CED-221 Structural Analysis-II

L	T	P
3	1	0

Introduction

Static and kinematic indeterminacy.

Statically indeterminate structures

Force methods, Three-moment equation, Method of consistent deformation, Approximate method of analysis(Portal Frame, Cantilever, Substitute Frame Method)

Kinematically Indeterminate Structures

Displacement Methods- slope deflection method, moment distribution method, Kani's Method.

Influence lines for In-determinate structures

Muller-Breslau Principle for Influence lines diagram of indeterminate structures: Beams, frame, trusses and two hinged & fixed arches.

Plastic Analysis of Structures

Theory of plastic bending, plastic analysis, statically method, Mechanism method.

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 II (CED -222)

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*.

Topic
Traversing and Triangulation: Compass and theodolite traverses- balancing and adjustment of traverses, computation of coordinates, omitted measurements Triangulation- network, strength of figures, selection of stations, inter-visibility, satellite stations, measurements and computations;
Area and volume computation: Area of a traverse**,** determining area from plans, area of X-section, volume from X-section, corrections, mass haul diagram
Photogrammetry : Aerial Photographs- Basic terms & Definitions, scales, relief displacements, Flight Planning, Stereoscopy, Characteristics of photographic images, Fundamentals of aerial photo-interpretation
Modern Surveying Equipment: Introduction, Electronic distance measuring instrument, automatic and digital level, electronic theodolite, total station.
Global Positioning System (GPS): Introduction, GPS principles, Satellite navigation System, GPS- Space segment, Control segment, User segment, GPS satellite signals, Receivers, Static, Kinematic and Differential GPS
Remote Sensing and GIS Introduction, electromagnetic radiation, target interaction, remote sensing systems, remote sensing from space, applications of remote sensing, Geographic information systems-concepts and introduction

Course No.: CED-223

Course title: Environmental Engineering –I (Water Supply and treatment)

L	T	P
3	1	0

Introduction: Scope and importance of Environmental Engineering and Management. Introduction to Environmental pollution, Impact on human health, Significant water quality parameters for Municipal Water Supplies. Standards and guidelines for Water Quality Parameter.

Demand and sources of water: Water demand Population forecast; Water quality requirements

Sources and its yield for water requirements; Intake structures; Water quality parameters and their significance in domestic use.

Water treatment: Design of treatment units such as aeration, sedimentation, coagulation and flocculation, filtration, Disinfection, water softening; Advanced water treatment methods.

Water distribution systems: Pumps and pumping system Pipes; Pipe appurtenances testing of water main Distribution reservoirs, Distribution methods, Pipe network analysis, Planning of water supply project; Plumbing and fittings for water supply House water connection, Design consideration for water piping system and storage of water in building.

Rural water supply and treatment:
Water demand and treatment techniques for rural area, water problems and remedial measures.

Technical tour & report: within semester visit to water treatment plant and prepare report.

Books:

1. B. C. Punmia, Ashok Jain, Arun Jain,
2. Water Supply Engineering, Laxmi Pub., New Delhi. 2003.
3. Davis and Cornwell, Elements of Water Supply and Waste water Disposal, John Wiley & Sons, New York. 1998.
4. Ministry of Urban Development,
5. Manual on Water Supply and Treatment 3rd Ed. Central Public Health & Environmental. Engg. Organization, Govt. of India, New Delhi, 1991.
6. Ronald L. Droste, Theory and Practice of Water and Wastewater Treatment, John Wiley & Sons, New York, 1997.
7. McGhee, T.J., Water Supply & Sewerage, McGraw Hill International Edition, 1991.

CED-224 Water Resources Engg.-I

L	T	P
3	1	0

Hydrological cycle, Water budget equation

Precipitation: Measurement, Computation of average rainfall over a basin, weather systems

Losses: Evaporation, transpiration, infiltration, Φ-index

Runoff: Factors affecting, runoff computation, rainfall-runoff correlation, flow mass curve, flow duration curve.

Hydrograph Analysis: Flood hydrograph, base flow separation, Unit and S-hydrograph, Unit Hydrograph from simple and complex storms, synthetic and instantaneous unit hydrograph, Derivation of IUH.

