

CE402E BRIDGE ENGINEERING

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
1 st	1	Definition, components of bridge, classification of bridges.
	2	Selection of site, economical span.
	3	Aesthetics consideration, necessary investigations.
	4	Essential design data.
2 nd	5	Standard Specifications for Roads and Railways Bridges: General, Indian Road Congress Bridge Code, width of carriage way, clearance,
	6	Various loads to be considered for the design of roads bridges, detailed explanation of IRC standard live loads.
	7	Various loads to be considered for the design of roads bridges, detailed explanation of IRC standard live loads.
	8	Various loads to be considered for the design of railway bridges, detailed explanation of IRC standard live loads.
3 rd	9	Various loads to be considered for the design of railway bridges, detailed explanation of IRC standard live loads.
	10	Design Consideration for R. C. C. Bridges: Various types of R.C.C. bridges(brief description of each type)
	11	Design of R.C.C. culvert bridges.
	12	Design of R.C.C. culvert bridges.
4 th	13	Design of R.C.C. culvert bridges.
	14	Design of R.C.C. T-beam bridges.
	15	Design of R.C.C. T-beam bridges.
	16	Design of R.C.C. T-beam bridges.
5 th	17	Design of R.C.C. T-beam bridges.
	18	Design Consideration for Steel Bridges: Various types of steel bridges (brief description of each)
	19	Various types of steel bridges (brief description of each)
	20	Design of truss bridges.
6 th	21	Design of truss bridges.
	22	Design of truss bridges.
	23	Design of truss bridges.
	24	Design of truss bridges.
7 th	1st Minor Test	
8 th	25	Design of plate girder bridges.
	26	Design of plate girder bridges.
	27	Design of plate girder bridges.
	28	Design of plate girder bridges.
9 th	29	Design of plate girder bridges.
	30	Design of plate girder bridges.
	31	Design of plate girder bridges.
	32	Design of plate girder bridges.
10 th	33	Design of plate girder bridges.
	34	Design of plate girder bridges.
	35	Hydraulic & Structural Design: Piers
	36	Hydraulic & Structural Design: Piers
	37	Hydraulic & Structural Design: Piers

11 th	38	Hydraulic & Structural Design: Piers
	39	Hydraulic & Structural Design: Abutments
	40	Hydraulic & Structural Design: Abutments
12 th	41	Hydraulic & Structural Design: Abutments
	42	Hydraulic & Structural Design: Abutments
	43	Hydraulic & Structural Design: wing-wall and approaches
	44	Hydraulic & Structural Design: wing-wall and approaches
13 th	45	Hydraulic & Structural Design: wing-wall and approaches
	46	Hydraulic & Structural Design: wing-wall and approaches
	47	Brief Description: Bearings, joints, articulation and other details.
	48	Brief Description: Bearings, joints, articulation and other details.
14 th	2 nd Minor test	
15 th	49	Bridge Foundation: Various types,
	50	Necessary investigations
	51	Design criteria of well foundation
	52	Design criteria of well foundation

CE – 404E RAILWAY AND AIRPORT ENGINEERING

Week	Theory	
	Lecture day	Topic (Including Assignment Test)
1 st	1	Introduction, Permanent Way and Rails, Rail transportation and its importance in India.
	2	Permanent way: requirements and components
	3	Gauges in India and abroad. Selection of gauge. Coning of wheels. Adzing of sleepers
2 nd	4	Rails: functions, composition of rail steel, types of rail sections, requirements of an ideal rail section, length of rails.
	5	Defects in rails. Creep of rails. Long welded rails and continuously welded rails.
	6	Sleepers: functions, requirements of an ideal sleeper. Types of sleepers: wooden, cast iron, steel and concrete sleepers, advantages, disadvantages and suitability of each type.
3 rd	7	Sleeper density. Fastenings for various types of sleepers: fish plates, spikes, bolts, bearing plates, keys, chairs, jaws, tie bars.
	8	Elastic fastenings. Ballast: functions, requirements, types of ballast and their suitability
	9	Numerical on Sleeper Density and depth of blast
4 th	10	Points and Crossings: Necessity. Turnout: various components, working principle.
	11	Switch: components, types. Crossing: components and types.
	12	Design elements of a turnout, design of a simple turnout.
5 th	13	Layout plan of track junctions: crossovers, diamond crossing, single-double slips, throw switch, turn table, triangle.
	14	Signaling, Interlocking and Train Control: Signals: objects, types and classification.
	15	Semaphore signal: components, working principle. Requirements / principles of a good interlocking system.
6 th	16	Brief introduction to devices used in interlocking. Methods of control of train movements: absolute block system, automatic block system,
	17	Centralized train control and automatic train control systems.
	18	Geometric Design of the Track: Gradients, grade compensation. Super elevation, cant deficiency, negative super elevation.
7 th	19	MINOR TEST I
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8 th	22	Maximum permissible speed on curves. Tractive resistances, types. Hauling capacity of a locomotive.
	23	Stations, Yards and Track Maintenance: Stations: functions and classification.
	24	Junction, non-junction and terminal stations.
9 th	25	Yards: functions, types. Marshalling yard: functions, types.
	26	Maintenance of railway track: necessity, types of maintenance.

