EN010 501A ENGINEERING MATHEMATICS IV
(Common to all branches except CS & IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Use basic numerical techniques to solve problems and provide scientific techniques to decision making problems.*

Module 1 (12 hours)
Function of Complex variable : Analytic functions – Derivation of C.R. equations in cartision co-ordinates – harmonic and orthogonal properties – construction of analytic function given real or imaginary parts – complex potential – conformal mapping of z^2 , $\frac{1}{z}$ - Bilinear transformation – cross ratio – invariant property (no proof) – simple problems.

Module 2 (12 hours)
Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series- Laurent's series – Zeros and singularities – types of singularities – Residues – Residue theorem – evaluation of real integrals in unit circle – contour integral in semi circle when poles lie on imaginary axis.

Module 3 (10 hours)
Numerical solution of algebraic and transcendental equations: Successive bisection method – Regula –falsi method – Newton –Raphson method - Secant method – solution of system of linear equation by Gauss – Seidel method**.**

Module 4 (10 hours)
Numerical solution of Ordinary differential equations: Taylor's series method – Euler's method – modified Euler's method – Runge – Kutta method (IV order) - Milnes predictor – corrector method.

Module 5 (16 hours)
Linear programming problem: Definition of L.P.P., solution, optimal solution, degenerate solution – graphical solution –solution using simplex method (non degenerate case only) Big -M method – Duality in L.P.P. – Transportation problem –Balanced T.P. – initial solution using Vogel's approximation method - modi method (non degenerate case only)

References

1. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
2. M.R.Spicgel , S.Lipschutz , John J. Schiller, D.Spellman – Complex variables, schanm's outline series - Mc Graw Hill
3. S.Bathul – text book of Engg.Mathematics – Special functions and complex variables – PHI
4. B.S. Grewal – Numerical methods in Engg. and science - Khanna Publishers

5. Dr.M.K Venkataraman- Numerical methods in science and Engg -National publishing co
6. S.S Sastry - Introductory methods of Numerical Analysis -PHI
7. P.K.Gupta and D.S. Hira – Operations Research – S.Chand
8. Panneer Selvam– Operations Research – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International

CE010 502 COMPUTER PROGRAMMING

Teaching Scheme **Credit: 4**

3 hours lecture and 1hour tutorial per week**.**

Objective:

To provide a strong foundation in the basics of C-Programming so that students can develop the ability to design software's.

Module I (15 Hours)

Introduction to C: The C character set- identifiers and keywords- data types-user defined data types-constants and variables-declarations- operators-expressions-statements-library input-output functions

Control statements: if, if-else, switch, -conditional and comma operators.

Module II (15 Hours)

Iterative statements: 'while', 'do-while', for 'statements-nested loops, break and continue statements.

Functions: Declarations, definition and access-passing arguments to a function – pass by value and pass by reference-recursion.

Storage classes: automatic variables-external variables-register variables-scope and lifetime of variables-macros

Module III (12 Hours)

Arrays: Single dimensional arrays-multidimensional arrays-definition-initializing arrays-passing arrays to a function- matrix operations-addition, transpose and multiplication. Pointers-declaration-operations.

Strings: definition –string handling function-comparison, concatenation and sorting of strings

Module IV (10 Hours)

Structures and union: definition –initialization-accessing structure members-array of structures-passing structure to a function –sorting of structures –binary files-reading and writing of data blocks-union.

Dynamic memory allocation - self referential structures - basic concepts of linked lists.

Module V (8 Hours)

Files :File pointers-data files-opening and closing-reading and writing-appending-error handling function-handling data in blocks-command line arguments.

References

1.B.S. Gotterfield Theory and Problems of Programming with C.TMH

2. Balaguruswamy, Programming in C, Tata Mc Graw Hill.

3. Kern Ingham , Ritchie, The C programming language, Prentice Hall.

4. Byron S Gottfried, Programming with C, Tata Mc Graw Hill.

5. Y. Kenetker, Let us C, BPB Publications.
6. V. Rajaraman, Programming with C.
7. Y. Kenetker, Exploring C, BPB Publications.

