MAHATMA GANDHI UNIVERSITY

B.TECH. DEGREE COURSE

5TH SEMESTER

SCHEME
&
SYLLABUS

2002

CIVIL ENGINEERING BRANCH

CIVIL ENGINEEING

SCHEME

5TH SEMESTER

Course Code	Subject Code	Subject	Duration of Uty. Exam (hrs.)	No. of periods per week (hrs)			Marks			
				Lect.	Tut.	Prac.	Sessional	Theory	Practical	Total
A	CMELPA501	Engineering Mathematics -IV	3	3	1	-	50	100	-	150
B	C502	Design of concrete structures –I	4	2	2	-	50	100	-	150
C	C503	Structural Analysis – II	3	2	2	-	50	100	-	150
D	C504	Computer programming	3	2	2	-	50	100	-	150
E	C505	Engineering Geology	3	3	1	-	50	100	-	150
F	C506	Geo Technical Engineering – I	3	3	1		50	100	-	150
G	C507	Computing Techniques Lab	3	-	-	3	50	-	100	150
H	C508	Geo Technical Engineering Lab	3	-	-	3	50	-	100	150
Total			25	15	9	6	400	600	200	1200

SYLLABUS

ENGINEERING MATHEMATICS - IV

CMELPA501 **3+1+0**

Module 1

Complex Integration: Line Integral –Cauchy's integral theorem- Cauchy's integral formula-Taylor's series-Laurent's series- zeros and singularities-Residues- residue theorem-Evaluation of real integrals using contour integration involving unit circle and semicircle.

Module 2

Numerical solution of algebraic and transcendental equations: Successive bisection method-Regula falsi method - Newton –Raphson method – solution of system of linear equations by Jacobi's iteration method and Gauss-Siedel method.

Module 3

Numerical solution of ordinary differential equation: Taylor's series method-Euler's method –Modified Eulers method - Runge – Kutta method (IV order)-Milne's predictor corrector method.

Module 4

Z – Transforms: Definition of Z transform- properties –Z transform of polynomial functions – trigonometric functions, shifting property, convolution property- inverse transform – solution of 1^{st} & 2^{nd} order difference equations with constant coefficients using Z transforms.

Module 5

Linear programming: graphical solution – solution using simplex method (non – degenerate case only) – Big-M method,two phase method- Duality in L.P.P.-Balanced T.P. – Vogels approximation method – Modi method.

References

1. Ervin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern limited.
2. Dr. B.S.Grewal, Numerical methods in Engineering & Science, Kanna Publishers.
3. Dr. B.S.Grewal, Higher Engineering Mathematics, Kanna Publishers.
4. Dr. M.K.Venkitaraman, Numerical methods in Science & Engineering, National Publishing Company.
5. P.C.Tulsian & Vishal Pandey, Quantitative techniques Theory & Problems, Pearson Education Asia.
6. Churchill and Brown, Complex variables and applications, McGraw-Hill.
7. Panneer Selvam, Operations research, PHI.
8. S Arumugam, A.T.Isaac & A Somasundaram, Engineering Mathematics Vol. III, Scitech publications

9. T.K.M.Pillai, G.Ramanaigh & S.Narayanan, Advanced Mathematics for Engg. Students Vol. III- S.Vishwananthan printers & publishers.

DESIGN OF CONCRETE STRUCTURES - I

C502 **2+2**

Module 1

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

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

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.

Module 4

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

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.

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.

STRUCTURAL ANALYSIS - II

C503 **2+2**

Module 1

Statically indeterminate structures-degree of indeterminacy-force and displacement methods of structural analysis. Force method of analysis of indeterminate structures - Method of consistent deformation-analysis of fixed beams and continuous beams. Clapyron's theorem of three moments- analysis of fixed and continuous beams Minimum strain energy-Castigliano's second theorem-analysis of indeterminate beams, portal frames and trusses.

