CE-302E Design of Steel Structures - II

Week	Theory	
	Lecture day	**Topic (Including Assignment Test)**
1st	1	Elementary Plastic Analysis and Design • Introduction, Scope of plastic analysis
	2	• Ultimate load carrying capacity of tension members
	3	• Ultimate load carrying capacity of compression members
2nd	4	• Flexural members, shape factor, mechanisms
	5	• Plastic collapse and analysis
	6	• Plastic analysis applied to steel beams and simple portal frames and design
3rd	7	Design of Water Tanks: • Introduction, permissible stresses
	8	• Design of circular steel tanks
	9	• Design of Rectangular steel tanks.
4th	10	• Prestressed steel tanks including staging
	11	Design of Steel Stacks: • Introduction, permissible stresses, various loads to be considered for the design of steel stacks
	12	• IS specifications for steel stacks
5th	13	• Foundation specification for steel stacks
	14	• Design of steel stacks including foundation
	15	• Design of steel stacks including foundation
6th	16	• Design of steel stacks including foundation
	17	• Guyed stacks - Introduction
	18	• Design of guyed stacks
7th	19	**MINOR TEST I**
	20	
	21	
8th	22	• Design of guyed stacks
	23	• Towers: introduction, types

	24	• Introduction - Transmission line towers microwave towers
9th	25	• Design loads, classification of towers
	26	• Specifications of transmission line
	27	• Design procedure of transmission line tower
10th	28	• Design procedure of transmission line tower
	29	• Design procedure of transmission line tower
	30	Cold Formed Sections: • Introduction and brief description of various types of cold formed sections
11th	31	• Applications of various types of cold formed sections, local buckling
	32	• concepts of effective width and effective sections, Elements with stiffeners
	33	• Design of compression
12th	34	• Design of bending elements
	35	Industrial Buildings: • Loads, general arrangement and stability
	36	• design considerations for industrial buildings
13th	37	• Purlins – introduction and specifications
	38	• Design of purlins
	39	• Design of purlins
14th	40	**MINOR TEST II**
	41	
	42	
15th	43	• Design of roof trusses
	44	• Industrial building frames
	45	• Bracings and Stepped columns

IRRIGATION ENGINEERING-I/CE-304E

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
Unit-I		
1st	1	**Introduction:** Irrigation-necessity, advantages, disadvantages
	2	Impact of irrigation on human environment
	3	Need and development of irrigation in India
	4	Crops and crop seasons, ideal cropping pattern and high yielding varieties of crops
2nd	5	**Soil-water relationship and irrigation methods:** Soil-water relationship
	6	Root zone soil water, infiltration,
	7	Consumptive use, field capacity,
	8	Wilting point, available moisture in soil, GCA, CCA,
3rd	9	Intensity of irrigation, delta, base period, Kor depth, core period
	10	Frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement,
	11	Flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation, favorable conditions
	12	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		
4th	13	**Canal irrigation**
	14	Component of canal distribution system,
	15	Alignment of channels
	16	Losses in irrigation channels
5th	17	Design discharge,
	18	Silt theories and design of alluvial channels
	19	Comparison of Kennedy's and Lacey's theories,
	20	Comparison of Kennedy's and Lacey's theories,
6th	21	Canal section and design procedure,
	22	Canal section and design procedure,
	23	Garrets and Lacey's diagrams
	24	Garrets and Lacey's diagrams
7th	**1st Minor Test**	
Unit-III		
8th	25	**Water logging and land reclamation**
	26	Water logging-effects
	27	Causes and measures of prevention,
	28	Lining of irrigation channels,
9th	29	Types of lining,
	30	Design of lined channel land drainage,
	31	Open drains, design considerations
	32	Advantages of tile drains
10th	33	Depth of tile drains
	34	Layout of closed drains
	35	Discharge and spacing of closed drains, diameter of tile drain

	36	Outlets for tile drains, maintenance of tile drains, purpose of land reclamation and methods of land reclamation.	
Unit-IV			
11^{th}	37	**River Training**	
	38	Classification of rivers	
	39	River training and its objectives	
	40	Classification of river training works	
12^{th}	41	Methods of river training	
	42	Marginal embankments	
	43	Guidebanks, spurs	
	44	Guidebanks, spurs	
13^{th}	45	Cutoffs	
	46	Bank pitching and launching apron	
	47	**Canal outlets**	
	48	Classification	
14^{th}	**2^{nd} Minor test**		
15^{th}	49	Requirements of a good outlet,	
	50	Design of pipe	
	51	APM and open flume outlet,	
	52	Flexibility proportionality, setting and sensitivity of outlet.	

