

Semester- VI (w.e.f. session 2017-2018)

Sr. No.	Course No.	Course Title	Teaching Schedule				Allotment of marks				Duration of Exam(Hrs)
			L	T	P/D	Hrs/ Week	Theory	Sessional	Practical	Total	
1	CE-302N	Design of Steel Structures-II	4	2	0	6	75	25	0	100	3
2	CE-304N	Irrigation Engineering-I	3	2	0	5	75	25	0	100	3
3	CE-306N	Disaster Management	3	1	0	4	75	25	0	100	3
4	CE-308N	Geotechnology-II	3	2	0	5	75	25	0	100	3
5	CE-310N	Transportation Engineering- I	3	1	0	4	75	25	0	100	3
6	CE-312N	Water Supply & Treatment	3	1	0	4	75	25	0	100	3
7	CE-314N	Transportation Engg.- I (P)	0	0	2	2	0	40	60	100	3
8	CE-316N	Environmental Engg.- I (P)	0	0	2	2	0	40	60	100	3
9	CE-318N	CAD (LAB)	0	0	3	3	0	40	60	100	3
		Total	19	9	7	35	450	270	180	900	

Note: The students will have to undergo another six weeks Field Training/Survey after VI sem and it will be evaluated during VII sem through submission of certified report to the H.O.D. followed by conduct of viva-voce & seminar/presentation.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-302N	DESIGN OF STEEL STRUCTURES-II	4	2	25	75	100	3 Hr
Course Objective	To Impart knowledge and ability to design various steel structures.						
UNIT	Course Outcome						
I	Students will be able to familiar with the Elementary Plastic Analysis and Design of steel structures.						
II	Students will be able to design steel water tank and steel stacks and their stability checks.						
III	Students will be able to design steel towers and Cold Formed Sections and their stability checks.						
IV	Students will be able to design steel industrial building and their stability checks.						

UNIT-I

Elementary Plastic Analysis and Design:

Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

UNIT-II

Design of Water Tanks:

Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.

Design of Steel Stacks:

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

UNIT-III

Towers:

Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

Cold Formed Sections:

Introduction and brief description of various types of cold formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

UNIT-IV

Industrial Buildings:

Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:

1. Design of Steel Structures, A.S.Arya & J.L.Ajmani, Nem Chand & Bros., Roorkee.
2. Design of Steel Structures, P.Dayartnam, Wheeler Pub. Allahabad.
3. Design of Steel Structures, Gaylord & Gaylord, MGH, Newyork/International Students Ed.
4. IS:800-1984, Indian Standard Code of Practice for General Construction in Steel.
5. IS-801-1975, Indian Standard Code of Practice for Use of Cold formed light gauge steel structural members in general building construction.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-304N	IRRIGATION ENGINEERING-I	3	2	25	75	100	3 Hr
Course Objective	To Impart knowledge irrigation water requirement and ability to understand the hydraulic structures.						
UNIT	Course Outcome						
I	Students will be able to understand water requirement of crops and methods of irrigation.						
II	Students will be able to study the canals, its types and also design of lined canals.						
III	Students will be able to study about losses and water logging and its techniques.						
IV	Students will be able to study about canal outlet, its design and ground water irrigation.						

UNIT-I

Introduction: Irrigation-necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India, crops and crop seasons, ideal cropping pattern and high yielding varieties of crops. **Soil-water relationship and irrigation methods:** Soil-water relationship, root zone soil water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, GCA, CCA, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation, favorable conditions, sprinkler systems, hydraulics of sprinkler irrigation, planning, design and maintenance of sprinkler systems, drip irrigation-components parts, advantages and limitations, suitability of drip irrigation.

UNIT-II

Canal irrigation: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories-Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's & Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy & Lacey's theories..

Lined canals: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.

UNIT-III

Losses in canals, water logging and drainage: Losses in canals-Evaporation and seepage, water logging, causes and ill effects of water logging anti water logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains.

River Training work: Classification of rivers, river training and its objectives, classification of river training works, methods of river training, marginal embankments, guidebanks, spurs, cutoffs, bank pitching and launching apron.

UNIT-IV

Canal outlets: Classification, requirements of a good outlet, design of pipe, APM and open flume outlet, flexibility proportionality, setting and sensitivity of outlet.

