CES -211 ENGINEERING MATHEMATICS - III

L	T	P
3	1	0

1. Solution of Nonlinear and Transcendental equations: Basic concepts on polynomial equations, Roots of equations by Bisection method, iterative method, Regula-falsi method, Newton-Raphson method, Secant method.

2. **Numerical Interpolation**: Least square curve fit and trigonometric approximations, Finite differences and difference operators, Newtons interpolation formulae, Gauss forward and backward formulae, Sterling, Bessel's and Evertte's formulae, Interpolation with unevenly space d data points-Lagrange's interpolation.

3. N**umerical differentiation and integration**: Numerical differentiation, errors in numerical differentiation, Numerical integration-Trapezoidal, Simpson's 1/3 and 3/8 rules, Romberg integration-recursive formulae, Evaluation of double integrals by Trapezoidal and Simpson's rules.

4. **System of simultaneous algebraic equations**: Matrix inversion and solution of transcendental and system of algebraic equations-Gauss elimination method, Jacobi's method and Gauss-Seidal method, Eigen values and Eigen vectors, Jacobi's method

5. **Ordinary differential equations**: Picard's method, Euler's method, Modified Euler's method, Runge- Kutta methods of 2^{nd} and 4^{th} order.

6. Applications to Civil Engg. problems: Formulation of various problems of Civil Engineering calculation of slope & design of a beam, Seepage and development of flow nets, consolidation of soil layer, head loss due to friction, water supply pipe network etc. and development of computer programmes.

Text books:

1. Grewal, B.S., Numerical methods in engineering and science, Khanna Publishers, Delhi.

2. Rajasekaran, S. Numerical methods in science and engineering : a practical approach, Wheeler
Publishing, New Delhi.

3. Lafore,Robert, Object Oriented programming in C++, Techmedia, Delhi.

4. Balagurusamy,E. Object oriented programming with C++, Tata McGraw-Hill, New Delhi.

CED-212 Structural Analysis – I

L	T	P

3	1	0

Introduction

Structure, Loads, Response, and Method of analysis.

Pin jointed Frames

Analysis Using Method of Joints, Method of Section, Graphical Method, and Tension co-efficient Methods.

Cables and Arches

Analysis of Cables, and Three Hinged Arches

Energy Methods

Strain Energy Due to Axial Force, Bending Moment, Shear Force and Torsion, Principle of Virtual Work, Betti's Law, Castigliano's Theorem I& II, and Dummy \Unit Load Method, Application of these Methods to Beams, Frames &Trusses.

Slope and Deflection in beams: Double integration method, Macaulay's method, Moment area Method, Conjugate beam Method and Strain energy method.

Rolling/Moving loads and Influence lines diagrams for Determinate structures

Rolling loads, ILD for determinate beams, Gantry girders, Trusses and three hinged Arches.

Books

1. R.C.Hibbeler, Structural Analysis, Pearson.
2. K.M.Leet,C.Ming UanG&A.M.Gilbert, Fundamentals of Structural Analysis, TATA McGraw Hill Education.
3. Devdas Menon, Structural Analysis, Narsoa
4. G.S.Pandit,S.P.Gupta&R.Gupta, Theory of Structures Vol-I&II, TATA McGraw Hill Education.
5. L.S.Negi&R.S.Jangid, Structural Analysis, TATA McGraw Hill education.
6. S.Ramamrutham &R.Narayan, Theory of Structures, Dhanpat Rai & Son.
7. C.S.Reddy, Basic Structural Analysis, TATA McGraw Hill education.
8. B.C.Punmia.Ashok Kumar Jain& Arun Kumar Jain, Theory of Structures, LAXMI.
9. S.S.Bhavikatti, Structural Analysis I&II, VIKAS.

Surveying I (CED-213)

L	T	P	C
3	1	0	3

Text Books:

1. Surveying and Leveling – Vol. 1 by *Kanetkar, T.P. and Kulkarni, S.V.*
2. Surveying and Leveling – Vol. 2 by *Kanetkar, T.P. and Kulkarni, S.V.*

Reference Books:

1. Engineering Survey by *W. Schofield*
2. Surveying: Theory and Practice by *Anderson, J. M. and Mikhail, E. M.*
3. **Surveying**, by *Bannister, A., Raymond, S. & Baker, R*.
1.

Topic
Basics of surveying: Introduction to surveying; concept of Geoid and reference spheroids, plane and geodetic surveys. Principles of surveying; Errors in measurements. Surveying instruments, Types of Maps, scale and uses, plotting accuracy coordinate systems
Linear measurements: Direct and indirect methods; Chain and tape measurements- corrections to tape measurements; Optical methods- Tachometric measurements,
Leveling: Various terms; Methods of height determination; Spirit and trigonometric leveling- different types of levels and staves; booking and reduction of data, profile leveling and cross sectioning; curvature, refraction and collimation errors, reciprocal leveling. Contours- characteristics, uses and methods of contouring
Measurement of directions: Bearings and angles; Compass surveying- magnetic bearings, declination, local attraction errors and adjustments; Theodolite- different types, uses, methods of observation and booking of data.
Plane table survey: Merits and demerits, accessories; orientation and resection; methods of plane tabling; three point/two point problems and solutions; errors in plane tabling.
Curve survey: Setting out of simple circular curves, compound curves, transition and vertical curves.

