

Course No.	Course title	L	T	P/D	Hours	Credit
CED-311	Structural Analysis – III	3	1	0	4	3

Plastic Analysis of Structures:Theory of plastic bending, plastic analysis, statically method, Mechanism method.

Introduction to Matrices methods:Introduction to matrices, flexibility &stiffness matrix,truss elements, beam elements, frame elements.

Flexibility Matrix Method :Analysis of Beam, Frames &Truss using Flexibility Matrix Method

Stiffness Matrix Method :Analysis of Beam, Frames &Truss using Stiffness Matrix Method

Introduction to Finite Element Methods:Principles of discretization, Element type, shape functions, element stiffness and mass formulation, and numerical integrations.FEM application to simple engineering structures.

Books

1. Weaver, W. and Gere, J.M., Matrix Analysis of Framed Structures, CBS
2. Moshe, F., Rubenstein, Matrix Computer Analysis of Structures, Prentice Hall, NewYork.
3. DevdasMenon, Advanced Structural Analysis,Narsoa
4. G.S.Pandit,S.P.Gupta&R.Gupta, Theory of Structures: A Matrix Approach ,TATA McGraw Hill Education.
5. L.S.Negi&R.S.Jangid, Structural Analysis,TATA McGraw Hill education.
6. V.K ManikamSelvam, Element of Matrix And Stability Analysis Of Structures,Khanna Publishers.
7. S.S.Bhavikatti, Structural Analysis II,VIKAS.
8. S.Rajasekaran&G.Sankarasubramanian, Computational Structural Mechanics,PHI
9. Ashok K.Jain, "Advanced Structural Analysis", Nem Chand & Bros, 1996.
10. R.D.Cook, Malkus&Plesha, Concept and Application of Finite Element Method, John Wiley.
11. Chandrupatla, Tirupathi R., Belgundu, Ashok D., Introduction to finite elements in engineering, Prentice-Hall.
12. C.S.Krishnamoorthy,Finite Element Analysis (Theory & Programming),Tata Mcgraw Hill Education.
13. Chennakesava R.Alavala,Finite Element Methods,PHI.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-312	Remote Sensing and GIS	3	1	0	4	3

Basics of Remote Sensing: Introduction to Remote Sensing, data acquisition and processing, sensor systems, Electromagnetic Radiation (EMR) and its characteristics, Radiation principles, prosperities of solar radiant energy, atmospheric windows. Interaction in the atmosphere, nature of atmospheric interaction, atmospheric effects of visible, near infra-red thermal and microwave wavelengths, interaction at ground surface, interaction with soils and rocks, effects of soil moisture, organic matter, particles, size and texture, interaction with vegetation, spectral characteristics of individual leaf, vegetation canopies, effect of leaf pigments, radiation geometry.

Introduction with GIS: Def. of GIS, Difference between GIS and CAD worlds, utility of GIS, various GIS packages and their salient features, essential components of a GIS, scanners and digitizers.

Map Projection and Coordinate Systems: Introduction, geographic Grid, Map projection, Coordinate systems.

Vector Data Models and Analysis: Vector data and its representation, topological data structure, non-topological vector data structure, TIN, Region, vector data editing and analysis.

Raster Data Models and Analysis: Acquiring and handling of raster data storage, function of raster based GIS data analysis.

Text Books:

1. Kang-Tsung Chang, *Introduction to Geographical Information Systems*, and
2. T.M. Lillensand and R.W. Keifer, *Remote Sensing and Image Interpretation*.
- 3.

Reference Books:

1. C.P. Lo and Albert K.W. Yeung, *Concept and Techniques of Geographical Information Systems*,
2. Stan Aromoff, *Geographical Information Systems- A Management Perspective*, and
3. P.J. Curren, *Principles of Remote Sensing*.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-313	Geotechnical Engineering-II (FoundationEngineering)	3	1	0	4	3

Stability Analysis: Stability of finite and infinite slopes, types of failures, different factors of safety, determination of factor of safety by method of slices, Swedish circle, friction circle, Bishop's method, Morgenstern Price method, Taylor's stability number, location of critical circle, stability analysis of earth dam slopes for different conditions. Design of filters and rock toe .

Earth Pressure: Different types of earth pressures, states of plastic equilibrium Rankine's theory and Coulomb's theory, influence of water table, surcharge, wall friction and deformation on the earth pressure, application of Rankine's and Coulomb's theory to cohesionless and cohesive soils, Culman's graphical method, stability considerations for retaining walls, effect of earthquakes. Design of retaining walls.