	27	Brief introduction to mechanized maintenance, M.S.P and D.T.M.
10 th	28	Introduction and Airport Planning: Air transportation, its importance and characteristics, status in India
	29	Layout plan of an airport and its basic elements: terminal area, apron, taxiway, runway, hanger
	30	Aircraft characteristics, their effect on elements of an airport.
11 th	31	Site selection of an airport
	32	Classification of airports
	33	Runway Layout and Pavement Design: Runway orientation
12 th	34	Wind Rose diagram
	35	Basic runway length. Corrections to basic runway length
	36	Numerical Problem
13 th	37	Runway patterns
	38	Difference between highway and runway pavement
	39	Types of runway pavements
14 th	40	MINOR TEST II
	41	
	42	
15 th	43	Design factors for runway pavement.
	44	Brief introduction to design of thickness of a runway pavement
	45	Illustrative example for runway pavement thickness

CE 406-E INDUSTRIAL WASTE WATER TREATMENT

Week	Theory	
	Lecture day	Topic (Including Assignment Test)
1 st	1	Industrial Waste Water - introduction
	2	Current Issues in Water and Wastewater Treatment Operations
	3	Wastewater Regulations, Parameters, and Characteristics
	4	Wastewater Sources and Types
2 nd	5	Wastewater Treatment: Basic Overview
	6	Collection Systems
	7	Preliminary Treatment
	8	Primary Sedimentation
3 rd	9	Biological Treatment
	10	Secondary Sedimentation
	11	Advanced Treatment
	12	Wastewater Disinfection
4 th	13	Discharge Effluent
	14	Methods for IWWT - Introduction
	15	Effects of industrial wastes on stream
	16	Sewerage systems - Introduction
5 th	17	Types of Sewerage systems
	18	Design of economical diameter of sewerage pipe
	19	Wastewater treatment plant - introduction
	20	Minimizing the effects of industrial effluents on waste water treatment plants and receiving streams-conservation of water
6 th	21	Pretreatment of Industrial Wastes - Introduction
	22	Pretreatment of Industrial Wastes – Unit Operations
	23	Pretreatment of Industrial Wastes – Unit Processes
	24	Reuse of waste water, volume reduction
7 th	25	MINOR TEST I
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8 th	29	Strength reduction, neutralization
	30	equalization and proportioning, Population equivalent
	31	Industrial effluent standards for disposal into inland surface water sources and on land for irrigation
	32	Study of the following Industries from waste generation, quality and its treatment including brief overview of manufacturing process: Textile – manufacturing process brief introduction
9 th	33	Textile wastes: Cotton textile wastes
	34	Raw Material, Manufacturing Process, Spinning, weaving and sizing
	35	Desizing, Caustic Kiering, Bleaching, Souring,
	36	Synthetic Fiber Wastes, Silk and Jute Manufacturing wastes
10 th	37	Tannery - manufacturing process brief introduction
	38	Tannery - waster generation, Characteristics of waste water and its treatment
	39	Sugar Mill - manufacturing process brief introduction
	40	Sugar Mill - waster generation and its treatment
11 th	41	Distillery - manufacturing process brief introduction
	42	Distillery - waster generation and its treatment
	43	Dairy, pulp & paper - manufacturing process brief introduction
	44	Dairy, pulp & paper - waster generation and its treatment
12 th	45	Metal plating, oil refinery - manufacturing process brief introduction
	46	Metal plating, oil refinery - waster generation and its treatment
	47	Nitrogenous fertilizers - brief introduction
	48	Manufacturing process - Ammonia Synthesis, Urea Synthesis
13 th	49	Phosphoric Acid, Ammonium Sulphate, DAP
	50	Methods of treatment
	51	Thermal power plants - manufacturing process brief introduction
	52	Thermal power plants - waster generation and its treatment
14 th	53	MINOR TEST II
	54	
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15 th	57	Radio-active wastes - brief introduction
	58	Handling Radioactive Material
	59	Waster generation, Case Studies
	60	Treatment and Management