Floods: Flood estimation, flood frequency analysis, reservoir capacity, reservoir and channel routing.

Subsurface Hydrology: Introduction to subsurface hydrology, unsaturated flow.

Water Resources Engineering: Water Resources of India, Description of water resources planning – Economics of water resources planning, physical and socio economic data – National Water Policy – Collection of meteorological and hydrological data for water resources development. Analysis of hydrologic data, Consumptive and non-consumptive water use - Concept of basin as a unit for development - Water budget and development plan. Reservoir - Single and multipurpose – Multi objective - Fixation of Storage capacity -Strategies for reservoir operation, Estimation of cost and Evaluation of Benefits related to water resources.

Books

K. Subramanya,Engineering Hydrology
Ojha, Berndtssson and Bhunia, Engineering Hydrology:
Bharat Singh, Fundamentals of Irrigation Engineering:
R.K. Linsleyand J.B. Franzini, Water Resources Engineering, McGraw-Hill Inc, 2000.
J.L. Douglas and R.R. Lee, Economics of Water Resources Planning, Tata McGraw-Hill Inc. 2000.
IS Codes.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-225	Transportation Engineering-II (Highway Engineering)	3	1	0	4	4

Road Development and Planning: Road cross-section, necessity of transportation planning, classification of roads, road patterns, planning surveys, saturation system.

Highway Location and Alignment: Ideal alignment and factors controlling, engineering survey for highway location, drawing and reports, highway projects.

Highway Geometric Design: Highway cross-section elements, sight distances, design of horizontal alignment, transition curves and vertical alignment, design aspects of hill roads.

Traffic Engineering: Traffic characteristics, traffic studies and their uses, traffic flow characteristics, traffic data collection, intersections & rotaries, signaling, road markings and parking facilities.

Pavement Design: Design factors, pavement material and their characteristics, design of flexible pavement by CBR method, group index and burmister methods, design of rigid pavements.

Construction of Roads: Construction of water bound macadam roads, bituminous pavements, cement concrete roads, construction of joints in cement concrete pavements.

Highway Maintenance: Pavement failures, maintenance techniques, evaluation and strengthening of existing pavements.

Books:

S K Khanna and C E G Justo, Highway Engineering

S K Sharma, Principles, Practice, and Design of Highway Engineering

L R Kadiyali, Traffic Engineering and Transport Planning

C A O Flaherty, Highway Vol. 1 and 2

Course No.	Course title	L	T	P/D	Hours	Credit
CED-226	Geotechnical Engineering-I (Soil Mechanics)	3	1	0	4	3

Soil properties: Soil mechanics, rock mechanics and foundation engineering, soil formation, soil structure, soil map of India. Basic definitions phase diagram, water content, specific gravity, void ratio, porosity, unit weight, weight volume relationships, index properties of soil and their determination, classification of soils, degree of saturation, density index.

Permeability: Darcy's law and its validity, seepage velocity, discharge velocity, constant and variable head permea-meter, pumping in and out tests, permeability of stratified soils, factors affecting permeability, laplace's equation, flow potential flow net and its properties, different methods of drawing flownets, seepage pressure, quick sand, exit gradient, piping, design of filter, principle of total and effective stresses, capillarity conditions in soil, effective and pore pressures.

Stress Distribution: Stress distribution in soil, assumptions in elastic theories, Boussinesq's equation for point, line, circular and rectangular loads, Westergaad's formula for point load, comparison of Boussinesq's and Westergaard's equation, concept and use of pressure bulbs, principle and use of New mark's influence chart, contact pressure.

Compaction: Mechanism of compaction, objective of compaction, measurement of compaction, factors affecting compaction, optimum moisture content, Standard Proctor test, Modified Proctor test, effect of moisture content and compactive effort on dry density, zero air void curve, compaction of cohesionless soils, field compaction, field control of compaction.

Consolidation: Mechanism of consolidation, e-log)p) curves, basic definitions, estimation of pre consolidation pressure, normally consolidation and over consolidation ratio, Terzaghi's theory of one dimensional consolidation, assumptions, governing equation, standard solution, laboratory determination of consolidation properties of soil, magnitude and rate of consolidation, settlements, secondary consolidation, compression characteristics of clays and settlement analysis.

