

SEMESTER V

CE301 ENVIRONMENTAL ENGINEERING – II

Characteristics and composition of sewage-sampling-analysis- population equivalent - drainage in buildings-plumbing systems for drainage

Primary treatment- Secondary treatment- biokinetics- Lagooning- sludge digestion-Tertiary treatment

Disposal standards- self purification of rivers- Streeter Phelps equation - oxygen sag curve

Toxic and hazardous wastes - equalization and neutralization- biological degradation- recycle and reuse of waste effluents- treatment of industrial wastes- Dairy, Tannery, Petrochemical, Fertilizer, textiles, Pulp and paper

Air pollution-effects- stack emission- automobile exhaust - control devices-solid waste Management - EIA.

Note: Assignments include the designs and drawings of various wastewater treatment units.

References

1. Duggal, K.N., Elements of Environmental Engineering, S.Chand and Co., New Delhi, 2002.
2. Birdie, G.S. and Birdie, J.S., Water Supply and Sanitary Engineering, Dhanpat Rai and Sons, New Delhi, 1992.
3. Metcalf and Eddy, Waste Water Engineering, Collection, Treatment and Disposal, Tata McGraw Hill, Inc., New York, 2005.
4. Manual of Sewage and Sewage Treatment - CPHEEO, 1999.

CE303 STRUCTURAL ANALYSIS – I

Slope deflection method - analysis of indeterminate structures- Settlement.

Moment distribution method - analysis of indeterminate structures - settlement of supports - sway.

Energy methods - Kani's method - analysis of indeterminate structures - settlement of supports - sway.

Moving loads for statically determinate structures -single load - two point loads - several points loads - maximum bending moment and maximum shear force - equivalent u.d.l. - absolute maximum bending moment.

Enveloping curves for maximum bending moment and maximum shear force and determination of equivalent UDL, ILD for shear, moment and reactions for statically determinate beams and pinjointed trusses - Reversal of stresses under live load.

References

1. Jindal. R.L, Indeterminate Structures, Chan Tea, New Delhi, 2000
2. Punmia B.C., Theory of Structures, Standard Book House, New Delhi, 2000

CE305 CONCRETE STRUCTURES – I

Stress strain behaviour of steel and concrete- Introduction to working stress method - permissible stresses. Limit state method-Limit states - Characteristic strength and load -

Partial safety factor - Design of singly and doubly reinforced beams, T and L beams - Design for Shear and Torsion. Slabs - one way and two way slabs for different edge conditions - Yield line theory - Flat slab - continuous slabs - stair cases - different types. Columns - axially loaded and eccentrically loaded columns - Interaction Diagrams. Footings - isolated footings - square, rectangular and circular footings - Combined footing Pile and pile cap- Introduction to masonry structures.

Note: Assignments include the design and drawings of various R.C.C structural elements.

References

1. Ashok, Kumar Jain, Reinforced Concrete Limit State Design, Nem Chand Brothers, 1990.
2. Sinha. S.N. Reinforced Concrete Design, Tata McGraw Hill, 2002.
3. Varghese, Limit state design of concrete, Oxford IBH, 2000.
4. IS456-2000 Code of practice for Plain and reinforced concrete code of practice.

CE307 STEEL STRUCTURES-I

Introduction- material specifications - Rolled sections - Permissible stresses in tension, compression, bending and shear. Bolted connections - Types of bolts - Resistance of bolts in shear and bearing - design-Bolt tensioning.

Welded joints- Methods of welding - weld symbols - welding electrodes - types of welded joints - strength of welds - design of fillet and butt welds - shear and moment resistance joints - design and detailing of connections.

Compression members- Slenderness ratio- Design-Simple and built-up sections- lacings and battens -Tension members- Flexural members - Design - Rolled sections - built-up beams - connections. Roof trusses -components - Loads - Design of purlins and truss members- End connections at the supports.

Note: Assignments include the design and drawings of various steel structural elements.

