

CE 601 B ENVIRONMENTAL ENGINEERING - I

Module I

Scope of environmental engineering, Health effects, effects on resources, effect on the balance of ecosystem natural resources. *Global environmental issues*. Water supply engineering, Quantity of water. Water demands – various types, total requirements of water for a town/city, per capita demand, variation in demand and their effects on the design of various components of a water supply scheme, design periods, population growth, population forecasting methods *Water supply scheme*. Gravitational, pumping and combined schemes, pumps, classification, hand pumps, well pumps Quality of water. Drinking water standards, physical, chemical and bacteriological analysis of water.

Module II

Water Treatment. Screening Sedimentation – theory of sedimentation, plain sedimentation, design of sedimentation tanks, coagulation and flocculation, design of flash mixers, flocculators, clariflocculators, Filtration, theory, filtering media, design, construction, control and operation of slow, rapid sand and pressure filters, dual media filters. Disinfection, methods of disinfection, chlorination, prechlorination, superchlorination, dechlorination, chloramine process, break point chlorination. Miscellaneous treatments, Colour, odour and taste removal, iron and manganese removal, flouridation and deflouridation, removal of hardness. Aeration, application in removal of iron and manganese.

Module III

Wastewater engineering. Sanitary pumping, closets, urinals, wash basins, sinks, baths, traps, soil pipes, antisiphonage pipes, wastewater pipes, systems of piping pipe joints, pipe fittings. House drainage, principles of house drainage, inspection chambers, ventilation, testing of drains, connection of house drains and street sewers. *Systems of sewerage*. Separate, combined and partially combined system. conservancy and water carriage system. *Quantity of sanitary sewage*. Source of sewage, relation to water consumption, ground water infiltration, fluctuation of sewage flow. Quantity of storm sewage, factors affecting storm water drainage, determination of storm water flow, time of concentration. Sewers and sewer appurtenances, materials used in construction of sewers, shapes of sewers, hydraulics of sewers, design of sewers, manholes, inlets, catch basins, flushing devices, regulators, leaping weirs, side weirs, syphon spillway, inverted syphons, sewage pumps, pumping stations, ejectors, sewer junctions, outlets, maintenance of sewers, inspections and repairs, ventilation of sewers.

Module IV

Wastewater treatment. Characteristics of sewage, physical, chemical and biological characteristics, physical and chemical analysis, sampling. Sewage disposal, dilution, disposal into stream, pollution assimilation capacity of streams, disposal by irrigation, surface and subsurface irrigation. Treatment of wastewater. Screens, grit chambers, detritus tanks, skimming tanks sedimentation tanks, oxidation ponds, design, construction and operation of these units. Design construction and operation of trickling filter and activated sludge treatment units. Sludge treatment and disposal, anaerobic digestion, sludge drying beds, sludge disposal. Design of septic tanks as per BIS specifications.

Solid waste management. Collection, transportation and processing. Types and sources of solid wastes, vehicles for solid waste collection and transportation, solid waste characteristics, disposal, composting, incineration, sanitary landfill. Air pollution. Types of pollutants, sources, health effects, Air pollution control, Noise pollution, Sources, effects, control

References:

- 1) K.N. Duggal : Elements of public health engineering (S.Chand&Col., Delhi)
- 2) S.K.Hussain : A text book of water supply and sanitary engineering
1. (Oxford I.B.Hpub.Co.,New Delhi)
- 3) Emil T. Cchanlett : Environmental protection (2nd Ed.) Mc Graw Hill)
- 4) Fair Geyer & Okun : Water supply Wastewater Engineering
- 5) Earnest W. Steel : Water supply and Sewage
- 6) Ehlers & Steel : Municipal & Rural sanitation (Mc Graw Hill)
- 7) Sawyer & Mc Ganty : Chemistry for Environmental Engineering (Mc Graw Hill)
- 8) Metcaif & Eddy Inc: Waste water Engg-Treatment, disposal and reuse
(2nd Ed.) McGraw Hill)

Type of Questions for University Exam.

Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.

Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 602A/B Analysis of Structures II

Module I

Column analogy method: fixed end moments for a beam with constant moment of inertia – stiffness and carryover factor to beam with constant moment of inertia – fixed end moments for a beam with variable moment of inertia – stiffness and carryover factor to beam with variable moment of inertia – moments in quadrangular frames with one axis symmetry – moments in closed frame with one axis symmetry – moments in unsymmetrical quadrangular frames – moments in unsymmetrical closed frames

Module II

Approximate methods of multistory frame analysis: Vertical and lateral load analysis of multistory frames – degree of indeterminacy– assumptions for vertical load analysis – assumptions for lateral load analysis – portal method – cantilever method – alternate moment and shear distribution – comparison of methods