CE-306E WATER RESOURCES & SYSTEMS ENGINEERING

Week	Theory	
	Lecture day	**Topic (Including Assignment Test)**
1st	1	**Water Resources Planning:** Introduction, Role of water in national development
	2	Assessment of water resources, planning process,
	3	Environmental consideration in planning, system analysis in water planning,
	4	some common problems in project planning, functional requirements in multipurpose projects,
2nd	5	Multipurpose planning, basin wise planning, long term planning.
	6	Reservoir planning-dependable yield,
	7	Sedimentation in reservoir, reservoir capacity,
	8	Empirical-area reduction method.
3rd	9	Numerical Problems
	10	Numerical Problems
	11	Economic and Financial Analysis: Meaning and nature of economic theory, micro and macro economics,
	12	the concept of equilibrium, equivalence of kind, equivalence of time and value,
4th	13	cost benefit, discounting factors and techniques
	14	Numerical Problems
	15	Numerical Problems
	16	Conditions for project optimality, cost benefit analysis,
5th	17	Numerical Problems on Cost – Benefit ratio method
	18	Numerical Problems on present worth method
	19	Numerical Problems on rate of return method
	20	Numerical Problems on annual – cost method
6th	21	The Institutional framework – political, engineering and financial feasibility
	22	Cost allocation, separable and non-separable cost,
	23	Project Formulation – A social benefit – cost approach
	24	Alternate justifiable and remaining benefit methods
7th	25	**MINOR TEST I**
	26	

	27	
	28	
8th	29	Profitability analysis – Numerical Problem
	30	Water Resources Systems Engineering: Concept of system's engineering,
	31	optimal policy analysis – different methods
	32	simulation and simulation modeling – tools for simulation
9th	33	Nature of water resources system – physical, sociological, economic, political, legal, geological and agricultural
	34	Analog simulation, Analog – Computer simulation, limitations of simulation
	35	Objective function, production function, optimality condition
	36	Numerical Problem
10th	37	linear, non-linear and dynamic programming,
	38	Numerical Problem
	39	Numerical Problem
	40	The system decomposition – Re-composition approach
11th	41	Applications to real time operations of existing system,
	42	Hydrologic modeling – Stochastic Models
	43	Applications of Basic concepts – Models, Flood flows, Economic data, least cost reservoir combinations.
	44	Applications of system engineering in Hydrology
12th	45	Reservoir Yield Model – Method of calculation, optimization
	46	Applications of system engineering in Irrigation
	47	Applications of system engineering in Agriculture
	48	Applications of system engineering in water quality
13th	49	Applications of system engineering in Economics and Financing
	50	Applications of system engineering in Drainage Engineering
	51	Applications of system engineering in Distribution network
	52	Applications of system engineering in operating and maintenance of irrigation and drainage systems
14th	53	**MINOR TEST II**
	54	
	55	
	56	
15th	57	Mathematical models for forecasting the water and salt regimeof irrigated lands

	58	and other water resources related problems
	59	Water and soil balance equation
	60	Illustrative model for water and soil balance equation

GEOTECHNOLOGY-II/CE-308E

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
Unit-I		
1st	1	**Earth Dams:** Introduction, types of sections
	2	Earth dam foundations, causes of failure and criteria for safe design,
	3	Control of seepage through the embankment, control of seepage through the foundation
	4	Drainage of foundations, criterion for filter design, Introduction to rock fill dams
2nd	5	**Stability of slopes:** Causes of failure, factors of safety
	6	Stability analysis of slopes-total stress analysis
	7	Effective stress analysis
	8	Stability of infinite slopes types of failures of finite slopes
3rd	9	Analysis of finite slopes-mass procedure, method of slices, effect of pore pressure
	10	Fellinius method to locate center of most critical slip circle
	11	Friction circle method, Tayler's stability number
	12	Slope stability of earth dam during steady seepage, during sudden draw down and during and at the end of construction
Unit-II		
4th	13	**Braced Cuts:** Depth of unsupported vertical cut,
	14	Sheeting and bracing for deep excavation,
	15	Movements associated with sheeting and bracing,
	16	Modes of failure of braced cuts, pressure distribution behind sheeting.
5th	17	**Cofferdams:** Introduction
	18	Types of cofferdams,
	19	Design and lateral stability of braced cofferdams
	20	Design data for Cellular cofferdams,
6th	21	Design data for Cellular cofferdams,
	22	Stability analysis of cellular cofferdams on soil and rock
	23	Stability analysis of cellular cofferdams on soil and rock
	24	Inter-lock stresses.
7th	**1st Minor Test**	
Unit-III		
8th	25	**Cantilever Sheet Piles:** Purpose of sheet piles
	26	Cantilever sheet piles
	27	Depth of embedment in granular soils-rigorous method,
	28	Depth of embedment in granular soils-rigorous method,
9th	29	Simplified procedure, cantilever sheet pile
	30	Penetrating clay and limiting height of wall
	31	**Anchored Bulkheads:** Methods of design,
	32	Free earth support method in cohesionless and cohesive soils, fixed
10th	33	Free earth support method in cohesionless and cohesive soils, fixed
	34	Earth support method in cohesionless soils-Blum's equivalent beam method
	35	Earth support method in cohesionless soils-Blum's equivalent beam method
	36	Earth support method in cohesionless soils-Blum's equivalent beam method
Unit-IV		

