

7th SEM

B. Tech. VII Semester (Civil)

CE-401E DESIGN OF CONCRETE STRUCTURES-II

| L | T | P/D | Total |
|---|---|-----|-------|
| 4 | - | - | 4 |

Max.Marks: 100
Theory: 100 marks
Duration: 4 hrs.

UNIT-I

Continuous Beams:

Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plan-analysis for torsion, redistribution of moments for single and multi-span beams, design examples.

Prestressed Concrete:

Basic principles, classification of prestressed members, various prestressing systems, losses in prestress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, I:S:Specifications .

End blocks-Analysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.

UNIT-II

Flat slabs and staircases:

Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design of various types of staircases, design examples.

Foundations:

Combined footings, raft foundation, design of pile cap and piles, under-reamed piles, design examples.

UNIT-III

Water Tanks, Silos and Bunkers:

Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples.

Silos and Bunkers-Variou theories, Bunkers with sloping bottoms and with high side walls, battery of bunkers, design examples.

UNIT-IV

Building Frames:

Introduction, Member stiffnesses, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductility of beams, design and detailing for ductility, design examples.

Yield Line Theory:

Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:

1. Plain and Reinforced Concrete, Vol.2, Jai Krishna & O.P.Jain, Nem Chand & Bros.,Roorkee.
2. Pre-Stressed Concrete, N.Krishna Raju, TMH Pub.,N.,Delhi.
3. Design of Prestressed Concrete Structures, T.Y.Lin, John Wiley & Sons., N.Delhi.
4. Reinforced Concrete-Limit StaTge Design, A.K.Jain, Nem Chand & Bros., Roorkee.
5. IS 1343-1980,IS Code of Practice for Prestressed Concrete.
6. IS 3370-1976(Part I to IV), Indian Standard Code of Practice for Liquid Retaining Structures.
7. IS 456-2000, Indian Standard of Practice for Plain and Reinforced Concrete, IS 1893, 4326 & 13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

B. Tech. VII Semester (Civil)
CE-403 E IRRIGATION ENGINEERING-II

| | | | |
|---|---|-----|-------|
| L | T | P/D | Total |
| 3 | 1 | - | 4 |

Max.Marks: 150
Theory: 100 marks
Sessionals: 50 marks
Duration: 3 hrs.

UNIT-I

Regulation works:

Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, and design of straight Glacis fall. Off-take alignment, cross-regulator and distributory, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.

UNIT-II

Cross drainage works:

Classification and their selection, hydraulic design aspects of aqueducts, syphon aqueducts, super passage, canal syphon and level crossing, design of transitions.

Diversion canal headworks:

Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

UNIT-III

Storage Headworks:

Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketches, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

UNIT-IV

Spillways and Energy Dissipaters:

Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

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Books:

- 1 Irrigation, Water Resources and Water Power Engineering by P.N.Modi.
- 2 Fundamentals on Irrigation Engineering by Bharat Singh.
- 3 Irrigation Engineering and Hydraulic Structures by S.K.Garg.
- 4 Theory and Design of Irrigation Structures Vol.I & II by R.S.Varshney, Gupta & Gupta.

B. Tech. (Civil) VII Semester
CE - 405E Transportation Engineering - II

| L | T | P/D | Total |
|---|---|-----|-------|
| 3 | 1 | - | 4 |

Max. Marks: 150
Theory: 100 Marks
Sessional: 50 Marks
Duration: 3 Hours

UNIT-I

Design of Flexible Pavements:

Types of pavements. Flexible and rigid pavements. Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method (including latest IRC guidelines), Triaxial method and Burmister's method.

Design Of Rigid Pavements:

Westergaard's theory, critical locations of loading, load and temperature stresses. Critical combination of stresses. IRC guidelines for determination of thickness of a rigid pavement. Joints: requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.

UNIT-II

Highway Construction : Non-Bituminous Pavements:

Brief introduction to earthwork machinery: shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM. WMM. Construction of cement concrete pavements. Slip-form pavers. Basic concepts of the following: soil stabilized roads, use of geo-synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements.

Construction of Bituminous Pavements:

Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for construction of bituminous roads: bitumen boiler, sprayer, pressure distributor, hot-mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MOST specifications.