CE-408E ESTIMATION AND ACCOUNTS

Week	Practical	
	Lecture day	Topic (Including Assignment Test)
1 st	1	Estimate: Principles of estimation, units, items of work, different kinds of estimates,
	2	different methods of estimation, estimation of materials in single room building,
2 nd	3	Illustrative example
	4	two roomed building with different sections of walls, foundation, floors and roofs,
3 rd	5	Illustrative example
	6	R.B. and R.V.C.C. works, Plastering, White-washing, Distempering and painting, doors and windows, lump sum items,
4 th	7	Estimates of canals, roads etc.
	8	Illustrative example
5 th	9	Specification of Works: Necessity of specifications, types of specifications, general specifications,
	10	Specification for bricks, cement, sand, water, lime, reinforcement;
6 th	11	Detailed specifications for Earthwork, Cement, concrete, brick work, floorings, D.P.C., R.C.C.,
	12	Cement plastering, white and color washing, distempering, painting.
7 th	13	MINOR TEST I
	14	
8 th	15	VIVA – VOCE Group - 1
	16	VIVA – VOCE Group - 2
9 th	17	Rate Analysis: Purpose, importance and requirements of rate analysis, units of measurement,
	18	Preparation of rate analysis, procedure of rate analysis for items:- Earthwork, concrete works,
10 th	19	Procedure of rate analysis for items: -R.C.C. works, reinforced brick work, plastering, painting, finishing (white-washing, distempering).
	20	Public Works Account: Introduction, function of P.W. department, contract,
11 th	21	Guidelines, types of contracts, their advantages and disadvantages,
	22	Tender and acceptance of tender, Earnest money, security money, retention money,
12 th	23	Illustrative example of contract and tender
	24	Measurement book, cash book, preparation, examination and payment of bills,
13 th	25	First and final bills, administrative sanction, technical sanction
	26	Illustrative example of Measurement book and bill preparation

14 th	27	MINOR TEST II
	28	
15 th	29	VIVA – VOCE Group - 1
	30	VIVA – VOCE Group - 2

CE – 414E GEOSYNTHETICS ENGINEERING

Week	Theory	
	Lecture day	Topic (Including Assignment Test)
1 st	1	• Introduction to Geosynthetics • Background of reinforced earth • Basic description, mechanism and concept • Historical Development of Geosynthetics
	2	• Nomenclature related to geosynthetics • Function of geosynthetics
	3	• Use around the World • Applications of geosynthetics
	4	• Development in India
2 nd	5	• Geosynthetics classification, functions
	6	• Raw material used, different types of geosynthetics
	7	• Raw Materials: Polyester, Polypropylene,
	8	• Polyethylene, HDPE, CPE, CSPE, PA, Nylon, PVC etc.
3 rd	9	• Their Durability and Ageing
	10	• Different types of geosynthetics: Geotextiles,
	11	• Geogrids, Geonets and Geomenbranes
	12	• Physical properties of geosynthetics
4 th	13	• Mechanical properties
	14	• Hydraulic – Permeability properties
	15	• Endurance Properties and Nano Material
	16	• Endurance Properties and Nano Material
5 th	17	• Degrading Agencies, Biological Resistance
	18	• Chemical Resistance and Weathering Resistance
	19	• Abrasion resistance,
	20	• Durability properties
6 th	21	• Melt flow index and asphalt retention

