MAHATMA GANDHI UNIVERSITY

B.TECH. DEGREE COURSE

3rd SEMESTER

SCHEME
&
SYLLABUS

2002

CIVIL ENGINEERING BRANCH

CIVIL ENGINEEING

SCHEME

3RD 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	CMELPA301	Engineering Mathematics -II	3	3	1	-	50	100	-	150
B	C302	Fluid Mechanics – I	3	3	2	-	50	100	-	150
C	C303	Mechanics of Solids	3	2	2	-	50	100	-	150
D	C304	Construction Engineering and Management	3	3	1	-	50	100	-	150
E	C305	Surveying -I	3	3	1		50	100	-	150
F	C306	Civil Engineering Drawing - I	3	-	-	3	50	100	-	150
G	C307	Material Testing Laboratory – 1	3	-	-	3	50	-	100	150
H	C308	Surveying practical – 1	3	-	-	3	50	-	100	150
Total			24	14	7	9	400	600	200	1200

SYLLABUS

ENGINEERING MATHEMATICS - II

CMELPA 301 **3+1**

Module 1 Vector Differential Calculus

Differentiation of vector functions - scalar and vector fields – gradient, divergence and curl of a vector function – their physical meaning – directional derivative – scalar potential, conservative fields – identities – simple problems.

Module 2 Vector Integral Calculus

Line, surface and volume Integrals – work done by a force along a path – Application of Green's theorem, Stokes theorem and Gauss divergence theorem.

Module 3 Function of Complex Variable

Definition of analytic functions and singular points – derivation of C.R. equations in Cartesian co-ordinates – harmonic and orthogonal properties – construction of analytic function given real or imaginary parts – complex potential – conformal transformation of function like z^n, e^z, $1/z$, $\sin z$, $z+k^2/z$ – bilinear transformation – cross ratio – invariant property – simple problems.

Module 4 Finite Differences

Meaning of Δ, ∇, E, μ, δ - interpolation using Newton's forward and backward formula – central differences – problems using Stirling's formula, Lagrange's formula and Newton's divided difference formula for unequal intervals.

Module 5 Difference Calculus

Numerical differentiation using forward and backward differences – Numerical integration – Newton – Cote's formula – trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rule – simple problems. Difference equations – Solution of difference equations.

References

1. Erwin Kreyszig, Advanced Engg. Mathematics, Wiley Eastern Ltd.
2. Grawal B.S., Higher Engg. Mathematics, Khanna Publishers.
3. M.K.Venkataraman, Numerical Methods in science & Engg., National Publishing Co.
4. S.Balachandra Rao and G.K.Shantha, Numerical Methods, University press.
5. Michael D.Greenberg, Advanced Engg. Mathematics, Prentice-Hall.
6. M. R. Spiegel, Theory and Problems of Vector analysis, McGraw – Hill.

FLUID MECHANICS - I

C302 **3+2**

Module 1

Properties of fluids: Definition and Units, Mass density, specific weight, surface tension, capillarity, Viscosity – Classification of fluids – Ideal and real fluids, Newtonian and non – Newtonian fluids.

Fluid pressure – Atmospheric, Absolute, gauge and Vaccum Pressure, Measurement of Pressure – Piezometer, manometer, Bourden Gauge.

Total pressure and centre of pressure on a submerged lamina. Pressure on a submerged curved surface – pressure on lock gates, Pressure on gravity dams.

Module 2

Buoyancy – Centre of buoyancy – Metacentre – Stability of floating bodies – Determination of metacentric height – Analytical & experimental methods.

Types of flow – Streamline, Path line and Streak line, Velocity Potential, Stream Function, Circulation and Vorticity, Laplace's Differential equation in rectangular co-ordinates for two dimensional irrotational flow.

Flow Net – Orthogonality of stream lines and equipotential lines.

Stream tube – continuity equation for one dimensional flow.