11th	37	**Soil Stabilization:** Soil improvement	
	38	Shallow compaction	
	39	Mechanical treatment	
	40	Use of admixtures	
12th	41	Lime stabilization, cement stabilization,	
	42	Lime fly ash stabilization, dynamic compaction and consolidation,	
	43	Bituminous stabilization, chemical stabilization	
	44	Pre-compression, lime pile and column, stone column, grouting, reinforced earth.	
13th	45	**Basics of Machine Foundations:** Terminology	
	46	Characteristics elements of a vibratory systems	
	47	Analysis of vibratory motions of a single degree freedom system-undamped free vibrations	
	48	Undamped forced vibrations	
14th	**2nd Minor test**		
15th	49	Criteria for satisfactory action of a machine foundation	
	50	Degrees of a freedom of a block foundation	
	51	Barken's soil spring constant	
	52	Barken's method of a determining natural frequency of a block foundation subjected to vertical oscillations	

CE – 310E TRANSPORTATION ENGINEERING - I

Week	Theory	
	Lecture day	**Topic (Including Assignment Test)**
1st	1	Transportation and its importance. Different modes of transportation
	2	Brief review of history of road development in India and abroad: Roman, Tresagne, Telford and Macadam constructions.
	3	Road patterns, Classification of roads, Objectives of highway planning
2nd	4	Planning surveys. Saturation system of planning
	5	**Highway Plans, Highway Alignment and Surveys:** Main features of 20 years road development plans in India
	6	Requirements of an ideal highway alignment.
3rd	7	Factors affecting alignment. Surveys for highway alignment
	8	Cross section elements: friction, carriageway, formation width, land width, camber, IRC recommended values.
	9	Types of terrain Design speed. Sight distance, stopping sight distance
4th	10	overtaking sight distance, overtaking zones, intermediate sight distance
	11	sight distance at intersections, head light sight distance
	12	Set back distance. Critical locations for sight distance
5th	13	**Design of Horizontal and Vertical Alignment:** Effects of centrifugal force
	14	Design of super elevation. Providing super elevation in the field
	15	Radius of circular curves. Extra-widening
6th	16	Type and length of transition curves. Gradient, types and values
	17	Summit curves and valley curves, their design criterion
	18	Grade compensation on curves
7th	19	**MINOR TEST 1**
	20	
	21	
8th	22	Traffic Characteristics And Traffic Surveys Road user and vehicular characteristics

	23	Traffic studies such as volume, speed and O & D study
	24	Parking and accident studies, Fundamental diagram of traffic flow
9th	25	Level of service and PCU, Capacity for non-urban roads
	26	Causes and preventive measures for road accidents
	27	**Traffic Control Devices:** Traffic control devices: signs, signals, markings and islands
10th	28	Types of signs. Types of signals.
	29	Design of an isolated fixed time signal by IRC method
	30	Intersections at grade and grade separated intersections
11th	31	Design of a rotary. Types of grade separated intersections
	32	**Highway Materials: Soil and Aggregates:** Subgrade soil evaluation: CBR test
	33	Plate bearing test. Desirable properties of aggregates
12th	34	Various tests, testing procedures
	35	IRC/IS specification for suitability of aggregates
	36	Proportioning of aggregates for road construction by trial and error and Routhfuch method
13th	37	Bituminous Materials and Bituminous Mixes: Types of bituminous materials: bitumen, tar, cutback and emulsions
	38	Various tests, testing procedures
	39	IRC/IS specifications for suitability of bituminous materials in road construction
14th	40	**MINOR TEST II**
	41	
	42	
15th	43	Bituminous mix, desirable properties
	44	Marshall's method of mix design
	45	Basic concept of use of polymers and rubber modified bitumen in bituminous mixes.