Module 2

Displacement method of analysis of statically indeterminate structures: 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

Theories of Elastic Failure: Maximum principal stress theory- maximum shear stress theory - maximum principal strain theory – Mohr's theory. Influence line diagrams for statically indeterminate structures: Muller Breslau's principle-Influence lines for reactions-shear force-bending moment-propped cantilever-continuous beams and fixed beams

Module 4

Matrix methods: Classification of structures-static& kinematic indeterminacy Stiffness method-coordinate systems-element stiffness matrix - 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 frames (rigid & pinjointed).

Module 5

Flexibility method: Flexibility influence coefficients - flexibility matrix-analysis of beams & frames (rigid and pinjointed).

References

1. Weaver &Gere, Matrix Analysis of Structures, East West Press.
2. Moshe F. Rubinstein – Matrix Computer Analysis of Structures- Prentice Hall, 1969.
3. Meek J.L., Matrix Structural Analysis, McGraw Hill,1971.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.1996.
5. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.
6. Rajesekharan & Sankarasubramanian,G., Computational Structural Mechanics, Prentice Hall of India, 2001.
7. Mukhopadhyay M., Matrix Finite Element Computer and Structural Analysis, Oxford & IBH,1984.
8. Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGraw Hill.1968.
9. Pezemieniecki, J.S, Theory of Matrix Structural Analysis, McGraw Hill Co., 1984
10. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.
11. Seeli F.B.&Smith J.P., Advanced Mechanics of Materials, John Wiley &Sons, 1993.
12. Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
13. Junarker S.R., Mechanics of Structures, Vol. II, Charorbar Book Stall.

COMPUTER PROGRAMMING

C 504 **2+2**

Module 1

Basic concepts of operation of a computer: Operating system - drives, directories and files - types of files -COM, EXE, BAT - booting - operating system commands - creating, editing, listing and copying files - different levels of programming languages - high level languages - compilers and interpreters - compiling, linking and running - structured programming - program planning - algorithms, flowcharts - simple examples.

Module 2

Introduction to C language: Character set -operators - constants and variables - data types - use of control statements - if, for, while, do-while, switch - conditional assignment - use of built in l/O functions - writing small programs.

Module 3

Functions: Declaration - passing parameters by value and by reference - writing trigonometric, algebraic and string handling functions - recursion – scope rules - storage classes - macros.

Module 4

Arrays: Declaration and handling - sorting - pointers and arrays - pointers as parameters to functions - structures and unions - array of structures - sorting of strings - linked lists.

Module 5

Data files: Reading, writing and appending data files - binary files - transfer of data in blocks - command line arguments - operation on files at command line.

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.
6. Y. Kenetker, Exploring C, BPB Publications.

ENGINEERING GEOLOGY

C 505 **3+1**

Module 1

Introduction: Various branches of geology - Relevance of Geology in Engineering. Geologic time scale.

Physical Geology: Geomorphic processes-Rock weathering-Formation of soils-soil profiles-soils of India – Geologic work and engineering significance of rivers and oceans.

Module 2

Dynamic Geology: Interior constitution of the earth-Various methods to study the interior-crust, mantle, core-lithosphere-asthenosphere-major discontinuities-Moho, Guttenberg, Lehmann- composition of different layers-sima & sial.

Plate tectonics: Lithospheric plates-diverging, converging and transform boundaries-their characteristic features-midoceanic ridge, benioff zone and transform faults-significance of plate tectonic concept.

Earthquake: Elastic rebound theory-types of seismic waves-cause of earthquake-intensity and magnitude of earthquake-Locating epicentre and hypocenter-effect of earthquake-distribution of earthquake-earthquake resistant structures.

Module 3

Mineralogy: Definition and classification-important physical properties of minerals-colour, streak, lusture, transperancy, cleavage, fracture, hardness, form, specific gravity and magnetism. Study of the diagnostic physical properties and chemical composition of the following rock forming minerals: 1.Quartz, 2.Feldspar, 3.Hypersthene, 4.Auguite, 5. Hornblende, 6. Biotite, 7.Muscovite, 8.Olivine, 9.Garnet, 10.Fluorite, 11.Tourmaline, 12.Calcite, 13.Kyanite, 14. Kaolin, 15. Serpentine.