Sheet pile wall: Different types of sheet pile walls:-free and fixed earth support, Design principles of anchored bulk heads, arching in tunnels, open cut strutting and sheeting.

Foundations: Different types of loads on foundations, types of shallow and deep foundations, footing, rafts, piles, wells, selection of foundation type, dewatering of foundations, type of explorations, methods of boring, soil samples and samples.

Shallow foundations: Bearing capacity, Terzaghi's theory of, effect of foundation size, shape, ground water table, determination of bearing capacity from building codes, plate load test, penetration test, static and dynamic cone tests, Housel's approach, bearing capacity of sands and clays, settlements analysis of foundation. permissible settlements, design principles of depth of foundation for different type of footing, principles of floating rafts, foundations on nonuniform soils.

Deep foundation: Types of piles based on function, materials and methods of construction, friction and end bearing piles, static formulae-Engineering News and Hiley's formula, Group action in piles, block failures, settlement of pile groups in sands and clays pile load test, negative skin friction and under reamed piles.

Well foundation: Elements, forces acting on well, lateral stability analysis, problems in sinking of wells and remedial measures.

Books:

- 1) Theory and Practice of Foundation Design by N. Som and S.C.Das
- 2) Soil Mechanics and Foundation Engineering by P. Purushothama Raj
- 3) Principles of Foundation Engineering by B. M. Das
- 4) Geotechnical Engineering by S.K.Ghulati and Manoj Dutta
- 5) Design of Sub-structures by Swami Saran
- 6) Foundation Engineering by P.C Varghese

Course No.	Course title	L	T	P/D	Hours	Credit
CED-314	Building Construction& Drawing	3	0	0	3	3

Components of building and building specification: Components of building and building specification, controlling of cost, various stage of construction.

Site preparation and setting out of works: site layout, site clearing, enclosing site, basic service, setting out building, method of determination of excavation depth.

Foundation: Function, types of shallow foundation, types of deep foundations.

Masonry Construction: Stone masonry: Introduction, various terms used, stone masonry, classifications of stone masonry, safe permissible loads.

Brick masonry: type of bricks, bonds in bricks, laying of brick work, defects in brick masonry, reinforced brick work, composite stone and brick masonry, glass block masonry.

Block masonry: classification, laying, application.

Composite masonry: classification, application.

Walls: Constructional details, precautions during construction, types of load bearing and non-load bearing walls, partition walls and Cavity.

Lintel, Plinth beam, Built beam & Arches: definition and necessity of these.

Lintel: classification, load on lintel,

Arch: terms used stability of arches, classification, and construction.

Beams: Types, Construction.

Damp and Water Proofing: Methods, Defects and causes of dampness, prevention of dampness, materials used, damp-proofing treatment in buildings, water proofing of roofs.

Concrete works: gauging of materials, mixing, transporting, placing, compacting, joints in RC.C construction, curing. Equipment used. **Form work:** Requirements, Load on Form Work, Form Work for Various Structures.

Shoring, Underpinning & Scaffolding: Definition, Terms used, Application.

Plastering, Pointing & Lining: Terms used, type, methods, defects.

Roofs and Floors, Flooring:

Roofs: Various terms used types of roofs and roof trusses.

Floors: basement and upper floors, various types of floorings.

Doors and Windows, Ventilators: Locations, sizes, types of doors, windows and ventilators. Fixtures and fasteners for doors and windows.

Stairs, Ramps, Lift & Escalators: terms used classification, planning, application.

Paints, Distemper & Varnishing: Basic constituents, types, characteristics and types of varnishes, defect, enamel, distemper, Method of application.

Building Service (Plumbing/Water Supply/Electrical Supply/drainage of waste water in Building): Necessity, terms used, Materials used and Method of application.

Termite Proof, Fire Protection, Thermal Insulation, and Acoustics & Sound Insulation:

Termite Proof: Type of Termite, Materials used and Method of application.

Fire Protection: Fire hazards, fire-resisting properties of materials, and fire resistant construction and fire protection requirements for buildings, Materials used and Method of application.

Thermal Insulation: Materials used and Method of application.

Acoustics & Sound Insulation: characteristics of audible sound, measurement and transmission of sound, sound absorber, classification of absorbers, defects, sound insulation of buildings, acoustical design of halls, Materials used and Method of application.

Ventilation & Air conditioning: Necessity, Function Requirements, Systems of Ventilation & Air Conditioning.

Miscellaneous works: Rain Water Harvesting, Cracks Repair, Periodical maintenance.

Building Drawing (Plan): Classification of Building, Terms used, regulations, Type of plan, conventional symbols for construction materials, door, window etc, sanitary items & electrical items, Plan for residential and public and Industrial buildings.