CE010 503 DESIGN OF CONCRETE STRUCTURES – I

Teaching Scheme **Credit: 4**

2 hours lecture and 2 hours tutorial per week**.**

Objective

- ***To provide the students with the knowledge of behaviour of reinforced concrete structural elements in flexure, shear, compression and tension and to enable them to design such elements.***

Module 1 (12 hours)

Working stress method: Introduction- permissible stresses-factor of safety – behaviour of R.C.C beams –assumptions-under reinforced –over reinforced and balanced sections. Theory of singly and doubly reinforced beams.

Module 2 (12 hours)

Limit state method: Concepts-assumptions –characteristic strength and load partial safety factors-limit states-limit state of collapse –limit state of serviceability. Theory of singly and doubly reinforced rectangular sections in flexure-design of simply supported and flanged beams.

Module 3 (15 hours)

Behaviour and design of one way and two way slabs-Continuous slabs-analysis using method recommended by BIS -arrangements of reinforcement in slabs. Design of flat slab (Concept only).

Module 4 (8 hours)

Design of columns: Limit state method- I S specifications-design of columns with lateral and helical reinforcement-members subjected to combined axial load and bending.

Module 5 (13 hours)

Design of footings-Isolated footing with axial and eccentric loading-combined footing. Stair cases-introduction to different types-design of simply supported flights-cantilever steps.

Note: Sketches only required for reinforcement details. Detailed drawing in drawing sheets not required.

References

1. Relevant IS codes. (I.S 456, I.S 875,SP 16)
2. Park R and Pauloy T, Reinforced concrete structures, John Wiely & sons Inc.
3. Purushothaman P, Reinforced concrete structural elements-Behaviour, Analysis and Design, Tata McGraw Hill publishing company Ltd.
4. Unnikrishna Pillai S. & D.Menon, Reinforced concrete design, Tata McGraw Hill

Publishing company Ltd.
5. Mallick S.K., Reinforced concrete, Oxford & IBH Publishing company.
6. Varghese P.C., Limit state design of Reinforced concrete, Printice Hall of India Pvt Ltd.
7. Ashok .K. Jain, Reinforced concrete- Limit state design, New Chand & Bose.
8. S.S Bhavikatti, Design of Reinforced concrete structures, I.K.International Publishing house Pvt.Ltd

CE010 504 GEOTECHNICAL ENGINEERING – I

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objective:
Geotechnical Engineering is one of the important disciplines of Civil Engineering involving the study of behaviour and engineering properties of soil.
The objective of the course is to present different laws and principles of Soil Mechanics so that the strength and settlement of the foundation soil can be evaluated.

Module 1 (15 Hours)

Soil formation and soil types: Residual soil and transported soil-Soil structure-Basic structural units of clay minerals. Simple soil properties: three phase systems - void ratio - porosity - degree of saturation - moisture content - specific gravity - unit weight relationships.

Laboratory and field identification of soils: Determination of water content, specific gravity, determination of field density by core cutter and sand replacement method, grain size analysis by sieve, hydrometer analysis - Atterberg limits and indices - field identification of soils.

Classification of soils: Principles of classification - I. S. classification - plasticity chart.

Module 2 (13 Hours)

Permeability of soils: Darcy's law - factors affecting - constant head and falling head test - permeability of stratified deposits. soil- water system - classification of soil water - capillarity of soils - principles of effective stress.

Seepage of soils: seepage pressure, critical hydraulic gradient - quick sand condition - flownet diagram for isotropic and anisotropic soils

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Module 3 (10 Hours)

Shear strength: Shear strength parameters - Mohr's circle – Mohr Coulomb strength theory -direct, triaxial, unconfined and vane shear tests- Drainage conditions - UU, CD and CD tests - choice of test conditions for field problems - measurement of pore pressure-critical void ratio and liquefaction. - Activity ,sensitivity and thixotropy

Module 4 (12 Hours)

Compaction: Objects of compaction - proctor test and modified proctor test - concept of OMC and Max. dry density - Zero air void line - factors affecting compaction - effect of compaction on soil properties - field methods-.of compaction - control of compaction.

Stability of slopes: types of failures of soil slopes - Analysis of finite slopes only-Swedish circle method - = 0 analysis and c - analysis. -Taylor's stability number and stability charts

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Module 5 (10 Hours)

Compressibility and consolidation of soils: void ratio - pressure relationship - concept of coefficient of compressibility - coefficient of volume change and compression index - normally loaded and pre loaded deposits - determination of preconsolidation pressure - Terzaghi's theory of one dimensional consolidation - time rate of consolidation - time factor - degree of consolidation - square root time and log time - fitting methods - coefficient of consolidation - calculation of void ratio - height of solids methods and change in void ratio method - settlement analysis.