CED- 214 Engineering Geology

L	T	P
3	**1**	**0**

Introduction: Origin, Surface features and Internal Structure of the Earth, Rock cycle (Igneous, Metamorphic and Sedimentary rocks). Natural agencies of weathering and its types, Mineral composition of Rocks, Plate tectonics, Continental drift and sea floor spreading, Geological time scale, Attitude, True and apparent dips, topographic maps, outcrops. Folds, types of folds, classification, Joints, rock mass concept, Joint, classification of joints. Faults, Classification of faults, Three point problems, Depth and thickness problems.

Hydrogeology: Ground water, zone of ground water, water table and perched water table, water bearing properties of rocks, occurrence of ground water, springs, selection of sites for well sinking and geophysical investigations (Electrical and Seismic methods).

Earthquake and landslides: Classification, causes and effects of earthquakes and landslides, seismic curve, seismograrphs, seismograms, accelograms, seismic problems of India, seismic zones of India, remedial measures to prevent damage for engineering structures, case histories.

Geology of dams and reservoirs: Types of dams, requirements of dam site, preliminary and detailed geological investigations for dam site, failures of dams and their causes, factors affecting seepage and leakage of the reservoirs and he remedial measures, silting of reservoirs.

Rock Mechanics: Rock Mechanics and its relationship with soil mechanics and engineering geology, application of rock mechanics to civil engineering problems.

Index properties, Strength and failure criteria for rocks and rock masses, Insitu stresses in rocks and their measurement. Strength and deformation behavior of discontinuities in rocks. Deformation behaviour of rocks and rock masses. Time dependent behaviour of rocks. Application of Rock mechanics to Underground Structures, Slopes and Foundations. Improving the properties of insitu rock masses. Rockmass classifications, Terzaghi, RQD, RSR, RMR and Q classifications, Rating, Applications. Creep and cyclic loading. Weathered rocks.

Purpose of tunneling and geological problems connected with tunneling, Basic design and Principles of tunnels in rocks, Types and design of tunnel lining.

Books

Z.T. Bieniawski, Rock mechanics design in mining and tunneling, A.A Balkema Publishers,Rotterdam

Rudd Weijermars, Principles of rock mechanics, Alboran Science Publishing, Dhahran.

Walter Wittke, Rock mechanics: theory and applications with case histories, Springer-Verlag Berlin.

Central Board of Irrigation and Power, Manual on Rock Mechanics, C.B.I.P, New Delhi.

T.R. Stay, Practical H.B. for underground rock mechanics.

Bureau of Indian Standards, Indian standard glossary of terms and symbols relating to rock mechanics, Bureau of Indian Standards, New Delhi

CED-215Hydraulics

L	T	P
3	1	0

Fundamental Concepts of Fluid Flow: Flow characteristics, Classification, Fluid properties, Foundations of flow analysis.

Fluid statics: Fluid pressure and its measurement, hydrostatic forces on submerged bodies, buoyancy and floatation, liquids in relative equilibrium.

Fluid kinematics: Continuity equation, rotational and irrotational flow, circulation and vorticity, velocity potential and stream function, flow net.

Fluid dynamics: Euler's equation, Bernoulli's equation and its applications, impulse momentum theory and its application.

Flow through pipes: Darcy-Weisbach equation, energy losses in pipelines, equivalent pipes, multiple pipe systems, siphon, three reservoir problem, and water hammer.

Laminar and Turbulent flows: Reynolds experiment, Laminar flow between parallel plates, Laminar flow in pipes, characteristics of turbulent flow, Turbulent flow in smooth and rough

Dimensional analysis and similitude: Dimensional homogeneity, Buckingham's π theorem, important dimensional numbers and their significance, geometric, Kinematic and dynamic similarity, model studies.

Boundary Layer Theory and Applications: Concepts of boundary layer, boundary layer thickness and equations, momentum integral equation, boundary layer separation and its control, cavitation. Circulation, Drag and lift on immersed bodies, Magnus effect.

Books

Ojha, Berndtsson and Chandramouli, Fluid Mechanics and Machinery
A.K. Jain, Fluid Mechanics
P.N.Modi and S.M.Seth, Hydraulics and Fluid Mechanics
Wiley and Streeter, Fluid Mechanics
F.M. White, Fluid Mechanics

Course No.	Course title	L	T	P/D	Hours	Credit
CED-216	Transportation Engineering-I (Airport and Railway Engineering)	3	1	0	4	4

Airports: ICAO, Aircraft Characteristics, Airport Planning, Regional Planning, Development of New Airports, Airport Site Selection, Airport Obstructions, Zoning, Classification of Obstructions, Imaginary Surfaces, Approach Zone and Turning Zones, Runway Design, Airport Capacity, Loading Apron, Service Hanger, Taxiway Design, Introduction to Airport Pavement Design.