Module III

Influence lines and moving loads: definition of influence line – influence line for statically determinate beams – criterion for maximum reaction or shear in simple beams – criterion for maximum bending moment in simple beams – absolute maximum bending moment in a simple beam – Muller Breslau influence theorem for statically determinate beams – influence lines for statically determinate trusses – criterion for maximum bending moment at a panel point on the loaded chord of a truss – criterion for maximum bending moment at a panel point on the unloaded chord of a truss – criterion for maximum bending moment at a panel point on the web member of a truss – Muller Breslau influence theorem for statically determinate trusses

Module IV

Arches and frames: Two hinged arches – symmetrical hingeless arches – Influence lines for bending moment shear force and axial thrust – frames with and without hinges

Cable Suspension bridges: Equilibrium of unstiffened cable – tension in the cable – Length of the cable – anchor cable – roller support – effect of cable length due to change in temperature

Reference

- 1) Wang C.K –Intermediate Structural Analysis, McGraw Hill International Edition.
- 2) Khurmi RS – theory of structures – Schand
- 3) Timoshenko S.P. & Young D.H –Theory of Structures, McGraw Hill International Edition.
- 4) Pandit and Gupta – Theory of structures – Tata McGraw Hill
- 5) Roy and Chakrabarty – Fundamentals of Structural Analysis – S Chand

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CE 603A/B Design of Structures II

Module I

Materials and specifications: rolled steel sections- types of structural steels – specifications
Structural Fasteners: Riveting – bolted joints – types of riveted and bolted joints – failure of riveted joints – strength of a riveted joints – efficiency of a joint – design of riveted joints for axially loaded members – welded joints – advantages and disadvantages of welded joints – types of welds and their symbols – design of fillet weld – design of butt weld – design of plug and slot weld. Design of bolted joint

Eccentric connections: riveted joints subjected to moment acting in plane of joint – rivets and bolts in tension and shear – design of eccentric connection – butt-welded joint loaded eccentrically – fillet welded joint loaded eccentrically

Module II

Tension member: Net sectional area – permissible stresses – design of axially loaded tension member – lug angle – tension splice

Compression member: strength of an axially loaded compression member – effective length – maximum slenderness ratio – compression member with two rolled sections back to back – design of compression members – lacing and battening for built-up compression member – column base – slab base – gussette base – grillage foundation – column splices
Computation of loads using IS 875 in trusses

Module III

Beams: design procedure for laterally supported and unsupported beams – built up beams – plate thickness – simple beam end connectors. Beam column: eccentricity of load – eccentrically loaded base plate. Welded connections in beams

Plate girder: economic depth and self weight of plate girder – design of web – design of flanges – curtailment of flange plate – riveted connection – web stiffeners – web splice – flange splice

Module IV

RC Column footing: Design of square, rectangular & circular footing:- combined footing rectangular & trapezoidal and strap footing by limit state method

RC Retaining walls : Types-Design of Cantilever and counterfort retaining walls by limit state method.

RC Water tanks: Design of underground & ground water tanks as per IS codes – rectangular water tanks – Circular Water tanks – Design of sidewalls

Reference

- 1) Ram Chandra –Design of steel structures, Standard Book House, Delhi.
- 2) Dayaratnam – Design of Steel Structures – S Chand
- 3) Negi L.S – Design of steel structures, Tata Mc Graw Hill.
- 4) Raz WA – Structural design of steel, New Age International (P) Ltd, New Delhi.

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CE 604A/B Geotechnical Engineering-II

Module I

Site investigation and soil exploration: objectives - planning - reconnaissance - methods of subsurface exploration - test pits - Auger borings - rotary drilling - depth of boring - boring log - soil profile- location of water table - S.P.T, Cone Penetration Tests, Plate load test, field vane shear test - geophysical methods (in brief) - sampling - disturbed and undisturbed samples –

Bearing capacity: ultimate and allowable bearing capacity - Terzaghi's equation for bearing capacity for continuous - circular and square footings - bearing capacity factors and charts - Skempton's formulae - effect of water table on bearing capacity –

Module II

Foundation -Functions of foundations - requisites of satisfactory foundations - different types of foundations - definition of shallow and deep foundation - selection of type of foundation

Footings: Individual, combined and continuous - design considerations –Allowable soil pressure- footings subjected to eccentric loading - procedure for proportioning footings for equal settlement

Raft foundations: bearing capacity equations - design considerations - conventional design procedure for rigid mat - floating foundations

Settlement analysis: distribution of contact pressure – estimation of immediate and consolidation settlement - causes of settlement - permissible, total and differential settlements

Module III

Pile foundations: uses of piles - classification of piles based on purpose and material – selection of type of piles - determination of capacity of axially loaded single vertical pile - (static and dynamic formulae) - determination of capacity by penetration tests and pile load tests (IS methods) - negative skin friction - group action and pile spacing – settlement analysis of pile groups.

