AKTU B.E./B.Tech CIVIL Sem 5 syllabus

Structural Analysis

KCE502 STRUCTURAL ANALYSIS

Unit 1
Classification of Structures, Types of structural frameworks and Load transfer Mechanisms, stress resultants, degrees of freedom, Static and Kinematic Indeterminacy for beams, trusses and building frames. Analysis of cables with concentrated and continuous loadings, Effect of Temperature upon length of cable.

Unit 2
Classification of Pin jointed determinate trusses, Analysis of determinate plane trusses (compound and complex). Method of Substitution, Method of tension coefficient for analysis of plane trusses.

Unit 3
Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's theorems, Calculations of deflections: Strain Energy Method and unit load method for statically determinate beams, frames and trusses. Deflection of determinate beams by Conjugate beam method.

Unit 4
Rolling loads and influence line diagrams for determinate beams and trusses, Absolute maximum bending moment and shear force. Muller-Breslau's principal & its applications for determinate structures.

Unit 5
Arches, Types of Arches, Analysis of three hinged parabolic and circular Arches. Linear arch, Eddy's theorem, spandrel braced arch, moving load & influence lines for three hinged parabolic arch.

References

1. Hibbler, “Structural Analysis”, Pearson Education
2. Mau, “Introduction to Structural Analysis” CRC Press Taylor & Francis Group.
3. Ghali, “ Structural Analysis: A Unified Classical and Matrix Approach” 5/e, CRC Press Taylor & Francis Group.
4. T S Thandavmorthy, “Analysis of Structures”, Oxford University Press 5.Wilbur and Norris, “Elementary Structural Analysis”, Tata McGraw Hill.
5. Temoshenko & Young “Theory of Structure” Tata Mc Grew Hill.
6. Reddy, CS, “Basic Structural Analysis”, Tata McGraw Hill.
7. Jain, OP and Jain, BK, “Theory & Analysis of Structures ”. Vol.I & II Nem Chand.
8. Vazirani & Ratwani et al , “Analysis of Structures”, Khanna Publishers

9. Coates, RC, Coutie, M.G. & Kong, F.K., “Structural Analysis”, English Language Book Society & Nelson, 1980.
10. SP Gupta & Gupta “Theory of Structure Vol.1 & 2” TMH
11. DS Prakash Rao “Structural Analysis: A Unified Approach” Universities Press.
12. S Ramamurtham “Theory of Structure” Dhanpat Rai.
13. Devdas Menon “Advanced Structural Analysis” Narosa
14. Wang, CK, “Intermediate Structural Analysis”, Tata Mc-Graw Hill.
15. Hsieh, “Elementary Theory of Structures” 4/e, Pearson Education, Noida.
16. Mckenzie, “Examples in Structural Analysis” 2/e, CRC Press Taylor & Francis Group.
17. Bibek Kumar Mukherjee, “Theory and Analysis of Structures” Satya Prakashan, New Delhi.
18. Jacques Heyman, “Structural Analysis” Cambridge University Press.

Geotechnical Engineering

KCE 501 GEOTECHNICAL ENGINEERING

Unit 1

Origin and classification: Preview of Geotechnical field problems in Civil Engineering, Soil formation, transport and deposit, Soil composition, Basic definitions, Weight volume relationships, Clay minerals, Soil structure, Index properties, sensitivity and thixotropy, Particle size analysis, Unified and Indian standard soil classification system.

Unit 2
Soil Hydraulics: Stress conditions in soil- total, effective and neutral stresses and relationships. Permeability - Darcy's Law, hydraulic conductivity, equivalent hydraulic conductivity in stratified soil. Seepage, flow nets, seepage calculation from a flow net, flow nets in anisotropic soils, seepage through earth dam, capillarity, critical hydraulic gradient and quick sand condition, uplift pressure, piping.

Unit 3
Soil compaction, water content - dry unit weight relationships. Factors controlling compaction. Field compaction equipment; field compaction control; Proctor needle method. Consolidation: Primary and secondary consolidation, Terzaghi's one dimensional theory of consolidation, Consolidation test, Normal and Over Consolidated soils, Over Consolidation Ratio, determination of coefficient of consolidation.

Unit 4
Stress Distribution in soil: Elastic constants of soils and their determination, Boussinesq equation for vertical stress, The Westergaard equation, Stress distribution under loaded areas, Concept of pressure bulb, contact pressure. Shear Strength: Mohr-Coulomb failure criterion, shear strength parameters and determination;
direct and tri-axial shear test; unconfined compression test; pore pressure, Skempton's pore pressure coefficients, and Soil liquefaction. [8]

Unit 5
Earth pressure: Classical theories, Coulomb and Rankine's approaches for frictional and c-φ soils, inclined backfill, Graphical methods of earth pressure determination. Stability of slopes - finite and infinite slopes, types of slope failure, Culmann’s method & Method of slices, Stability number & chart, Bishop’s method.