Module 3

Forces influencing motion – Energy of fluids, Euler's equation, statement and derivation of Bernoulli's equation and assumptions made.

Applications of Bernoulli's equation – Venturi meter, Orifice meter, Pitot tube

Orifices and Mouth Pieces – Coefficients of Contraction, Velocity and Discharge, External and internal mouthpiece.

Notches and weirs – Rectangular, triangular, trapezoidal notches, Cippoletti weir, submerged weir, broad crested weir.

Module 4

Flow through pipes: Laminar and Turbulent flow – Reynold's experiment, loss of head due to friction, Darcy – Weishbach Equation, Other energy losses in pipes.

Hydraulic Gradient and Total Energy Lines: Flow through long pipes – Pipes in series and parallel, Siphon, Transmission of power through pipes –nozzle diameter for maximum power transmission.

Laminar Flow in circular pipes: Hagen poiseuille Equation, Laminar flow through porous media, Stoke's law.

Turbulent flow through pipes: Hydro-dynamically smooth and rough boundary, Velocity distribution for turbulent flow.

Drag and lift for immersed bodies.

Module 5

Dimensional Analysis and Model studies: Units and dimensions of physical quantities, Dimensional Homogeneity of formulae and it's application to common fluid flow problems, Dimensional Analysis-Rayleigh's method, Buckingham's method. Derivations of dimensionless parameters, Froude's, Reynold's, Webber, Mach numbers.

Hydraulic Models: Need, Hydraulic Similitude, geometric, Kinematic, Dynamic Similarity, Scale ratios of various physical quantities for Froude's and Reynold's model laws – problems, Selection of scale of models – Distorted models, Moving Bed models, Scale effects in models, Spillway models and Ship models.

References

1. Streeter V. L., Fluid Mechanics, Mc Graw Hill, International Students Edition.
2. Dr. P. N. Modi & Dr. S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House Delhi.
3. Jagdishlal, Fluid Mechanics & Hydraulics, Metropolitan Book Co., Delhi.
4. R. J. Garde and A. G. Mirajoaker, Engineering Fluid Mechanics, Nem Chand & Bross., RoorKee.

MECHANICS OF SOLIDS

C303 **2+2**

Module 1

Stress-strain: Bars of varying cross section-Composite section-temperature stresses.

Strain energy: Gradually applied and suddenly applied load.

Compound stresses: Two dimensional problems-principal stresses and principal planes-maximum shear stress-planes of maximum shear- Graphical method.

Module 2

Bending moment and shear force: Shear force and Bending moment diagrams for various types of statically determinate beams with various loading combinations-relation between load, shear force and bending moment.

Module 3

Stresses in beams: Theory of simple bending- stresses in symmetrical sections-bending stress distribution- modulus of section- shear stress distribution in beams-stress in various sections- built up sections – composite sections- beams of uniform strength.

Module 4

Stresses due to torsion: Torsion of solid and hollow circular shafts- power transmitted-stresses due to axial thrust-bending and torsion.

Springs: Close coiled and open coiled- carriage springs.

Pressure vessels: Thin and thick cylinders-Lame's equation-stresses in thick cylinders due to internal and external pressures.

Module 5

Columns and struts: Short and long columns-elastic instability-Euler's formula for long columns with different end conditions- slenderness ratio- Rankine's formula-Empirical formula-Buit up members-columns subjected to eccentric loading and initial curvature.

Combined bending and direct stresses: Core of different sections- wind pressure on structures.

Unsymmetrical bending: Product of inertia-principal axes-stresses due to unsymmetrical bending.

Shear centre: Shear centre of sections having two axes of symmetry.