Railways: Component Parts of Railway Track, Gauges, Resistances to Traction and Stresses in Track, Various Resistances and Their Evaluation, Hauling Capacity and Tractive Effort, Stresses in Rail, Sleepers, Coning of Wheels, Creep, Wear, Joints in Rails, Sleeper Types, Rail Fittings and Fixtures, Ballast, Geometric Design, Track Alignment, Horizontal Curves, Super Elevation, Equilibrium Cant and Cant Deficiency, Transition Curves, Vertical Curves-Gradients and Grade Compensation, Points and Crossings, Design of Simple Turn Out, Various Types of Track Junctions, Principles and Classification of Signals, Functions and Methods of Interlocking.

Books:

Saxena and Arora, A Textbook of Railway Engineering

Arora and Jain, Airport Planning and Design by Khanna,

R.Srinivasan and S.C. Rangwala, Harbour, Dock and Tunnel Engineering

M M Agarwal, Indian Railway Tracks: Railway Engineering

Robert Horonjeff, Planning and Designing of Airport

II YEAR: SEM-III

CED-217 Structural Analysis Lab

L	T	P
0	0	3

1) To verify the Betti's Law& Maxwell law of reciprocal displacements.
2) Study of a three hinged arch experimentally for a given set of loading and to compare the results with those obtained analytically.
3) To obtain experimentally the influence line diagram for horizontal thrust in a three hinged arch and to compare the same with the theoretical value.
4) To determine the flexural rigidity of a given beam.

5) To study the behavior of different type of struts.
6) To verify moment area theorem for slopes and deflections of a beams
7) To find the deflection of a pin-connected truss and to verify the results by calculation and graphically.
8) To determine the carry over factors for beam with rigid connections.
9) To determine the rotational stiffness of a beam when far end is (a) fixed (b) pinned.
10) Determine experimentally the horizontal displacement of the roller end of a two hinged arch for a given set of loading and to compare the results with those obtained analytically.
11) To obtain experimentally the influence line diagram for horizontal thrust in a two hinged arch and to compare the same with the theoretical value.
12) To determine the bending moment, shear force, deflection, flexural rigidity, bending stress, torsion in a cantilever, simply supported, continuous, fixed beams and Portal frames through data acquisition.
13) To verify deflection, strain, forces and stresses of a determinate, redundant truss and suspension bridge for different load.
14) To study tensile stress and strain on different materials
15) Computer simulation of different structures principles as a virtual experiment.

Books:

1. H.S.Moondera & Rajiv Gupta, Lab Manual For Civil Engineering, CBS

CED-218 Surveying-I Lab

L	T	P
0	0	3

To determine the difference in elevation of two given points.

Profile levelling and cross sectioning of a given route.

To prepare the contour map of an area by the method of radial lines.

To measure the horizontal angle by reiteration and repetition method,

Theodolite traversing and error adjustment.

Determination of height and distance using Stadia tacheometry

Plane tabling by radiation and intersection method.

Solution of Three point problem in plane tabling

Setting out of simple circular curve by offsets from long chord and by successive bisection of long chord.

Setting out of simple circular curve by radial and perpendicular offsets from tangent.

Setting out of simple circular curve by one theodolite and by two theodolite method

Use of total station

CED-219 Engineering Geology Lab

L	T	P
0	0	3

Mineralogy

Optics

Study of rocks in hand specimen and under microscope

Topographical maps. Structural Geological maps.

Structural Geological problems.

Engineering Geological maps and Engineering Geological experiments

Geophysical Experiments

Engineering properties of rocks

Field and laboratory testing of rocks and rock masses

Geological field work to study the geology of project

Books

F.J.H. Blyth, and M.H. de Freitas, Geology for Engineers, ELBS, 1994.
H.H. Read, Rutley's Elements of Mineralogy, CBS Publisher, 1991.
M.P. Billings, Structural Geology, Prentice Hall Inc., 1992.
K.V.G.K. Gokhale, and D.M. Rao, Experiments in Engineering Geology, Tata McGraw Hill.

CED-210 Hydraulics Lab

L	T	P
0	0	3

To determine the metacentric height of a ship model

Verification of Bernoulli's theorem

To calibrate a venturimeter and to determine its coefficient of discharge

To calibrate an orifice meter and study the variation of coefficient of discharge with the Reynolds

To study the flow over V-notch (weir) and Rectangular notch and to find their coefficient of

To determine the coefficient of discharge of a mouth piece.

To verify the momentum equation experimentally

To determine the coefficient of friction of pipes of different diameters.

To determine the form losses in a pipe line

To obtain the surface profile on the total heads distribution of a forced vortex

Flow measurement using Rotameter.

To differentiate between laminar and turbulent flow.

To verify Darcy's law.