Caissons: different types – different shapes of well foundations- construction details and design considerations of well foundations

Note: Structural designs of foundations are not contemplated in this course.

Module IV

Earth Pressure-General and local states of plastic equilibrium – Rankines and coulomb's theories for active and passive conditions- influence of surcharge – Rebhann's and Culmann's graphical methods for active earth pressure

Sheet pile walls and cofferdams : Types and uses of sheet piles – Design of cantilever and anchored sheet pile walls. Types and uses of coffer dams.

Reference

- 1) Gopal Ranjan & Rao A.S.R – Basic and Applied Soil Mechanics., Wiley Eastern Ltd
- 2) Joseph.E. Bowles – Foundation Analysis and Design., Mc Graw Hill
- 3) Tomlinson – Foundations Design and Construction.
- 4) N.P. Kurian – Design of foundation system, Narosa Publication
- 5) Das B.M – Principles of Foundation Engineering – Thomson Learning
- 6) P.C.Varghese- Foundation Engineering, Prentice Hall of India

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Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.

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CE 605 A Transportation Engineering –II

Module I

Railway Engineering: Permanent way – main requirements – Component parts. Rails – functions of rails –requirements of a good rail, weight and length., defects in rails, rail joint and other fastenings, check and guard rails, coning of wheels, creep of rail. Sleeper- its functions and requirements, types of sleepers, sleeper density. Ballast- functions and requirements, different types used. Geometric Design: Design of horizontal curves-Super elevation, negative super elevation in branches, length of transition curves –grade compensation on curves, widening of gauge on curves.

Module II

Railway Operation control: Points and Crossings-Design features of a turn out-Types of railway track points –Details of station yards and Marshalling yards-Signaling and interlocking – Principles of track circuiting-Control of train movement by absolute block system-automatic block system-Centralized traffic control systems.

Tunnel Engineering: Tunnel sections-types size and shapes-tunnel surveying-Alignment, transferring center grade in to tunnel-tunnel driving procedure-tunneling through hard and soft soils(Only Full face Method and Needle Beam Method) –Tunnel lining ventilation lighting and drainage of tunnels.

Module III

Harbor Engineering: Classification of harbours Breakwaters-necessity and functions-different types-forces acting on breakwater-design principles-construction of breakwaters-general study of pier heads, quays, landing stages-wharves, jetties, transit sheds and warehouses-channel demarcation-signal characteristics Beacons,buoys,channel- lighting, light houses).

Module IV

Dock Engineering Function and types of docks, dry docks, floating docks slipways, dock gates and caissons-s Dredging-Mechanical and hydraulic dredgers-general study of bucket ladder-Dredger, grab dredger and dipper dredgers.

Reference

- 1) S.C.Rangwala – Railway Engineering , CharoterPublishing House
- 2) Saxena & Arora – Railway Engineering, Dhanpatrai & Sons.
- 3) Subash C.Saxena – Railway Engineering , Dhanpatrai&Sons
- 4) S.P.Bindra – A Course in Docks & harbor Engg., Dhanpatrai & Sons
- 5) Chandola – A text book of Transportation Engineering – S Chand

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CE 605 B MIS & FINANCE MANAGEMENT

Module I

Introduction to MIS Classification of computers-hardware & software details –introduction to networking-concepts of networking- Configuration –types and inter connection of various networks(LAN/MAN/WAN) Data base: definition- n analysis of DBMS- classification of data items –coding considerations –types of coded structures.

Module II

Concept of data and information –role of MIS for managing information system for decision making –phases in the information system life cycle .File storage : composition of data files classification – selection consideration for file media and file organization methods –file design considerations.

Module III

Finance Management : Tasks evolution of corporate management , long term financing equity, preference and debenture, term loans ,dividends and share valuation, legal aspects of dividends, short term financing, working capital, influencing factors, cash budgeting, ,terms of liquidity, management of receivable and inventories, budgets and budgetary control- objectives of budgeting classification ratio analysis.

Module IV

Management of Accounting: Fundamentals of book keeping , journalizing ledger accounts, subdivision of journal cash book, banking transactions, trail balance, preparation of trading profit and loss account and bank balance sheet ,adjustments.

References:

- 1) Murdick & Rose : Information systems of Modern Management, Prentice Hall
- 2) Prasanna Chandra Tata: Financial Management, Mc Graw Hill
- 3) V.Rajaraman : Analysis and design of information systems
- 4) Stefar K & Staney : Theory and Practice of relational data bases.

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Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.

Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 606A/B Water Resources & Irrigation Engineering

Module I

Hydrologic cycle, scope, application of hydrology. Precipitation: Formation of precipitation – forms of precipitation – type of precipitation - measurement of precipitation –recording and non recording gauges – gauge network - adjustments of precipitation data - average depth of precipitation over an area - Arithmetic mean, Thiessen polygon and isohyetal method – Hyetograph – Mass curve - Depth area duration curves. Water Loses : Evaporation, transpiration and infiltration – Factors affecting evaporation-measurement of evaporation - Evaporation formulas – Infiltration, factors affecting infiltration. Determination of infiltration rate - Effect of infiltration on run-off - Recharge of ground water Run off : Factors affecting run-off – Empirical formulae-runoff – hydrograph - Components of hydrograph - Separation of base flow - Hydrograph for isolated storm and complex storm - unit hydrograph - derivation of unit hydrograph for isolated and complex storm - Unit hydrograph for different duration – S hydrograph.

Module II

Ground water Hydrology : Occurrence, distribution of ground water – Darcy’s law – Permeability, safe yield - Location and development of ground water supplies - Hydrology of well – Steady flow in confined and unconfined aquifers - open well – yield of an open well – Effect of partial penetration - Interference of wells - Boundary effect - Specific capacity of well – Tube wells –Yield from a tube well - Strainers – Site for a tube well Flow and lift Irrigation –Perennial and Inundation irrigation - Important Crops and crop seasons –Duty and delta – Method of Cultivation - Water requirement – Irrigation efficiency - Multipurpose projects. Reservoirs : Investigation and planning – Selection of site – Engineering, Geological, and hydrological Investigations - Fixation of storage capacity - Contours- Mass curve - operation of reservoirs - reservoirs sedimentation.

Module III

Head works : Storage and diversion works- Layout of head works - Selection of site – Weirs- Types of weirs – Weirs on permeable foundation – Uplift and piping – Bligh’s creep theory - Lane’s weighted creep theory – Khosla’s theory of independent variables - Design of aprons- Body wall – vertical drop weir - design of sloping glacis weir. River regulators - Silt excluder -Silt vane. Surplussing Arrangements : Spillways – Type and Functions – design of Ogee Spillway and Siphon Spillway - energy dissipation below spillways – stilling basin - spillway crest gates. Distribution works : Classification of canals – design of canals – erodible canals - canals in alluvial soils – regime theory – Kennedy, Lacey traction theories – Manning’s formula - Design. Non-erodible canals - Friction formula—Chezy, Manning’s formula, Silting in canal and prevention – Scour-protection against scour.

Module IV

Storage works : Type of dams-Gravity dams –Forces acting on a gravity dam-Elementary profile-Single step method of design –Method of stability analysis-Zonal method of design-safety criteria-Galleries in dams. Earth and rockfill dams-Types of earthen dams.

Reference

- 1) Subramanya K, Engineering Hydrology, Tata McGraw-Hill.
- 2) Punmia & Lal, Irrigation and Water Power, Laxmi Publications Pvt Ltd.
- 3) Modi P N, Irrigation Water Resources & Water Power, Standard Book House.
- 4) Sahasrabudhe S F, Irrigation Engineering & Hydraulic Structures, Kataria Publications.

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Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE607A CAD in Civil Engineering

1. Panelled door
2. Glazed window
3. Roof truss in structural steel sections- king post truss
4. Reinforced concrete staircase

Residential buildings

5. A cottage
6. A residence
7. A twin house with combination roof
8. Flats

Public buildings

9. A small hospital
10. A factory building

Note: serial no 1,2 ,3& 4 drawings shallbe drawn in drawing sheet and also using AutoCAD or other equivalent software. Sl. No. 5 to 10 shall be drawn only using software.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE607 B CAD in Civil Engineering

1. Panelled door and Glazed window
2. Roof truss in structural steel sections- king post truss
3. Reinforced concrete staircase

Residential buildings

4. A cottage
5. A residence
6. A twin house with combination roof
7. Flats

Public buildings

8. A small hospital
9. A factory building

Note: serial no 1,2 & 3 drawings shall be drawn in drawing sheet and also using AutoCAD or other equivalent software. Sl. No 4 to 9 shall be drawn only using software.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 608A Environmental Engineering lab

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water.
2. Determination of turbidity and optimum coagulant dose.
3. Determination of alkalinity and ph of water.
4. Determination of hardness and chlorides in water.
5. Determination of iron in water.
6. Determination of sulphates and sulphides in water.
7. Determination of h.o and BOD of waste water.
8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample.
9. Determination of manganese in water.
10. Determination of coliforms in water.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 608 B Environmental Engineering lab

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water.
2. Determination of turbidity and optimum coagulant dose.
3. Determination of alkalinity and ph of water.
4. Determination of hardness, chlorides and iron in water.
5. Determination of sulphates and sulphides in water.
6. Determination of h.o and BOD of waste water.
7. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample.
8. Determination of manganese in water.
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