References

1. Murthy V. N.S, Soil Mechanics and Foundation Engineering, Nai Sarak, Delhi.
2. Gopal Ranjan and A .S .R .Rao, Basic and Applied Soil Mechanics, New Age International Publishers.
3. Punmia B. C., Soil Mechanics and Foundation Engineering, Laxshmi Publications, New Delhi.
4. Arora K. R., Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.
5. V. Narasimha Rao and Venkatramaiah, Numerical Problems, Examples and Objective Questions in Geotechnical Engineering, Orient LongMan Publishers.
6. Lambe & Whitman, Soil Mechanics, John Wiely Publications
7. S. K. Garg, Soil Mechanics and Foundation Engineering, Khanna Publishers.

CE010 505 QUANTITY SURVEYING AND VALUATION

Teaching Scheme **Credit: 4**

3 hours lecture and 1hour tutorial per week**.**

Objective

To make the students proficient in preparing the rates and thereby adapting them to estimate the entire project.

Module 1 & 2 (26 Hours.)

Purpose of estimates- different methods-Preparation of detailed estimates and abstracts for RCC Single storey buildings - R C. Footings, Columns – T- Beams. Preparation of bar bending schedule for R. C. works such as beams and slabs.

Module 3 (12 hours.)

Preparation of specification for common materials of construction and its items of works with reference to IS specifications. Cost of materials at source - different types of conveyance and rates - head loads - preparation of conveyance statement- cost of materials at site.

Module 4 (12 hours)

Analysis of rates for earth works, mortars, RCC Works, plastering, brick works, stone works, laterite work, Pointing, form work, flooring - different types, wood works - reinforcement works.

Module 5 (10 hours)

Valuation - explanation of terms - material value, rate, years purchase - freehold and lease hold purchase - depreciation - methods of calculating depreciation - straight line method - constant percentage method, sinking fund method - and quantity survey method. Methods of valuation of land - comparative method - abstractive method. Methods of valuation of property - rental method - direct comparison with capital cost - valuation based on profit - valuation based on cost - development method - depreciation method.

References

1. Schedule of rates, KPWD
2. PWD Data Book
3. Dutta, Estimating and costing,S Dutta & Company, Lucknow
4. Rangawala S.C., Estimating & costing, Charator Anand, Delhi
5. I.S: 1200- 1968 - Methods of measurements of building and civil engineering

University Examination Pattern

Module1&2

Quantity calculation-4 items	**4x10 marks**

Module 3

Specification of any 4 items or conveyance statement as per PW D norms and cost of any 6 materials at source	**4x5 marks**

Module 4

Rate analysis of any two items	**2x10 marks**

Module 5

Problem connected with depreciation of cost	**2x10 marks**

Note:-choice should be given to questions from all the 5 modules

CE 010 506 STRUCTURAL ANALYSIS I

Teaching scheme: **Credits: 4**

3hour lecture and 1 hour tutorial per week

Objective:

To study the force and displacement methods of structural analysis of indeterminate structures , the influence line diagrams and an introduction to Finite Element Method.

Module 1 (12 hours)

Indeterminate structures- force and displacement methods of structural analysis. Force method of analysis of indeterminate structures - static indeterminacy Method of consistent deformation, Clapyron' s theorem of three moments- analysis of fixed and continuous beams

Module 2 (12 hours)

Displacement method of analysis: Kinematic indeterminacy
Slope deflection method-fundamental equations-analysis of continuous beams & portal frames (with sway and without sway)
Moment distribution method - analysis of continuous beams & portal frames (with sway and without sway).

Module 3 (14 hours)

Matrix methods: Stiffness method-stiffness-equilibrium equation
Direct stiffness method - structure stiffness matrix-assembly of structure stiffness matrix from element stiffness matrix-equivalent joint load – incorporation of boundary conditions –analysis of beams and pin-jointed frames.

