B.Tech Civil Engineering (AKU Syllabus) SEMESTER- VI

SOIL MECHANICS & ROCK MECHANICS Credit : 5

1.Shear Strength of Soil : Engineering use of shear strength, Direct and triaxial shear tests, Mohr-Coulomb strength criterion, drained, consolidated undrained and undrained tests, strength of loose and dense sands, NC and OC soils, dilation, pore pressure and Skempton's pore pressure coefficients. Lecture : 7

2. Earth pressure theories & Retaining Walls : Limit equilibrium method, effect of wall movement on earth pressure, pressure at rest, Rankine state of plastic equilibrium, Coulomb's theory, Rebhann and Culmann's graphical methods. Sheet piles – Types and uses of sheet piles, Analysis of Cantilever and anchored sheet piles in cohesionless and cohesive soil, Rowe's theory of moment reduction. Lecture: 5

3.Stability of slopes : Limit equilibrium methods, methods of slices, simplified Bishop's method and friction circle method, factors of safety, stability under conditions of submergence, drawdown and steady seepage, location of critical arc, stability number, chart. Lecture : 9

4. Engineering properties of rocks : engineering classification of rocks, Surface and sub-surface investigation in rock including geophysical studies. Lecture : 7

5.Weathering of rocks : discontinuities, field and laboratory testing of rocks and rock masses, Stress- strain characteristics, Deformability of rocks, Friction and Shear strength, Slope stability, effect of water. Lecture : 8

6.Introduction to analysis and design of tunnels, blasting, bolting, tunneling techniques, application. Lecture 6

Structural Analysis – II Credit : 3

(1)Analysis of statically indeterminate structures : fixed beams and propped cantilevers by conjugate beam method; Theorem of three moments. Influence lines for propped cantilevers, continuous beams and two – hinged arches. Lecture : 12

(2)Introduction to force and displacement methods : consistent deformation. Lecture : 6

(3)Energy method, slope-deflection and moment distribution; Analysis of 2 hinged arches. Lecture : 6

(4) Matrix formulation of force and displacement methods : Solution of simultaneous equations: Stiffness matrix approach with reference to computer application; generation of frame element stiffness matrix, Torsion effect; Concept of local effects, generation of load vector, Effects of finite joints; application to plane frames, space frames, grid structures. Lecture : 12

(5) Finite element Method for 2-D, Plane problems- introduction. Lecture : 6

(6) Introduction to Structural analysis Software. Lecture : 2

DESIGN OF CONCRETE STRUCTURE – I Credit : 5

1. Introduction to the design of concrete structure : Working stress and Limit, State Analysis Lecture : 6

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2. Design of beams for flexure (Working Stress & Limit State Method) Lec : 10
3. Bond, Shear and Torsion : Lecture : 8
4. One and two- way slabs. Flat slabs. Ribbed slabs: Lecture : 8
5. Axially and eccentrically loaded columns : Isolated and combined footings. Lecture : 10
(IS : 456 to be followed with limit state Design method or any other method as recommend in IS code)

ENVIRONMENTAL ENGINEERING-I Credit : 5

1. Water quantity demand, Design period; population forecast, variation of quantity of water, sources of water:
ground and surface, Intakes. Lecture : 7
2. Water quality physical chemical and biological parameters: Examination of physical, chemical and biological
characteristics of water. Lecture: 5
3. Water purification: philosophy of treatment. Unit operations and processes, Design of physical chemical and biological processes: Plain sedimentation, Coagulation and flocculation. Lecture : 7
4. Filtration: Slow and rapid sand filters: disinfection. Softening, adsorption and reverse osmosis and other
treatment method. Lecture : 8
5. Water Storage: Pumping Transportation of water; Water distribution systems and analysis' Appurtenances of water transport and distribution systems, Hardly-Cross method of analysis. Lecture : 9
6. Introduction to air noise pollution Lecture : 6

TRANSPORTATION ENGINEERING – I Credit : 5

1. Introduction : Importance of transportation, Different modes of transportation. Characteristic of road
transport, importance of roads in India, Scope of Highway Engineering, Classification of roads and road patterns, recently launched highway projects in India. Lecture : 3
2. Traffic Engineering : Traffic Characteristic, Traffic Operation, Elements of Design of IntersectionsLecture 6
3. Highway Geometric Design : Introduction, Highway cross- section elements, sight distance, Design of Horizontal Alignment, Design of Vertical alignment, IRC Specifications. Lec: 12
4. Highway Materials : Sub-grade soil, Stone aggregate, Binding material (Bitumen emulsion tar and cut back), modification binders, use of Geo- textiles and Geo- grids, MORT specs, SUPERPAVE Lecture: 6
5. Design of highway Pavements : Function and desirable characteristics of pavements, pavements course, Pavements types, comparison of rigid and flexible pavement, pavement components, IRC and AASHTO methods. Lec : 8
6. Highway construction : WBM, WMM, BM, BMM, PC, AC, Mastic Asphalt , BSG, PM, Seal Coat , BSD, Prime coat, Track coat, Highway maintenance and pavement Evaluation highway drainage. Lecture : 10

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DESIGN OF STEEL STRUCTURES Credit : 4

1. Introduction to Design : Design Loads and Load combinations, Working Stress Design, Plastic Design, LRFD Method, Introduction to steel and steel structures. Lecture : 4

2. Design of structural Fasteners : rivets, bolts and welds. Lecture : 6

3. Design of tension members. Lecture : 4

4. Design of compression member, laced and battened columns. Lecture : 6

5. Design of flexure members : Beams- rolled sections, built up section, plate Girders- riveted/ bolted and welded, Design of eccentric connections: riveted/ bolted and welded. Lecture : 8

6. Design of beam : Columns and columns based welded and riveted column bases- moment resistant connection - semi rigid connection- design of supports. Lecture : 5

7. Design of steel industrial sheds. Wind Design. Lecture : 8

8. Introduction inelastic action and plastic hinges application of PD and LRFD. Lecture : 3

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