WATER SUPPLY & TREATMENT/CE-312E

Week	Theory		
	Lecture Day	Topic (Including assignment / Test)	
Unit-I			
1st	1	**Water Quantity: Introduction**	
	2	Importance and necessity of water supply scheme	
	3	Water demands and its variations	
	4	Estimation of total quantity of water requirement	
2nd	5	Estimation of total quantity of water requirement	
	6	Population forecasting	
	7	Population forecasting	
	8	Quality and quantity of surface and ground water sources	
3rd	9	Quality and quantity of surface and ground water sources	
	10	Selection of a source of water supply	
	11	Selection of a source of water supply	
	12	Types of intakes	
Unit-II			
4th	13	**Water Quality: Introduction**	
	14	Impurities in water and their sanitary significance	
	15	Impurities in water and their sanitary significance	
	16	Impurities in water and their sanitary significance	
5th	17	Impurities in water and their sanitary significance	
	18	Physical analysis of water	
	19	Physical analysis of water	
	20	Chemical analysis of water	
6th	21	Bacteriological analysis of water	
	22	Bacteriological analysis of water	
	23	Water quality standards	
	24	Water quality standards	
7th	**1st Minor Test**		
Unit-III			
8th	25	**Water Treatment: Introduction**	
	26	Objectives	
	27	Treatment processes and their sequence in conventional treatment plant	
	28	Sedimentation – plain and aided with coagulation	
9th	29	Types, features and design aspects	
	30	Mixing basins and Flocculation units	
	31	Filtration – mechanism involved	
	32	Types of filters	
10th	33	Slow and rapid sand filtration units (features and design aspects)	
	34	Slow and rapid sand filtration units (features and design aspects)	
	35	Disinfection principles and aeration	
	36	Disinfection principles and aeration	
Unit-IV			
11th	37	**Water Distribution: Introduction**	
	38	Distribution system	
	39	Gravity system	
	40	Pumping System	

12th	41	Dual system,	
	42	Layout of Distribution System	
	43	Dead End System	
	44	Grid Iron System	
13th	45	Ring System	
	46	Radial System, their merits and demerits	
	47	Radial System, their merits and demerits	
	48	Radial System, their merits and demerits	
14th	**2nd Minor test**		
15th	49	Distribution Reservoir-functions & determination of storage capacity	
	50	Distribution Reservoir-functions & determination of storage capacity	
	51	Distribution Reservoir-functions & determination of storage capacity	
	52	Distribution Reservoir-functions & determination of storage capacity	

CE-314E TRANSPORTATION ENGINEERING-I (P)

Week	Practical	
	Lecture day	**Topic (Including Assignment Test)**
1st	1	Tests on Road Aggregates – Introduction of – MORTH, IS: 2386 Part IV, IS: 383 – 1970 (Group 1)
	2	Tests on Road Aggregates – Introduction of – MORTH, IS: 2386 Part IV, IS: 383 – 1970 (Group 2)
2nd	3	Exp. 1 - Aggregate Impact Test (Group 1)
	4	Exp. 1 - Aggregate Impact Test (Group 2)
3rd	5	Exp. 2 - Los-Angeles Abrasion Test on Aggregates (Group 1)
	6	Exp. 2 - Los-Angeles Abrasion Test on Aggregates (Group 2)
4th	7	Exp. 3 - Dorry's Abrasion Test on Aggregates (Group 1)
	8	Exp. 3 - Dorry's Abrasion Test on Aggregates (Group 2)
5th	9	Exp. 4 - Deval Attrition Test on Aggregates (Group 1)
	10	Exp. 4 - Deval Attrition Test on Aggregates (Group 2)
6th	11	Tests on Bituminous Material – Introduction of – IS:73 – 2006, IS: 1202 – 1978, IS:1203 – 1978, IS: 1205 – 1978, IS: 1208 – 1978,IS: 1209 – 1978 (Group 1)
	12	Tests on Bituminous Material – Introduction of – IS:73 – 2006, IS: 1202 – 1978, IS:1203 – 1978, IS: 1205 – 1978, IS: 1208 – 1978, IS: 1209 – 1978 (Group 2)
7th	13	**MINOR TEST I**
	14	
8th	15	**VIVA – VOCE Group - 1**
	16	**VIVA – VOCE Group - 2**
9th	17	Exp. 5 - Penetration Test on Bitumen (Group 1)
	18	Exp. 5 - Penetration Test on Bitumen.(Group 2)
10th	19	Exp. 6 - Ductility Test on Bitumen (Group 1)
	20	Exp. 6 - Ductility Test on Bitumen(Group 2)
11th	21	Exp. 7 - Viscosity Test on Bituminous Material (Group 1)
	22	Exp. 7 - Viscosity Test on Bituminous Material(Group 2)
12th	23	Exp. 8 - Softening Point Test on Bitumen (Group 1)
	24	Exp. 8 - Softening Point Test on Bitumen (Group 2)
13th	25	Exp. 9 - Flash and Fire Point Test on Bitumen (Group 1)
	26	Exp. 9 - Flash and Fire Point Test on Bitumen (Group 2)
14th	27	**MINOR TEST II**