Tube-well irrigation: Types of tube wells - strainer type, cavity type and slotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield & specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions, Theim's & Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tubewells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tubewell.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:

1. Irrigation, Water Resources and Water Power Engg. by P.N.Modi.
2. Fundamentals on Irrigation Engg. by Bharat Singh.
3. Irrigation Engg & Hydraulic Structures by S.K.Garg.
4. Irrigation Engg. by S.K.Sharma.
5. Irrigation-Theory & Practice by A.M. Michael.
6. Irrigation – Theory & Practice by G.L. Asawa.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-306N	DISASTER MANAGEMENT	3	1	25	75	100	3 Hr
Course Objective	To Impart knowledge about Disaster management and design & planning to control the accidents.						
UNIT	Course Outcome						
I	Students will be able to study about Disaster and their types.						
II	Students will be able to study about assessment of disaster and management of its control.						
III	Students will be able to understand the building structures and their efficiency to control hazard.						
IV	Students will be able to study the efficient structures and analysis of Hazard by case study.						

UNIT-I

Introduction to Disaster Management: Define and describe disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and describe the types of natural and non-natural disasters. Important phases of Disaster Management Cycle.

Disaster Mitigation and Preparedness: Natural Hazards: causes, distribution pattern, consequences and mitigation measures for earth quake, tsunami, cyclone, flood, landslide drought etc. Man-made hazards: causes, consequences mitigation measures for various industrial hazards/disasters, Preparedness for natural disasters in urban areas.

UNIT-II

Hazard and Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.

Emergency Management Systems (EMS): Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation.

UNIT-III

Capacity Building: Gender sensitive disaster management approach and inculcate new skills and sharpen existing skills of government officials, voluntary activists, development of professional and elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines..

Application of Geo-informatics and Advanced Techniques: Use of Remote Sensing Systems (RSS) and GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.

UNIT-IV

Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

Case Studies: Lessons and experiences from various important disasters with specific reference to Civil Engineering.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books/References:

1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill. Pub
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester
3. Disaster Management, R.B. Singh (Ed), Rawat Publications
4. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction.
5. [www.http//ndma.gov.in](http://ndma.gov.in)
6. Disaster Management –Future Challenges & Opportunities by Jagbir Singh, I.K. International Publishing House.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-308N	GEOTECHNOLOGY-II	3	2	25	75	100	3 Hr
Course Objective	To Impart knowledge of earth soil and its structures and also the stability of earth structures.						
UNIT	Course Outcome						
I	Students will be able to study about earth dams and stability of slopes.						
II	To study about braced cuts and coffer dams, their design and stability.						
III	To study about stabilization of soil masses by using sheet piles.						
IV	To study the methods of Soil Stabilization and machine tools						

UNIT-I

Earth Dams: Introduction, types of sections, earth dam foundations, causes of failure and criteria for safe design, control of seepage through the embankment, control of seepage through the foundation, drainage of foundations, and criterion for filter design. Introduction to rock fill dams.

Stability of slopes: Causes of failure, factors of safety, stability analysis of slopes-total stress analysis, effective stress analysis, stability of infinite slopes types of failures of finite slopes, analysis of finite slopes-mass procedure, method of slices, effect of pore pressure, Fellinius method to locate center of most critical slip circle, friction circle method, Taylor's stability number, slope stability of earth dam during steady seepage, during sudden draw down and during and at the end of construction.

UNIT-II

Braced Cuts: Depth of unsupported vertical cut, sheeting and bracing for deep excavation, movements associated with sheeting and bracing, modes of failure of braced cuts, pressure distribution behind sheeting.

Cofferdams: Introduction, types of cofferdams, design and lateral stability of braced cofferdams, design data for Cellular cofferdams, stability analysis of cellular cofferdams on soil and rock, inter-lock stresses.

UNIT-III

Cantilever Sheet Piles: Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method, simplified procedure, cantilever sheet pile, penetrating clay and limiting height of wall.

Anchored Bulkheads: Methods of design, free earth support method in cohesionless and cohesive soils, fixed earth support method in cohesionless soils-Blum's equivalent beam method.

UNIT-IV

Soil Stabilization: Soil improvement, shallow compaction, mechanical treatment, use of admixtures, lime stabilization, cement stabilization, lime fly ash stabilization, dynamic compaction and consolidation, bituminous stabilization, chemical stabilization, pre-compression, lime pile and column, stone column, grouting, reinforced earth.