Petrology: Definition and classification-important structures and textures of igneous sedimentary and metamorphic rocks-diagnostic texture, mineralogy, engineering properties and uses of following rocks:

Igneous rocks: 1. Granite, 2. Syenite, 3. Diorite, 4. Gabbro, 5. Peridotite, 6.Dolerite, 7.Basalt 8.Pegmatite.

Sedimentary rocks: 1. Conglomerate, 2. Breccia, 3. Sandstone, 4. Limestone, 5. shale.Metamorphic rocks: 1. Gneiss, 2. Schist, 3. Slate, 4. Marble, 5. Quartzite, 6. Mylonite, 7. Pseudotachyllite.

Special Indian rock types: 1. Charnockite, 2. Khondalite, 3. Laterite.

Module 4

Structural Geology: Definition-outcrop-stratification-dip and strike. Folds-definition- parts of fold-classification-recognition of folds in the field- Faults-definition-parts of a fault-classification-recognition in the field-effects of faulting and subsequent erosion on outcrops. Joints-definition-classification. Unconformites-definition-classification recognition in the field. Effects of all the above described structures in the major engineering projects like reservoirs, dams, tunnels and other important structures.

Module 5

Engineering Geology: Mass movement of earth materials-Landslides-definition, classification, causes of land slides and their corrections-Geological considerations in the selection of sites for reservoirs and dams. Geological considerations in Tunnel constructions and mountain roads-rocks as building materials.

Hydrogeology: Groundwater table-abundance and advantages-aquifer-acquiclude-acquifuge-artesian conditions and artesian wells-cone of depression–perched water table.

Recommended field work: Field trip to quarries or geologically significant places to learn - in site character of rocks in quarries/outcrops-measuring strike and dip of a formation-tracing of outcrops.

References

1. Arthur Holmes, Physical geology, Thomas Nelson.
2. Parbin Singh, Engineering & general geology, K.Katria & sons, New Delhi.
3. HH.Read, Rutleys elements of mineralogy, George Allen & Unwin Ltd, London.
4. G.W.Tyrell, Principles of petrology, B.I. Publications, Bombay.
5. M.P.Billings, Strucutural geology, Aisa publishing house, New Delhi.
6. Krynine&Judd, Engineering geology & geotechniques, Tata McGraw hill, New Delhi.
7. David Keith Todd, Groundwater hydrology, John Wiley & sons, New York.

GEOTECHNICAL ENGINEERING - I

C506 **3+1**

Module 1

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 and pipette analysis - Atterberg limits and indices - field identification of soils. Classification of soils: Principles of classification - I. S. classification - plasticity chart - Sensitivity and thixotropy.

Module 2

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 - phreatic line in earth dams - exit gradient- protective filters.

Module 3

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.

Module 4

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 - Swedish circle method - (ϕ) = 0 analysis and C - (ϕ) analysis. Friction circle method -Taylor's stability number and stability charts.

Module 5

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

COMPUTING TECHNIQUES LAB (C)

C 507 **0+3**

1. Familiarisation with the computer system - PCs - LAN Peripherals.
2. Fundamentals of operating system like DOS, WINDOWS etc.,(Use of files, directories, internal commands, external commands,editors and compilers.
3. Familiarisation with packages like Wordstar, dbase, lotus, MS Office.
4. Familiarisation with data processing packages like FOXPRO etc,.
5. Familiarisation of application softwares - like Grapher, Surfur, Hardward Graphics - 3.
6. Familiarisation of drawing Softwares - AUTOCAD, Auto Architect, 3D Studio.
7. Programming with C as per syllabus of computer programming.

GEOTECHNICAL ENGINEERING LABORATORY

C508 **0+3**

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.