UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CET101	**Course Name:** Engineering Drawing and Sketching
Credit: 2	**L-T-P: 1-0-0**
Pre-requisite Course:	

Syllabus

Basic Concepts:- Importance of drawing, Layout and printing of drawing, Principles and methods of dimensioning, Scaling; Introduction to AutoCAD; Orthographic Projections:- Introduction to different types of projections and their uses, Orthographic projection, I angle and III angle projections; Projection of points lying in different quadrants; Projections of lines inclined to one or more planes, Traces, True length of line and its inclination with principal planes, Projection on auxiliary plane; Projection of planes other than reference planes, Planes perpendicular and inclined to principal planes, Traces, Cases of planes of different shapes and making different angles with one or both reference planes, True shape of the plane figure; Method of drawing projections:- Isometric and oblique projections

Course Outcomes

1. To be able to imagine simple geometric shapes like lines, planes, and regular solids, in different orientations
2. To produce drawings of simple geometric shapes in different orientations and projections
3. To be familiar with conventional practices of engineering drawing
4. To be able to use modern day tools for engineering drawing, e.g. AutoCAD

Text Books and References

1. ND Bhatt, Engineering Drawing, Charotar Publishing House
2. PS Gill, Engineering Drawing, SK Kataria and Sons
3. B Agarwal, CM Agarwal, Engineering Drawing, McGraw-Hill

UG/PG: UG	**Department:** Civil Engineering
Course Code:	**Course Name:** Engineering Drawing & Sketching Lab
Credit: 1	**L-T-P: 0-0-2**
Pre-requisite Course:	

LIST OF EXPERIMENTS

Lab #	Lab Session Topics
1	Introduction to AutoCAD & Projections of Points
2	Projections of Lines – I
3	Projections of Lines – II
4	Traces of Lines
5	Orthographic Projections
6	Auxiliary Projections
7	Projections of Planes – I
8	Projections of Planes – II
9	Projections of Solids
10	Isometric Projections – I
11	Isometric Projections – II
12	Oblique Projections

Course Outcomes

1. To be able to imagine simple geometric shapes like lines, planes, and regular solids, in different orientations
2. To produce drawings of simple geometric shapes in different orientations and projections
3. To be familiar with conventional practices of engineering drawing
4. To be able to use modern day tools for engineering drawing, e.g. AutoCAD

References

1. ND Bhatt, Engineering Drawing, Charotar Publishing House
2. PS Gill, Engineering Drawing, SK Kataria and Sons
3. B Agarwal, CM Agarwal, Engineering Drawing, McGraw-Hill

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CET102	**Course Name:** Environmental Science
Credit: 2	**L-T-P: 2-0-0**
Pre-requisite Course:	

Syllabus

Air Pollution: Types of air pollutants, classification, sources and impacts; Air Quality Index; NAAQS; Tropospheric ozone and photochemical smog; Monitoring of air pollutants; Dispersion of air pollutants; Air pollution disasters; Vehicular pollution and control; Introduction to indoor environmental quality. Noise Pollution: Sources, measurements, monitoring, impacts, standards, control measures of noise pollution. Water Pollution: Sources of water pollution; Classification of pollutants; Drinking water standards; Impacts of poor water quality; Water conservation; Restoration of water bodies. Soil and marine Pollution: Nature & composition of soil; fertilizers & nutrient enrichment, soil pollutants, nutrient loss & degradation of quality; case study: soil pollution by solid waste. Solid Waste Management: Composition of Municipal solid waste (MSW); Generation rate, properties, collection, storage, transport, treatment technologies (composting, incineration, gasification etc.) and disposal of MSW; e-waste; Plastic waste; Hazardous waste; MSW rules 2016; Zero-waste cities. Social issues and Environment: Sustainable Development Goals (SDGs) of the UN; Climate change, global warming, ozone layer depletion, acid rain and urban heat island (UHI). Introduction to ISO 14000; Green Building Concepts; Conservation of energy and Renewable energy technologies; Environmental Impact Assessment (EIA); Role of an individual in preventing pollution Case studies on various topics related to environmental degradation / restoration; environmental ethics and value education.

Course Outcomes

1. To be able to analyze and evaluate aspects of local and global environmental issues and apply understating to create informed opinions about how to interact with the environment on both a personal and a social level.
2. To consider environmental issues as among the highest educational priorities and as a key determinant to sustainable development.
3. To sensitize about existing environmental conditions, policies, programs and practices for implementation at different stages of life in an environmentally sound manner.
4. To create awareness about various techniques/practices to conserve and protect the environment.

Text Books and References

1. Bala Krishnamoorthy," Environmental Management" PHI Pvt. Ltd., 2005
2. R. Rowe and H. S. Peavy, “Environmental Engineering”, McGraw Hill Education, 2017.
3. R. Rajagopalan, “Environmental Studies”, Oxford university press, 2015.
4. Standards and Manuals of Central Pollution Control Board. WHO, USEPA reading materials.
5. Municipal Solid Waste Management Manual, Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, 2016

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CET103	**Course Name:** Surveying
Credit: 3	**L-T-P: 3-0-0**
Pre-requisite Course:	

Syllabus

Basic principles, Maps, their scales, referencing system and uses, plotting accuracy; Map coordinate system; projections and their types, Compass and other instruments; Measurement of distances and directions; Theodolite, Temporary and permanent adjustments of Theodolite, Traversing, Adjustment of survey data; Computation of coordinates, Levelling, Tacheometery, Trigonometrical levelling, Introduction to Total Station, Contouring, Curves; Theory of errors; Adjustment of surveying observations; Triangulation and Trilateration; Various triangulation schemes; Type of triangulations; Triangulation measurements; Adjustment of triangulation scheme; Uses of Total Station and other advanced surveying instruments.