Module 4 (10 hours)

Flexibility method: Flexibility **–**compatibility equation-flexibility influence coefficients – force transformation matrix-flexibility matrix-analysis of beams & frames (rigid and pin-jointed).

Module 5 (12hours)

Finite element method: Introduction to FEM-Historical development-Idealization of actual structures- Boundary conditions. General procedure of FEA-Displacement approach - shape functions

References

1.Devdas Menon, Structural Analysis, Vol.1&II, Narosa, Chennai.
2. Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.
3. Weaver &Gere, Matrix Analysis of Structures, East West Press.
4. Moshe F. Rubinstein – Matrix Computer Analysis of Structures- Prentice Hall, 1969.
5. Meek J.L., Matrix Structural Analysis, McGraw Hill,1971.
6. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.1996.

7. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.
8. Rajesekharan & Sankarasubramanian,G., Computational Structural Mechanics, Prentice Hall of India, 2001.
9. Mukhopadhyay M., Matrix Finite Element Computer and Structural Analysis, Oxford & IBH,1984.
10. Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGrawHill.1968.

11. Pezemieniecki, J.S, Theory of Matrix Structural Analysis, McGraw Hill Co., 1984
12. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.
13. Seeli F.B.&Smith J.P., Advanced Mechanics of Materials, John Wiley &Sons, 1993.
14. Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
15. Junarker S.R., Mechanics of Structures, Vol. II, Charorbar Book Stall.
16.O C Zienkiewicz,.Finite Element Method, fourth Edition,McGraw Hill,
17. R.D.Cook, Concepts and Applications of Finite Element Analysis, John Wiley &Sons.
19. C.S.Krishnamoorthy, Finite Element Analysis, Tata McGraw Hill .New Delhi, 1987.
20. S.Rajasekharan, Finite Element Analysis, Wheeler Publishing Co., &Sons.1993.

CE010 507COMPUTING TECHNIQUES LAB

Teaching Scheme **Credit: 2**

3 hours Practical per week**.**

Objective:

To make the students aware of recent application softwares and to develop programming skills in C language.

List of Experiments:

1. Familiarization of computer hardware, peripherals and network components. Study of operating systems like DOS, Windows. Linux etc. Commands for use of files and directives.
2. Familiarization with packages like MS Word, MS Excel, and power point.
3. Programming examples related to control statements, arrays, structures, functions, pointers and files in accordance with syllabus of C like,
    a. Solution of quadratic equations
    b .Preparation of conversion tables
    c. Summation of series
    d. Arrays manipulation
    e. Functions
    f. Recursive functions
    g. String manipulations
    h. Matrix operations
    i. .Preparation of mark lists of students, bills etc. using structures
    j. Input and out using files
    k. Simple programs of linked lists and command lime arguments

References

1. Balaguruswamy, Programming in C, Tata Mc Graw Hill.
2. Kern Ingham , Ritchie, The C programming language, Prentice Hall.
3. Byron S Gottfried, Programming with C, Tata Mc Graw Hill.
4. Y. Kenetker, Let us C, BPB Publications.
5. V. Rajaraman, Programming with C.

CE010 508 GEOTECHNICAL ENGINEERING LABORATORY

Teaching Scheme **Credit:2**

3 hours practical per week**.**

Objective:

To practice the different experiments for determination of index properties and strength of soil and to develop confidence in students to assess the suitability of soil for various construction activities

List of Experiments:

1. Determination of specific gravity, water content and particle size distribution by hydrometer method / pipette method.
2. Determination of field density of soil by sand replacement method and core cutter method.
3. Determination of Atterberg limits.
4. Proctor's compaction tests (light and heavy).
5. Permeability tests for cohesive and cohesionless soil.
6. Direct shear test.
7. Triaxial shear test.
8. Unconfined Compression test.
9. Vane shear Test.
10. Consolidation test.
11. Study on Collection and Field Identification of Soil and Sampling Techniques.

References

1. Gopal Ranjan and A .S .R .Rao, Basic and Applied Soil Mechanics, New Age International Publishers.
2. Punmia B. C., Soil Mechanics and Foundation Engineering, Laxshmi Publications, New Delhi.
3. Arora K. R., Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.
4. V. Narasimha Rao and Venkatramaiah, Numerical Problems, Examples and Objective Questions in Geotechnical Engineering, Orient LongMan Publishers.