Basics of Machine Foundations: Terminology, characteristics elements of a vibratory systems, analysis of vibratory motions of a single degree freedom system-undamped free vibrations, undamped forced vibrations, criteria for satisfactory action of a machine foundation, degrees of a freedom of a block foundation, Barken's soil spring constant, Barken's method of a determining natural frequency of a block foundation subjected to vertical oscillations.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books Recommended:

1. Analysis and Design of Foundation and Retaining Structures by S. Prakash, Ranjan & S.Saran, Sarita Prakashan.
2. Analysis and Design of Sub Structures by Swami Saran, IBH Oxford
3. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Newage Int.Pub.
4. Soil Dynamic by Shamsheer Prakash, McGraw Hill
5. Foundation Design by Teng, Prentice Hall
6. Soil Mechanics & Foundation Engineering by Bharat Singh, Shamsheer Prakash, Nem Chand & Bros, Roorkee.
7. Soil Mechanics and Foundation Engineering by Alam Singh.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-310N	TRANSPORTATION ENGINEERING -I	3	1	25	75	100	3 Hr
Course Objective		The study of safe & optimum geometric design of highways & fundamental parameters of highway materials.					
UNIT	Course Outcome						
I	Students will able to study the history review of roads and development of their concern authorities.						
II	Students will study about geometric design and their cross sectional elements of highways.						
III	Students will study about regulation and safe movements of the traffic.						
IV	Students will study about different fundamental parameters of highway materials.						

UNIT-I

Introduction: Transportation and its importance. Different modes of transportation. Brief review of history of road development in India and abroad: Roman, Tresagne, Telford and Macadam constructions. Road patterns. Classification of roads, Objectives of highway planning, Planning surveys. Saturation system of planning.

Highway Plans, Highway Alignment and Surveys: Main features of 20 years road development plans in India. Requirements of an ideal highway alignment. Factors affecting alignment. Surveys for highway alignment.

UNIT-II

Cross Section Elements and Sight Distance Considerations: Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values. Types of terrain Design speed. Sight distance, stopping sight distance, overtaking sight distance, overtaking zones, intermediate sight distance, sight distance at intersections, head light sight distance, set back distance. Critical locations for sight distance.

Design of Horizontal and Vertical Alignment: Effects of centrifugal force. Design of super-elevation. Providing super-elevation in the field. Radius of circular curves. Extra-widening. Type and length of transition curves. Gradient, types, values. Summit curves and valley curves, their design criterion. Grade compensation on curves.

UNIT-III

Traffic Characteristics and Traffic Surveys: Road user and vehicular characteristics. Traffic studies such as volume, speed and O & D study. Parking and accident studies. Fundamental diagram of traffic flow. Level of service. PCU. Capacity for non-urban roads. Causes and preventive measures for road accidents.

Traffic Control Devices: Traffic control devices: signs, signals, markings and islands. Types of signs. Types of signals. Design of an isolated fixed time signal by IRC method. Intersections at grade and grade separated intersections. Design of a rotary. Types of grade separated intersections.

UNIT-IV

Highway Materials: Soil and Aggregates: Subgrade soil evaluation: CBR test, plate bearing test. Desirable properties of aggregates. Various tests, testing procedures and IRC/IS specification for suitability of aggregates. Proportioning of aggregates for road construction by trial and error and Routhfuch method.

Bituminous Materials and Bituminous Mixes: Types of bituminous materials: bitumen, tar, cutback and emulsions. Various tests, testing procedures and IRS/IS specifications for suitability of bituminous materials in road construction. Bituminous mix, desirable properties. Marshall' method of mix design. Basic concept of use of polymers and rubber modified bitumen in bituminous mixes.

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Books:

1. Highway Engg. by S.K.Khanna & C.E.G.Justo, Nem Chand & Bros,Roorkee.
2. Principles of Transportation and Highway Engg. by G.V.Rao,Tata McGraw Hill Pub., N.Delhi.
3. Traffic Engg. And Transport Planning by L.R.Kadiyali,Khanna Pub.Delhi.
4. Traffic Engg. by Matson, T.M.,Smith,W.S. and Hurd,P.W.McGraw Hill Book Co., New York.