	22	Manufacturing Methods of:
	23	• Fibers, Yarn, Nonwoven Geotextiles,
	24	• D.S.F. Fabrics
7 th	25	Geogrids – Introduction, Applications MINOR TEST 1
	26	
	27	
	28	
8 th	29	• Tests on Geogrids: Aperture opening & Percent open area
	30	• Thickness of rib and junctions, Number of ribs per meter length test
	31	• Mass per unit area test, Tensile strength test
	32	• Mass per unit area test, Tensile strength test
9 th	33	• Interface frictional strength: Shear and pullout
	34	• Connection strength between facing blocks and Geogrids
	35	• Sampling, Factors influencing Testing
	36	• Sampling, Factors influencing Testing
10 th	37	• Physical Properties
	38	• Physical Properties
	39	• Mechanical Properties under Uniaxial loading
	40	• Creep Testing
11 th	41	• Test on Geonets - I
	42	• Test on Geomenbranes: thickness, density
	43	• Tensile strength / Elongation test,
	44	• Permeability test
12 th	45	• Erosion Control with Geogrids: Wind Erosion, Rain Water Erosion
	46	• Erosion Control Measures, Placement of Geogrids
	47	Bearing Capacity Improvement with Geogrids: • Reinforced soil system,

	48	• Geocells
13 th	49	• Geocells / Geofoam systems
	50	• Advantages, Mechanism, Modes of Failure
	51	• Friction Coefficient,
	52	• Experimental Studies
14 th	53	MINOR TEST – II
	54	
	55	
	56	
15 th	57	Application of Geosynthetics in Water Resource Projects: Case Study • Dharoidam, Hiran II Dam
	58	• Dharoidam, Hiran II Dam
	59	• Meda Creek Irrigation Scheme
	60	• Lining of Kakarpar Canal

GROUND WATER HYDROLOGY /CE-418E

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
Unit-I		
1 st	1	Properties of Aquifers
	2	Formation constants
	3	compressibility of aquifers
	4	Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers
2 nd	5	Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers
	6	Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers
	7	Dupit's assumptions
	8	Unconfined flow with a recharge
3 rd	9	Unconfined flow with a recharge
	10	Tile drain problem
	11	Ground water exploration and methods of investigations
	12	Ground water exploration and methods of investigations
Unit-II		
4 th	13	Effect of boundaries
	14	Interference of water
	15	leaky aquifers
	16	leaky aquifers
5 th	17	Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers
	18	Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers
	19	Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers
	20	Partial penetration of an aquifer by a well
6 th	21	Partial penetration of an aquifer by a well
	22	Spherical flow in a well
	23	Non equilibrium formula for aquifer (unsteady radial flows)
	24	Non equilibrium formula for aquifer (unsteady radial flows)
7 th	1 st Minor Test	
Unit-III		
8 th	25	Tube wells, design of tube wells in different aquifers
	26	Optimum capacity, silting of tube well
	27	tube well types
	28	tube well types and its parts
9 th	29	Bore hole, strains, its types, well pipe, casing pipe, blind pipe
	30	Construction and working of tube wells, site selection
	31	drilling operation, cable tool method, hydraulic method, rivers Rotary Method and drilling fluids
	32	well screen assembly installation, verticality and alignment of tube wells, gravel packing,
10 th	33	development of tube wells, sickness
	34	In construction and corrosion and failure of tube wells

	35	Pumping equipment and hydraulic testing of pumps	
	36	Pumping equipment and hydraulic testing of pumps	
Unit-IV			
11 th	37	Artificial recharge of ground water	
	38	Considerations and methods	
	39	Considerations and methods	
	40	Recharge techniques induced infiltration	
12 th	41	Water spreading	
	42	Flooding	
	43	Basins	
	44	Ditching	
13 th	45	Ditching	
	46	Modification of natural channels	
	47	Modification of natural channels	
	48	Irrigation, recharge pits	
14th	2nd Minor test		
15 th	49	Irrigation, recharge pits	
	50	Irrigation, recharge pits	
	51	Shafts and recharge wells	
	52	Shafts and recharge wells	

CE - 426E TRANSPORTATION ENGINEERING – II (P)