Books:

B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Building Construction, Laxmi.

P.C.Varghese, Building Construction, PHI.

Sharma and Kaul, Building Construction.

Sushil Kumar, Building Construction.

Gurcharan Singh, Building Construction.

Subir K.Sarkar, Subhajit Saraswati, Construction Technology, Oxford University Press.

Course No.	Course Title	L	T	P/H	Hours	Credits
CED-315	Project Planning and Management	3	1	0	4	3

Construction Management: Significance, objectives and functions, resources for construction industry, stages in construction, Civil Engineering drawings.

Construction Contracts & Specifications: Types of contracts, contract document, specifications, important conditions of contract, arbitration.

Construction Organization: Principles of organization, communication in organization, types of organizations, temporary services, job layout.

Construction Planning: Work breakdown structure, pre-tender stage planning, contract stage planning, scheduling, bar charts, limitations of bar charts, milestone charts, preparation of material, equipment, labour, and finance schedule.

Critical Path Method : Network techniques, element of a network, rules for developing networks, development logics, numbering events, time computations, activity floats, network updating. Resources profile, resources smoothing and resources leveling.

Cost-Time Analysis : Cost versus time, direct cost, indirect cost, total project cost, optimum duration, contracting network for cost optimization.

Programme Evaluation and Review Technique : Probability concept in network, optimistic time, pessimistic time, most likely time, variance, standard deviation, slack, central limit theorem, probability of achieving completion time.

Construction Equipment : Selection, bulldozer, dumpers, trenchers, excavators, hoe, hoists, graders, piling hammers, pumps, compressors, bitumen mix plant, rollers, clam shell, aggregate production techniques, crushers.

Text Books:

- 1) P.S. Gehlot and B.M. Dhir, *Construction Planning and Management*,
- 2) B.C. Punmia and K.K. Khandelwal, *Project Planning and Control with PERT and CPM*,
- 3) R.L. Peurify, *Construction Planning Equipments and Methods*.

Reference Books:

- 1) L.S. Srinath, *PERT and CPM -Principles and Applications*, and
- 2) K.K. Chitkara, *Construction Project Management: Planning, Scheduling and Control*,
- 3) J. Moder, , C. Phillips and E. Davis, *Project Management with CPM, PERT and Precedence Diagramming*, and
- 4) H.N. Ahuja, *Project Management Technique in Planning and Controlling Construction Projects*.

Course No.	Course Title	L	T	P/D	Hours	Credits
CEO-316	CPM & PERT	3	1	0	4	3

Construction Planning: Work breakdown structure, scheduling by bar charts, limitation of bar charts, milestone charts, and multiple calendar date scheduling using bar chart.

Network Techniques in Construction Management-I: CPM: Introduction with network techniques, classification of activities, rules for developing networks, network development-logic of network, numbering events, network analysis, determination of project schedules, critical path, floats in activities, updating, resources allocation, resources smoothing and resources leveling.

Network Techniques in Construction Management-II- PERT: Probability concept in network, optimistic time, pessimistic time, most likely time, lapsed time, deviation, variance, standard deviation, slack critical path, probability of achieving completion time, central limit theorem.

Cost-Time Analysis: Cost versus time, direct cost, indirect cost, total project cost and optimum duration, contracting the network for cost optimization, steps in time cost optimization.

Text Books:

B.C. Punmia and K.K. Khandelwal, *Project Planning and Control with PERT and CPM*, and

H.N. Ahuja, *Project Management Technique in Planning and Controlling Construction Projects*.

Reference Books:

K.K. Chitkara, *Construction Project Management: Planning, Scheduling and Control*,

J. Moder, , C. Phillips and E. Davis, *Project Management with CPM, PERT and Precedence Diagramming*, and

L.S. Srinath, *PERT and CPM -Principles and Applications*.

Course No.	Course title	L	T	P/D	Hours	Credit
CEO-316/325	Finite element Method	3	1	0	4	3

Introduction: Principles of discretization, element stiffness and mass formulation based on direct, variational and weighted residual techniques and displacements approach, Shape functions and numerical integrations, convergence, Displacement formulation for rectangular, triangular and isoparametric elements for two dimensional and axisymmetric stress analysis. Three dimensional elements and degenerated forms. Stiffener elements and modifications such as use of different coordinate systems use of non-conforming modes and penalty functions. FEM applications in engineering problems.

Books

O.C. Zienkiewicz And R.L. Taylor, Finite Element Methods, Vol I & Vol II, Mcgraw Hill, 1989

K. J. Bathe, Finite Element Procedures, Phi Ltd.

R.D.Cook, Malkus&Plesha, Concept and Application of Finite Element Method, John Wiley.