Shear stress: Normal, shear and principal stresses, Columb's equation, Mohr's stress circle, Mohr-Columb failure criteria, laboratory determination of shear parameters of soil by direct shear tests, triaxial test, unconfined compression test, Vane shear test, Consolidated drained, consolidated undrained and unconsolidated undrained shear test, pore pressure parameters, Lambe's p-q diagram.

Books

B.C. Punmia, Soil Mechanics and Foundations, Laxmi Publications, New Delhi.
C.Venkatramaiah, Geotechnical Engineering, New Age International Publishers, New Delhi.
Ronald F. Scott, Principles of soil mechanics Addison-Wesley, Massachusetts.
Graham Barnes, Soil mechanics: Principles and Practice, Palgrave Macmillan, New York.

CED-227 Surveying-II Lab

L	T	P
0	0	3

1. Total station set up and finding slope, horizontal distance and vertical distances.
2. Total station traversing.
3. Collecting topographic data using total station.
4. Data downloading from total station and topographic map compilation.
5. Staking out horizontal/vertical curve using total station
6. Collecting topographic data using hand held GPS.
7. Collecting data using DGPS in static/RTK mode
8. Processing DGPS data.
9. Elementary processing of satellite data, generation of colour composite, land cover/land use classification using ERDAS Imagine/ILWIS
10. Generation of DTM and 3D view from stereo satellite images using photogrammetric software.
11. Georeferencing, creating and editing data in ArcGIS.
12. Creating a professional map in ArcGIS.

Course No.: **CED-228**

Course title: **ENVIRONMENTAL ENGINEERING LABORATORIES-I**

L	T	P
0	0	3

1. Introduction: quality assessment of water & safety in the laboratory
2. To find the turbidity and color of a given sample of water.
3. To determine the pH value of a given sample of water.
4. To determine the conductivity of a given sample of water.
5. To find out total solid, dissolved solids and suspended solids of the given sample.
6. To determine the carbonate, bicarbonate, and hydroxide alkalinity of a sample.
7. To find out the concentration of chlorides in the given sample of water.
8. To estimate the hardness of the given sample of water by standard EDTA method
9. To find the optimum amount of coagulant required to treat the turbid water by Jar Test.

10. To determine residual chlorine in a given sample of water.
11. To determine MPN of the given water sample.
12. To determine the metal & metalloids of the given sample.

Books

1. Methods Of Sampling And Test (Physical And Chemical) For Water And Wastewater (IS:3025)
2. Standard Methods for the Examination of Water and Wastewater: APHA, AWWA,
3. Chemistry for Environmental Engg and Science: C.N. Sawyer, P.L. McCarty & G.F. Parkin
4. Eaton, A. D. Standard Methods for the Examination of Water and Wastewater.

Course No.	Course title	L	T	P/D	Hours	Credit
CED-229	Transportation Engineering Lab	0	0	3	3	3

List of experiments:

1. To determine the impact value of aggregate sample
2. To determine the crushing value of aggregate sample
3. To determine the flakiness and elongation index of aggregate sample
4. To perform Los Angeles Abrasion test on aggregate sample
5. To determine the CBR value of a given soil sample
6. To carry out the grain size analysis of course and fine aggregates
7. To perform penetration test on bitumen sample

8. To determine the softening point of bitumen sample

9. To determine the specific gravity and water absorption of aggregate sample

10. To determine the ductility value of a bitumen sample.

11. To determine the bituminous content in a bituminous mix.

13. To conduct traffic volume studies on a road stretch

14. To conduct traffic speed studies on a road stretch

15. To conduct traffic volume studies on a intersection

Course No.	Course title	L	T	P/D	Hours	Credit
CED-220	Geotechnical Engineering Lab -I	0	0	3	3	2

Determination of water content of the given soil sample.

Determination of specific gravity of soil solids.

Sieve Analysis of the given soil sample

Hydrometer Analysis of the given soil sample

Determination of liquid and plastic limit of the given soil sample

Determination of field density by Sand replacement method

Determination of field density by Core cutter method

Proctor`s compaction test.

Determination of coefficient of permeability of the given soils by constant head method

Determination of coefficient of permeability of the given soils by falling head method

Unconfined compressive strength test.

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.