	28	
15th	29	**VIVA – VOCE Group - 1**
	30	**VIVA – VOCE Group - 2**

CE-316E ENVIRONMENTAL ENGINEERING-I (P)

Week	Practical	
	Lecture day	**Topic (Including Assignment Test)**
1st	1	Experiment 1 –Determine the pH value of a given sample of waste water (Group 1)
	2	Experiment 1 –Determine the pH value of a given sample of waste water(Group 2)
2nd	3	Experiment 2 –To Determine the turbidity in given waste water sample. (Group 1)
	4	Experiment 2 - To Determine the turbidity in given waste water sample. (Group 2)
3rd	5	Experiment 3 - Determine the acidity of given sample of waste water (Group 1)
	6	Experiment 3 - Determine the acidity of given sample of waste water (Group 2)
4th	7	Experiment 4 - Determine the alkalinity of given sample of waste water (Group 1)
	8	Experiment 4 - Determine the alkalinity of given sample of waste water (Group 2)
5th	9	Experiment 5 - Determine temporary hardness in a given water sample(Group 1)
	10	Experiment 5 - Determine temporary hardness in a given water sample (Group 2)
6th	11	Experiment 5 - Determine permanent hardness in a given water sample (Group 1)
	12	Experiment 5 - Determine permanent hardness in a given water sample (Group 2)
7th	13	**MINOR TEST I**
	14	
8th	15	**VIVA – VOCE Group - 1**
	16	**VIVA – VOCE Group - 2**
9th	17	Experiment 6 –Determine total suspended, suspended, in a sewage sample (Group 1)
	18	Experiment 6 - Determine total suspended, suspended, in a sewage sample (Group 2)
10th	19	Experiment 6 -To determine dissolved settable solids in a sewage sample (Group 1)
	20	Experiment 6 - To determine dissolved settable solids in a sewage sample (Group 2)
11th	21	Experiment 8 –To Determine chlorine dose required for given water sample (Group 1)
	22	Experiment 8 - To Determine chlorine dose required for given water sample (Group 2)
12th	23	Experiment 9 - Determine the chloride concentration in a given sample of waste water (G1)
	24	Experiment 9 - Determine the chloride concentration in a given sample of waste water (G2)
13th	25	Experiment 10 - Determine the Sulphate concentration in given water sample (Group 1)
	26	Experiment 10 - Determine the Sulphate concentration in given water sample (Group 2)
14th	27	**MINOR TEST II**
	28	

15th	29	**VIVA – VOCE Group - 1**
	30	**VIVA – VOCE Group - 2**

COMPUTER APPLICATION/ CE-318E

Week	Practical
	Topic
1st	Computation of roots of a polynomial using. Bisection method, (b) Newton-Raphson method
2nd	Computation of roots of a polynomial using. Bisection method, (b) Newton-Raphson method
3rd	Solution of linear simultaneous equation suing Gauss Elimination/Gauss Jordan /Triangulation factorization method
4th	Solution of linear simultaneous equation suing Gauss Elimination / Gauss Jordan / Triangulation factorization method.
5th	Solution of system of non-linear equation using fixed point / Newton Raphson / modified Newton-on method.
6th	Solution of system of non-linear equation using fixed point / Newton Raphson / modified Newton-Raphson method.
7th	**Minor Test-1**
8th	Analysis of multi-span Beam and frames using stiffness matrix method.
9th	Analysis of multi-span Beam and frames using stiffness matrix method.
10th	Analysis of Plane frame and space Frame using automated software.
11th	Analysis of Plane frame and space Frame using automated software
12th	Analysis of a three storeyed and ten storeyed building using automated software
13th	Analysis of a three storeyed and ten storeyed building using automated software.
14th	**Minor Test-II**
15th	Introduction to Auto CAD.