References

1. Timoshenko.S.P, Strength of Materials, Part-1, D.Van Nostrand company, Inc.Newyork.
2. Popov E.P., Engineering Mechanics of solids, Prentice Hall of India, New Deihi.
3. Punmia B.C, Strength of Materials and Mechanics of structures, Vol.1, Lakshmi Publications, New Delhi.
4. Vazirani V.N., Ratwani N. M., Analysis of Structures, Vol.1, Khanna Publishers, New Delhi.
5. Kazimi S.M.A., Solid Mechanics, Tata Mc Graw Hill.
6. William A Nash, Strength of Materials, Mc Graw Hill.
7. Ryder G.H., Strength of Materials, ELBS.
8. Arthur Morley, Strength of Materials, ELBS, Longman's Green& Company.

CONSTRUCTION ENGINEERING AND MANAGEMENT

C 304 **3+1**

Module 1

Admixtures in Concrete – light weight concrete – heavy weight concrete – mass concrete – ready mix concrete – polymer concrete – vacuum concrete – shortcrete – pre-packed concrete – pumped concrete.

Joints – Construction joints – expansion joints – contraction joints – sliding joints – joints in water retaining structures etc.

Scaffolding and Formwork (elementary concepts only).

Module 2

Flooring – different types – Mosaic – marble – granite – roofing – pitched and flat roofs – domes and folded plate roofs – doors, windows and ventilators – types – construction details of paneled&glazed– I. S. specifications.

Damp prevention – Causes – Material used – Damp proofing of floors – walls – roofs.

Finished works – plastering, painting – white washing – distempering – application of Snowcem – Concrete repairs-construction and constructed facilities.

Module 3

Functional planning of buildings – general principles of site plan – principles of functional planning – orientation of buildings – shading principles.

Modern construction materials – Intelligent buildings – building automation.

Module 4

Construction management – Mechanisation in construction – earth moving, handling, pneumatic and hoisting equipment – pile driving equipment – Earth work computation – mass diagram – soil compaction & stabilization – owning and operating works of construction equipment.

Module 5

Departmental organizational structure – staff pattern – powers and functions of officers in planning, organising, directing and controlling construction –PWD code.

PWD system of account – classification of transactions –heads of accounts – cash – precautions in keeping accounts – construction accounts.

Stores – Safe custody of stores – classification – works – administrative sanction, technical sanction – categories of works.

References

1. M. S. Shetty, Concrete technology, S.Chand & Co.
2. S. P.Arora, Building construction, Dhanpat Rai & Sons, New Delhi.
3. Dr.Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company.
4. R.L.Peurifoy, W.B.Ledbetter, Construction Planning, Equipment, and methods, Tata Mc Graw Hill.
5. B.L.Gupta, Amit Gupta, Construction Management and Accounts, Standard publishers and Distributors.

SURVEYING - I

C305 **3+1**

Module 1

Introduction – Principles – classifications – Chain surveying: Ranging and chaining. Reciprocal ranging – over-coming obstacles –setting perpendicular and gradients – traversing – plotting – errors in chaining and their corrections.

Compass surveying – Prismatic compass – surveyor's compass – bearings – systems and conversions – local attraction – Magnetic declination – dip –

traversing – plotting – adjustment of error by graphical and analytical method (Bowditch's). Plane table surveying – Different methods – Traversing.

Module 2

Levelling: levels and staves – spirit level – sensitiveness – bench marks – temporary and permanent adjustments –booking - methods of reduction of levels – arithmetic checks-differential, fly, check and profile levelling cross sectioning – curvature and refraction – reciprocal levelling – errors in levelling – contouring – characteristics and uses of contours – Locating contours- plotting.

Module 3

Theodolite traversing: Transit theodolite – vernier, micrometer and micro-optic theodolites – description and uses – fundamental lines of a transit theodolite – temporary and permanenet adjustments – horizontal angle – reiteration and repetition methods– booking. Vertical angle measurements. Methods of traversing – conditions of closure – closing error and distribution – Gales traverse table – plotting by co-ordinates – omitted measurements.