UNIT-III

Highway Maintenance:

Pavement failures. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Pavement evaluation. Benkleman beam. Introduction to various types of overlays.

Highway Drainage and Hill Roads:

Surface drainage: types, brief design. Types of sub-surface drainage. Special characteristics of hill roads: geometrics, hair pin bends, construction of hill roads, drainage of hill roads, maintenance problems of hill roads

UNIT-IV

Highway Economics and Finance

Need of economic evaluation. Highway user benefits and costs. Methods of economic evaluation: benefit cost ratio method, net present value method, internal rate of return method, comparison. Highway finance.

Tunnels

Sections of tunnels: advantages, limitations and suitability of each section. Shaft. Pilot tunnel. Driving tunnel in rocks: sequence of construction operations, full face method, heading and bench method, drift method. Driving tunnels in soft ground: sequence of construction operations, needle beam method, shield tunneling, compressed air tunneling.

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Recommended Books

1. Highway Engg by S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
2. Principles and Practice of Highway Engg. by L.R.Kadiyali, Khanna Publishers, Delhi.
3. Principles of Pavement Design by Yoder,E.J & Witczak,M.W., John Wiley and Sons, USA.
4. Tunnel Engineering by S.C.Saxena, Dhanpat Rai Publications, N.Delhi.
5. A text book of Tunnel, Bridges and Railway Engg. by S.P.Bindra, Dhanpat Rai Delhi.

B. Tech. (Civil) VII Semester
CE-407E SEWERAGE AND SEWAGE TREATMENT

L T P/D Total
2 1 - 3

Max. Marks: 150
Theory: 100 marks
Sessional: 2 marks
Duration: 3 hrs.

UNIT-I

Collection of sewage:

Importance of sanitation, Systems of sewerage – separate, combined and partially separate. Quantity of sanitary sewage and variations. Shapes of sewer – circular and egg shaped. Design of sewers, self-cleansing velocity and slopes, Construction and testing of sewer lines. Sewer materials. joints and appurtenances.

UNIT-II

Sewage Characterization:

Quality parameters- BOD, COD, Solids, D.O., Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land.

UNIT-III

Sewage Treatment:

Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment- activated sludge process & its modifications, Tricking filter, sludge digestion and drying beds.

Stabilization pond, aerated lagoon, UASB process , septic tank and Imhoff tank.

UNIT-IV

Disposal of Sewage:

Disposal of sewage by dilution – self-purification of streams. Sewage disposal by irrigation (sewage treatment).

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Recommended Books:

1. Waste Water Engineering: Metcalf and Eddy.
2. Sewage and Sewage Treatment: S.K. Garg.
3. Sewage and Sewage Treatment: S.R. Krishansagar.
4. Waste Water Engineering: B.C. Punmia.
5. Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.

B. Tech. VII Semester (Civil)
CE-409E CONCRETE STRUCTURES-II(DRAWING)

| L | T | P/D | Total |
|---|---|-----|-------|
| - | - | 3 | 3 |

Max. Marks: 75
Pract.: 25 marks
Sessional: 50 marks
Duration: 3 hrs.

Preparing drawing sheets showing reinforcement details in case of:

1. Flat slabs
2. Underground and Overhead Water Tanks.
3. Combined Footings, Pile Foundations, Raft foundation.
4. T-Beam Bridge.
5. Silo/Bunker.

B. Tech. VII Semester (Civil)
CE-411E IRRIGATION ENGINEERING DESIGN & DRAWING

| | | | |
|---|---|-----|-------|
| L | T | P/D | Total |
| - | - | 3 | 3 |

Max. Marks: 75
Sessional: 50 marks
Viva-voce: 25 marks
Duration: 3 hrs.

Complete design and drawing of the following:

- 1 Design of weirs and barrages on permeable foundation for surface and sub surface flow conditions.
- 2 Design of Guide Banks.
- 3 Flood Routing using step by step method.
- 4 Design of Syphon Aqueduct.
- 5 Design of Sarda type fall & sloping glacis fall.
- 6 Seepage line in a homogeneous earth dams on impermeable foundation with horizontal drainage.
- 7 Design of Ogee Spillway and stilling basin.

Note: Emphasis would be given to the computer aided designs of some of above structures.