References

1. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi 2008.
2. Dayaratnam P, Design of Steel Structures, S.Chand & Co., New Delhi, 2003.
3. Arya, A.S. and Ajmani, A.L., Design of Steel Structures, Nemchand and Brothers, Roorkee, 1992.
4. IS 800-1984, Code of practice for general construction in steel.

CE309 HYDRAULIC MACHINERY

Principles of impingement of jets - Impact of jet on a stationary vertical plate, stationary inclined plate, stationary curved plate, hinged plate, moving vertical and inclined plates, moving curved plate and on series of moving flat and curved vanes fixed on the periphery of circular rim.

Turbines - classification- impulse turbines - Pelton wheel - Reaction turbines - Francis and Kaplan Turbines - draft tubes - Governing of a Francis turbine - Performance of turbines - specific speed and their significance.

Centrifugal pump - description and working - Head, discharge and efficiency of a centrifugal pump - pressure rise in the pump - minimum starting speed of a pump - cavitation - priming - multistage pumps - characteristic curves.

Reciprocating pump - Description and working - types - discharge and slip - power required to drive the pump - Indicator diagram - Air vessel - work done against friction with and without air vessels.

Working principle and use of the following hydraulic pumps and machines - Deep well pumps - submersible and jet pumps, special pumps - Gear pump - screw pump, sewage pump, miscellaneous machines - Hydraulic press - hydraulic accumulator - Hydraulic ram.

References

1. Bansal, R.K., A text book of Fluid Mechanics and Hydraulic Machines, Laxmi Publications (P) Ltd., New Delhi, 2002.
2. Nagaratnam, S., Fluid Machines and Systems, Tata McGraw Hill, 1989.
3. Khurmi, R.S., Text Book of Hydraulics and Hydraulic Machine, S. Chand & Co, 2003.

CE311 ADVANCED STRENGTH OF MATERIALS

Mechanical Properties of Materials - Stress-Strain Diagrams- Elastic and Plastic Deformation - Brittle and Ductile Failures of Materials - Mechanical Tests like Surface Hardness, Fatigue, Creep etc. Principal stresses in a 3D field.- Computation -Mohr's Circle - Lamé's Ellipsoid. Theories of failure - Criteria for Failure - Different failure theories for ductile and brittle materials. Equivalent bending and twisting moments

Unsymmetrical bending- Properties of unsymmetrical sections- Circle of inertia - Dyadic circle - Momental ellipse- Stresses and deflection due to unsymmetrical bending - Concept and relevance of Z polygon.

Shear Centre - Concept and significance - Shear flow for thin walled open sections-Location of shear centre for singly symmetric sections. Stresses in curved flexural members-Winkler Bach Formula - Crane hooks - rings and links

Fundamentals of vibration - free vibration of single degree of freedom systems - Undamped and damped free vibration with different types of damping.- Resonance-Harmonic response of single degree of freedom systems with and without damping.

References

1. Srinath, L. S., Advanced Mechanics of Solids , Tata McGraw Hill,1980.
2. Kazimi, S.M.A., Solid Mechanics, Tata McGraw Hill, 1976.
3. Punmia, B.C., Strength of Materials Part II, Standard Publishers and Distributors, 1991.
4. Shames I.H., Engineering Mechanics, Prentice Hall of India,1996

CE313 FLUID MECHANICS LAB

1. Determination of pipe friction
2. Calibration of flow meters - Venturimeter and Orifice meter
3. Determination of discharge coefficients for notches
4. Determination of minor losses

5. Pressure gauge calibration.
6. Centrifugal pump
7. Submersible pump
8. Reciprocating pump
9. Jet pump
10. Gear pump
11. Screw pump
12. Francis Turbine

CE315 ENVIRONMENTAL ENGINEERING LAB

1. Physical characteristics of water
2. Chemical characteristics of water
3. Bacteriological tests
4. Microscopic tests
5. Jar test
6. Chlorine demand and residual test
7. Total solids and settleable solids.
8. Organic and inorganic solids.
9. Determination of pH and chemical constituents like Cl^- , Fe^{2+} etc.