David V.Hutton, Fundamental of Finite Element Analysis, Tata Mcgraw Hill Education

J.N.Reedy, An Introduction to The Finite Element Method, Tata Mcgraw Hill Education.

Kenneth H.Huebner,Donald L.Dewhirst&Douglas E.Smith,Ted G.Byrom, The Finite Element Analysis for Engineers, John Wiley.

Chandrupatla, Tirupathi R., Belgundu, Ashok D., Introduction to Finite Elements in Engineering, Prentice-Hall.

C.S.Krishnamoorthy,Finite Element Analysis (Theory & Programming),Tata Mcgraw Hill Education.

Chennakesava R.Alavala,Finite Element Methods, PHI.

V.K.Manicka Selvam, Rudiments of Finite Element Method Analysis of Structures, Dhanpat Rai.

P.Seshu, Finite Element Analysis, PHI.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-317	Remote Sensing and GIS Lab.	0	0	3		1

- 1) Exploring geospatial data in ArcCatalog,
- 2) Creating Point, Line and polygon Features in GIS,
- 3) Creating a professional map in ArcGIS,
- 4) Georeferencing of an image in ArcGIS,
- 5) Creating and editing geospatial data in ArcGIS,
- 6) Exploration the use of ArcGIS 3D Analyst,
- 7) Geospatial spatial analysis using Spatial Analyst tool, and
- 8) Generation of DTM and 3D view from stereo satellite images using photogrammetric software.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-318	Geotechnical Engineering-II Lab	0	0	3	3	2

- 1) Determination of consolidation properties of the given clay sample
- 2) Direct shear test on granular soil sample.
- 3) Unconsolidated undrained (UU) triaxial shear test of fine grained soil sample.
- 4) Consolidated undrained (CU) triaxial shear test of the given soil sample
- 5) Consolidated drained (CD) triaxial shear test of the given soil sample
- 6) Determination of Free swell index of the given expansive soil
- 7) Determination of Swelling pressure of the given expansive soil
- 8) Undisturbed and representative sampling
- 9) Determination of bearing capacity using DCPT
- 10) Determination of bearing capacity using SPT

Books

S.Prakash, P.K. Jain, Soil Testing for Engineers, Nem Chand & Bros.,Roorkee.

Lambi, Engineering Soil Testing, Wiley Eastern.

J.P.Bowles, Engineering Properties of Soils and their Measurement, McGraw Hill.

Alam Singh, Soil Engineering in Theory and Practice, Vol.II, Geotechnical Testing and Instrumentation, CBS Pub.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-319	Building Construction Drawing	0	0	3		1

Indian standard specification for Drawing: Type of plan, conventional symbols for construction materials, door, window etc, sanitary items& electrical items, Plan for residential and public and Industrial buildings.

Masonry: Different types of bonds in brick and stone masonry walls, individual and attached columns and buttresses.

Foundations: Drawing of Various Shallow foundation and deep foundations, Brick /Stone Masonry Isolated/ Strip Foundation.

Walls &DPC: Drawings of loading and non-loading bearing partition walls, Cavity.

Lintel, Plinth beam, Built beam &Arches: Drawing of Lintel, Plinth Beam, Built Beam &Various Arches

Roofs and Floors: Drawing of various Roofs, Roof Trusses-King Post Truss, Queen Post Truss and Floors

Doors and Windows, Ventilators: Drawing of various Doors and Windows, Ventilators.

Stairs, Lift& Escalators, Ramps: Drawing of various Stairs, Lift, and Escalators& Ramps.

Building Service (Plumbing/Water Supply/Electrical Supply/drainage of waste water in Building): Drawing of various Building Service like Plumbing/Water Supply/Electrical Supply in Building.

Building Drawing(Plan): Plan for various Residential , Public and Industrial Buildings.

Books:

1. Shah Kale and Patki, Building Drawing :
2. B.P.Verma,Civil Engineering Drawing and House Planning,Khanna Publishers.
3. Murugesan&PadminiSubbarayan,Building Drawing, Pratheeba Publishers.
1. B.C.Punmia.Ashok Kumar Jain& Arun Kumar Jain, Building Construction, Laxmi.
2. P.C.Varghese, Building Construction, PHI.
3. Sharma and Kaul, Building Construction.
4. Sushil Kumar, Building Construction.
5. Gurcharan Singh, Building Construction.
6. Subir K.Sarkar,Subhajit Saraswati, Construction Technology, Oxford University Press.