Text & References Books
1. V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)
2. K.R. Arora – Soil Mechanics and Foundation Engineering
3. Narasinga Rao, B.N.D, “Soil Mechanics & Foundation Engineering”, John Wiley &Sons, Wiley India Pvt. Ltd., Daryaganj, New Delhi – 110 002.
4. Alam Singh – Modern Geotechnical Engineering
5. Brij Mohan Das – Geotechnical Engineering , CENGAGE Learning

6. I.H. Khan – Text Book of Geotechnical Engineering
7. C. Venkataramaiah – Geotechnical Engineering
8. Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics
9. G.V. Rao & G.V.S.S. Raju – Engineering with Geosynthetics
10. P. Purushottam Raj- Soil Mechanics and Foundation Engineering, Pearson Education in South Asia, New Delhi.
11.Shenbaga R Kaniraj- Design Aids in Soil Mechanics and Foundation Engineering
12.Gulati, S.K., "Geotechnical Engineering" McGraw Hill Education (India), Pvt. Ltd., Noida.

Quantity Estimation and Construction Management

KCE 503 QUANTITY ESTIMATION AND CONSTRUCTION MANAGEMENT

Unit 1

Quantity Estimation for Buildings Measurement units for various building materials, Centreline method, Long and short wall method of estimates, Types of estimates, PWD schedule of rate.

Unit 2

Rate Analysis, Specification and Tenders Analysis of rates knowing cost of material, labour, equipment, overheads, profit, taxes etc, Specifications – Preparation of detailed and general specifications, Legal aspects of contracts, laws related to contracts, land acquisition, labour safety and welfare. Different types of contracts, their relative advantages and disadvantages. Elements of tender preparation, process of tendering, pre-qualification of contracts, Evaluation of tenders, contract negotiation and award of work, monitoring of contract extra items.

Unit 3

Elements of Management & Network Techniques Project cycle, Organization, planning, scheduling, monitoring, updating and management system in construction, Bar charts, milestone charts, work break down structure and preparation of networks. Network Techniques like PERT & CPM in construction management. Project monitoring and resource allocation through network techniques.

Unit 4

Equipment Management Productivity, operational cost, owning and hiring cost and the work motion study. Simulation techniques for resource scheduling. Construction Equipment for earth moving, earth

compaction, Hauling Equipment, Hoisting Equipment, Conveying Equipment, Concrete Production Equipment, Tunnelling Equipment [8]

Unit 5
Project Cost Management Budgeting, Cost planning, Direct Cost, Indirect cost, Total Cost Curve, Cost Slope. Time value of money, Present economy studies, Equivalence concept, financing of projects, economic comparison, present worth method Equivalent annual cost method, discounted cash flow method, Depreciation and its type, depletion, Arbitration, and break even cost analysis.

References:
1.Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt. Ltd., 2003
2.Srinath, L.S., “PERT and CPM Principals and applications” Affiliated East-West Press Pvt. Ltd., New Delhi.
3.Patil, B.S., “Civil Engineering Contracts and Estimates” University Press India, Pvt. Ltd. Hyderabad –500 004
4.Construction Management by Ojha
5.Srivastava, U.K., “Construction Planning and Management”, Galgotia Publications Pvt. Ltd., New Delhi.
6.Construction Technology by Sarkar, Oxford
7.Delhi Schedule of Rates (latest version)

ENGINEERING HYDROLOGY

KCE055 ENGINEERING HYDROLOGY

Unit 1 Introduction: hydrologic cycle, water budget equations, world water balance, Precipitation: Forms of precipitation, measurement. Introduction to characteristics of storm. Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration-process, capacities indices, measurement & estimation.

Unit 2 Runoff and Hydrographs: Runoff characteristics of stream, mass curve. Hydrograph, Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Unit 3 Flood: Rational method, empirical formulae, flood frequency studies, statistical analysis, regional flood frequency analysis, design

storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

Unit 4 Groundwater: Introduction, forms of subsurface water, aquifers & its properties, Occurrence of ground water, hydro-geology& aquifers, Ground water movement.
Steady and unsteady flow through confined and unconfined aquifers. Well Hydraulics: Single& Multiple well system, partially penetrating wells, Image wells, Mutual interference of wells, well losses, specific capacity.

Unit 5 Water Wells: Introduction to Well construction, completion and Development. Pumping equipment for water wells, maintenance of wells. Ground Water quality, Contamination of groundwater and its Control, Ground Water Modelling Techniques and exploration, artificial discharge and Recharge of Ground Water, Roof-top rainwater harvesting and recharge.

Text Books:
- 'Groundwater Hydrology' by Todd D. K., Wiley
- 'Groundwater Resource Evaluation' by Walton W. C., McGraw Hill
- 'Groundwater' by Raghunath H. M., New Age Publisher
- 'Engineering Hydrology' by K. Subramanya, Mc Graw Hill Education
- 'Hydrology: Principles. Analysis. Design' by Raghunath H. M., New Age Publisher
- 'Handbook of Applied Hydrology' by Chow V. T., Mc Graw Hill Education

Reference:
- 'Irrigation: Theory & Practice' by Michael A. M., Vikas Publication House
- 'Groundwater' by S.Ramakrishnan, Scitech Publications
- 'Irrigation: Theory & Practice' by Michael A. M., Vikas Publication House
- 'Engineering Hydrology' by Ojha, Oxford University Press.
- 'Introduction to Hydrology' by Viessman& Lewis by Pearson Publication.
- 'Applied Hydrology' by Fetter, by Pearson Publication

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