Code	Nomenclature of Subject	L	T	Int.	Ext.	Total	Time
CE-312N	WATER SUPPLY AND TREATMENT	3	1	25	75	100	3 Hr
Course Objective	The aim of study is the water requirement, quantity, its properties and its distribution.						
UNIT	Course Outcome						
I	Students will study the quantity requirement of the water for supply.						
II	Students will study the physical, chemical and bacteriological properties of water.						
III	Students will study the methods of treatment of water.						
IV	Students will study the methods to supply the water for different purpose.						

UNIT-I

Water Quantity:

Importance and necessity of water supply scheme. Water demands and its variations. Estimation of total quantity of water requirement. Population forecasting. Quality and quantity of surface and ground water sources. Selection of a source of water supply. Types of intakes.

UNIT-II

Water Quality:

Impurities in water and their sanitary significance. Physical, chemical and bacteriological analysis of water. Water quality standards.

UNIT-III

Water Treatment:

Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation – plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units. Filtration – mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects). Disinfection principles and aeration.

UNIT-IV

Water Distribution:

Distribution system – Gravity system, Pumping System, Dual system, Layout of Distribution System – Dead End System, Grid Iron System, Ring System, Radial System, their merits and demerits. Distribution Reservoir-functions & determination of storage capacity.

Paper Setter Note: 8 questions of 15 marks each distributed in four sections are to be set taking two questions from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.

Books:

1. Water Supply and Sewerage: E.W. Steel.
2. Water Supply Engineering: S.R. Kshirsagar.
3. Water Supply Engineering: S.K. Garg.
4. Water Supply Engineering: B.C. Punmia.
5. Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.

Code	Nomenclature of Practical	P	External	Sessional	Total	Time
CE-314N	TRANSPORTATION ENGINEERING-I (P)	2	60	40	100	3H
Course Objective	The aim of study is to determine the different properties of highway construction materials.					

LIST OF EXPERIMENTS

1. To determine the toughness of the aggregate by aggregate Impact Test.
 2. To determine the hardness of the aggregate by Los-Angeles Abrasion Test.
 3. To determine the hardness of the aggregate by Dorry's Abrasion Test on Aggregates.
 4. To determine the hardness of the aggregate by Deval Attrition Test on Aggregates.
 5. To determine the Crushing Strength Test on Aggregates.
 6. To determine the grade and hardness of the bitumen by Penetration Test.
 7. To determine the elastic property of the bitumen by Ductility Test.
 8. To determine the grade and hardness of the bitumen by Viscosity Test.
 9. To determine the Softening Point Test on Bitumen.
 10. To determine the Flash and Fire Point Test on Bitumen.
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Code	Nomenclature of Practical	P	External	Sessional	Total	Time
CE-316N	ENVIRONMENTAL ENGINEERING-I (P)	2	60	40	100	3H
Course Objective	To Impart knowledge of quality and mineral composition of drinking water supply.					

LIST OF EXPERIMENTS

1. To determine the pH value of a given sample of water waste water.
2. To determine the turbidity in given water waste water sample.
3. To determine the acidity of given sample of water waste water.
4. To determine the alkalinity of given sample of water waste water.
5. To determine temporary and permanent hardness in a given water sample.
6. To determine the chlorine does required for a given water sample.
7. To determine total suspended, suspended, dissolved settleable solids in a sewage sample.
8. To determine the chloride concentration in a given sample of waste water.
9. To determine the sulphate concentration in given water sample.

Code	Nomenclature of Practical	P	External	Sessional	Total	Time
CE-318N	CAD Lab	3	60	40	100	3H
Course Objective	The students will able to understand the 3D structures and prepaid drawing in cad					

LIST OF EXPERIMENTS

PART-A

Detailed drawing of the following reinforced concrete structures:

1. Footings: Isolated footings, combined footings, rectangular, trapezoidal, strip, strap, raft footings
2. Domes: Spherical and conical domes.
3. Water tanks: rectangular, cylindrical, Intz type overhead water tank.
4. RCC Flat slabs
5. Masonary columns, bearing walls, retaining walls.

PART-B

Detailed design and drawing of the following steel structures:

1. Columns, base plates and their foundations
2. Plate Girder (welded)
3. Gantry Girder
4. Simple roof trusses.