Marks
Examination	:	75Marks
Total	:	100 Marks
Duration of Exam.	:	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

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UNIT – I

Water Sources: Definition and Scope of Environmental Engineering, Surface and ground water sources; Selection and development of sources;

Water Supply Systems: Municipal water demands and demand variations, Population forecasting and water demand estimations; Intakes and transmission systems, pipes for transporting water and their design

UNIT – II

Water Quality: Physical, chemical and biological water quality parameters; Water quality index; Water quality standards;

Water treatment - I: Water treatment schemes; Basic principles of water treatment; Design of plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure filter; Disinfection units.

UNIT – III

Water treatment - II: Fundamentals of water softening, fluoridation and deflouridation, and water desalinization and demineralization. Advanced treatments like adsorption, ion exchange, membrane processes.

Design ofWater Supply Systems: Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems. Data and background information for the design of water supply system;

UNIT – VI

Pumps and pumping stations: Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; pumping stations:

Small scale and household level water purification system and water fixtures, 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.

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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