Tacheometric surveying: - general principles Stadia method – distance and elevation formulae for staff held vertical – Instruments constants – analytic lens – tangential method – use of subtense bar – electromagnetic distance measurement – principles

Module 4

Areas and volumes Areas – by latitude and departure - meridian distance method – double meridian distance method – co-ordinate method – trapezoidal and Simpson's method – area by planimeter. Volume – trapezoidal and prismoidal rule. Volume from contours. - Capacity of reservoirs – Mass haul curve.

Module 5

Curves: Elements of a simple curve – setting out simple curve by chain and tape methods – Rankine's method – two theodolite method – compound and reverse curve (parallel tangents only) – transition curves – different kinds – functions and requirements – setting out the combined curve by theodolite – elements of vertical curve.

References

1. Dr. B. C. Punmia, Surveying Vol. I & II, Laxmi Publications (P) LTD, New Delhi.
2. T.P. Kanetkar & Kulkarni, Surveying and leveling Vol. I&II A.V.G.Publications, Pune.
3. Dr. K. R. Arora, Surveying Vol. I, Standard Book House New Delhi.
4. C. Venkatramaiah, Text Book of Surveying, Universities Press (India) LTD. Hyderabad.
5. S.K.Roy, Fundamental of Surveying, Prentice Hall of India, New Delhi.
6. S.K. Hussain & M.S. Nagaraj, Surveying, S.Chand & Company Limited.
7. B.N.Basak – Surveying.
8. Alak De, Plane Surveying, S.Chand &Co.

CIVIL ENGINEERING DRAWING - I

C306 **0+3**

PART A

Detailed drawings of paneled doors, glazed doors, glazed windows and ventilators with wooden frames. (2 sheets).
Reinforced concrete staircase (1 sheet).
Roof truss in standard steel sections (1 sheet).
Roof lines (1 sheet).
Roof detailing for M. P. tiles (1 Sheet).

PART B

Working drawings – plan, section and elevation of single storied buildings with RC and tiled roofs (only residential buildings) (8 sheets).
(Preparation of plan from line sketches only)

Marks distribution

Part A	40 marks
Part B	60 marks

References

1. Balagopal & T. S. Prabhu, Building drawing & detailing, Spades Publishers and distributors, Calicut.
2. Shah & Kale, Building Drawing, Tata Mc Graw Hill, New Delhi.
3. B.P.Varma, Civil Engineering drawing and House Planning, Khanna Publishers, Delhi.
4. Gurucharan Singh, Subhash Chander Sharma, Civil Engineering drawing, Standard Publishers distributors, Delhi.

MATERIAL TESTING LABORATORY - I

C 307 **0+3**

1. Tests on springs (open and close coiled)
2. Bending Test on Wooden Beams using U. T. M. '
3. Verification of Clerk. Maxwell's Law of reciprocal deflection and determination of E for steel.
4. Torsion Pendulum (M.S. wires. Aluminum wires and brass wires)
5. Torsion test using U. T. M. on M. S. Rod, torsteel and High Tensile steel.
6. Torsion Test on M. S, Road
7. Shear Test on M.S. Rod.
8. Fatigue Test
9. Impact Test (Izod and Charpy)

10. Hardness Test (Brinell, Vicker's and Rebound)
11. Strut Test.

Note

All tests should be done as per relevant BIS.

SURVEY PRACTICAL - I

C308 **0+3**

1. Running a closed compass traverse – plotting and adjustments.
2. Plane table surveying.
    i. Traversing.
    ii. Three point problem
    iii. Two point problem.

3. Levelling.
    i. Study of leveling instruments
    ii. Reduction of levels by H I method
    iii. Reduction of levels by rise and fall method
    iv. Longitudinal sectioning and cross sectioning.
    v. Contouring.

4. Theodolite Surveying
    i. Study of transit theodolite.
    ii. Measurements of horizontal angles by the method of repetition.
    iii. Measurement of horizontal angles by the method of reiteration.

5. Study of minor instruments.