Week	Practical	
	Lecture day	Topic (Including Assignment Test)
1 st	1	Experiment 1 –Flakiness and Elongation Index of aggregates (Group 1)
	2	Experiment 1 –Flakiness and Elongation Index of aggregates (Group 2)
2 nd	3	Experiment 2 –Specific gravity and water absorption test on aggregates (Group 1)
	4	Experiment 2 - Specific gravity and water absorption test on aggregates (Group 2)
3 rd	5	Experiment 3 - Specific gravity of bitumen(Group 1)
	6	Experiment 3 - Specific gravity of bitumen (Group 2)
4 th	7	Experiment 4 - Proportioning of aggregates (Group 1)
	8	Experiment 4 - Proportioning of aggregates (Group 2)
5 th	9	Experiment 5 - Marshall’s stability test (Group 1)
	10	Experiment 5 - Marshall’s stability test (Group 2)
6 th	11	Experiment 6 - Stripping test on aggregates (Group 1)
	12	Experiment 6 - Stripping test on aggregates (Group 2)
7 th	13	MINOR TEST I
	14	
8 th	15	VIVA – VOCE Group - 1
	16	VIVA – VOCE Group - 2
9 th	17	Experiment 7– Determination of bitumen content (Group 1)
	18	Experiment 7 - Determination of bitumen content (Group 2)
10 th	19	Experiment 8 -CBR lab test on soil (Group 1)
	20	Experiment 8 - CBR lab test on soil (Group 2)
11 th	21	IRC 37 – 2012 specification, CBR calculations and error corrections (Group 1)
	22	IRC 37 – 2012 specification, CBR calculations and error corrections (Group 2)
12 th	23	Experiment 9–Traffic volume study using videography technique(Group 1)
	24	Experiment 9 - Traffic volume study using videography technique(Group 2)
13 th	25	Experiment 10 - Traffic speed study using videography technique(G1)
	26	Experiment 10 - Traffic speed study using videography technique(G2)
14 th	27	MINOR TEST II

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

CE-428E ENVIRONMENTAL ENGINEERING-II (P)

Week	Practical	
	Lecture day	Topic (Including Assignment Test)
1 st	31	Exp. 1 - Determine the acidity and alkalinity of a sewage sample (Group 1)
	32	Exp. 1 - Determine the acidity and alkalinity of a sewage sample (Group 2)
2 nd	33	Exp. 2 - Determine total, suspended, dissolved and settleable solids in a sewage sample (Group 1)
	34	Exp. 2 - Determine total, suspended, dissolved and settleable solids in a sewage sample (Group 2)
3 rd	35	Exp. 3 - Determine volatile and fixed solids in a sewage sample (Group 1)
	36	Exp. 3 - Determine volatile and fixed solids in a sewage sample.(Group 2)
4 th	37	Exp. 4 - To determine oil and grease in a sewage sample.(Group 1)
	38	Exp. 4 - To determine oil and grease in a sewage sample.(Group 2)
5 th	39	Exp. 5 - To determine the chloride concentration in a sewage sample. (Group 1)
	40	Exp. 5 - To determine the chloride concentration in a sewage sample.(Group 2)
6 th	41	Exp. 6 - To determine the Sulphate concentration in a sewage sample.(Group 1)
	42	Exp. 6 - To determine the Sulphate concentration in a sewage sample.(Group 2)
7 th	43	MINOR TEST I
	44	
8 th	45	VIVA – VOCE Group - 1
	46	VIVA – VOCE Group - 2
9 th	47	Exp. 7 - To determine the B.O.D. of a given sewage sample. (Group 1)
	48	Exp. 7 - To determine the B.O.D. of a given sewage sample.(Group 2)
10 th	49	Exp. 8 - To determine the C.O.D. of a given sewage sample.(Group 1)
	50	Exp. 8 - To determine the C.O.D. of a given sewage sample.(Group 2)
11 th	51	Exp. 9 - To determine the T.O.C. of a given sewage sample.(Group 1)
	52	Exp. 9 - To determine the T.O.C. of a given sewage sample.(Group 2)
12 th	53	Exp. 10 - To determine the fecal count of a given sewage sample.(Group 1)
	54	Exp. 10 - To determine the fecal count of a given sewage sample.(Group 2)
13 th	55	Exp. 11 - Microscopic studies of a sewage. (Group 1)
	56	Exp. 11 - Microscopic studies of a sewage. (Group 2)

14 th	57	MINOR TEST II
	58	
15 th	59	VIVA – VOCE Group - 1
	60	VIVA – VOCE Group - 2