Course Outcomes

1. Understand the basic skills of surveying work including distance and angle measurement
2. Be able to choose and justify a particular type of survey and equipment suitable for a particular engineering application.
3. Be able to use different type of surveying equipment like Compass, Theodolite, levels etc., for direction measurement, angle measurement, differential levelling and contouring
4. Be able to prepare a surveying map using collected surveying data.

Text Books and References

1. Surveying Instruments by James M. Anderson & Edward M. Mikhail
2. Surveying Vol. I & II by S.K. Duggal
3. Surveying, by A. M. Chandra, Narosa Pub. House., New Delhi
4. Punmia, B.C., Surveying Vol. II & III, 2005.
5. Kavanagh, B., Surveying Principles and Applications, Seventh Edition, Prentice Hall, 8th edition, 2008.
6. G.L. Hosmer, Geodesy, John Wiley & Sons, New York, 1946

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CEP104	**Course Name:** Surveying Lab
Credit: 1	**L-T-P: 0-0-2**
Pre-requisite Course:	

LIST OF EXPERIMENTS

Lab #	Name of the Experiment
1	Introduction demonstration of surveying equipment
2	Measurement of angles and bearings using Compass
3	Temporary adjustment of Theodolite
4	Measurement of horizontal and vertical angles using Theodolite
5	Compass Traversing
6	Theodolite traversing
7	Contouring exercise
8	To determine horizontal angles in a triangle by 2-4-6 method of repetition
9	To determine horizontal distance and vertical height using tangential method
10	To determine Tacheometric constants
11	To determine RL using Tacheometry
12	Contouring using radial method

Course Outcomes

1. Understand the working of different type of surveying equipment.
2. Be able to choose surveying equipment in field for measurement of distance, direction and elevation.
3. Be able to adjust the traverse and calculation of coordinates i.e., latitude and departures.
4. Be able to prepare maps using surveying data.

References

1. Surveying Instruments by James M. Anderson & Edward M. Mikhail
2. Surveying Vol. I & II by S.K. Duggal
3. Surveying, by A. M. Chandra, Narosa Pub. House., New Delhi
4. Punmia, B.C., Surveying Vol. II & III, 2005
5. Kavanagh, B., Surveying Principles and Applications, Seventh Edition, Prentice Hall, 8th edition, 2008.
6. G.L. Hosmer, Geodesy, John Wiley & Sons, New York, 1946.

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CET106	**Course Name:** Mechanics of Solids
Credit: 4	**L-T-P: 3-1-0**
Pre-requisite Course:	

Syllabus

Introduction: concept of stress and strain, shear stress and strain, stress-strain behavior of ductile and brittle material in uniaxial state of stress, relationships between elastic constants, type of beams, type of supports, type of loads; Axially loaded members: free body diagrams, determination of axial-force, deformation of axial members, stiffness and flexibility, statically indeterminate structures, thermal effects; Shear force and bending moment diagrams: determination of axial-force, shear force and bending moment at a section. axial force diagram, shear force diagram and bending moment diagrams for simple determinate beams and plane frames, differential relation between loads, shear force and bending moment; Stresses in beams: assumption and derivation of simple bending theory, relation between bending moment, bending stress and curvature beams. Shear stresses in simple beams, shear stress distribution; Complex stress system: state of stress in two dimensions, state of stress in three dimensions, principal stresses, Maximum shear stress, Use of Mohr's circle. strain gauge rosettes; Combined bending and direct stresses: eccentric load on column, kern of section, maximum and minimum stress; Buckling of column: slenderness ratio, Euler's buckling load for slender column, effective length for different end condition; Torsion: torsion of circular shafts, assumptions and derivation of relation between torsion moment, shear stress and angle of twist; Analysis of truss: method of joints and method of section for analysis of determinate truss.

Course Outcomes

1. To be able to estimate forces, stresses, and strains of different structural components subjected to axial and torsional loads
2. To be able to analyze the structures and to draw shear force and bending moment diagrams
3. To be able to determine bending and shear stress distribution in beams
4. To be able to determine buckling load of long columns

Text Books and References

1. Mechanics of Materials: Barry Goodno & James Gere, Cengage Learning, 2012
2. Mechanics of Materials: Beer F. P., Johnston E. R., DeWolf J. T., & Mazurek D. F., MeGraw-Hill Education Ltd., 2015
3. Mechanics of Materials: Hibbeler, R. C., Pearson Education, 2005
4. Statics and Mechanics of materials: Hibbeler, R. C., Pearson Education, 2016

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CET107	**Course Name:** Engineering Geology
Credit: 3	**L-T-P: 3-0-0**
Pre-requisite Course:	

Syllabus

Introduction: Geology and civil engineer; atmosphere & clouds; earth's internal structure. Structural Geology: Folds & faults; joints & unconformities; plate tectonics. Geomorphology: Geologic action & engineering consideration of weathering & erosion agents; winds & deserts; glaciers; streams & rivers; seas & oceans; groundwater. Mineralogy: Minerals – properties & crystallography; formation processes & classification. Petrology: Igneous; Sedimentary; Metamorphic. Engineering Applications: Engineering properties of rocks; dams; tunnels; powerhouses; bridges; land use planning; selection of waste disposal sites. Geological Disasters: Earthquakes; landslides. Energy Geology: Fossil fuels; renewable sources; emerging and future sources. Field Investigations: Geophysical; geological; remote sensing. Miscellaneous: ore deposits; natural wetlands; stratigraphy of India.

Course Outcomes

1. To be able the judge the suitability of geologic materials for use in Civil Engineering applications, based on their engineering properties and site conditions
2. To appreciate of the role and impact of geologic formations in the planning and design of various Civil Engineering projects
3. To be able to evaluate the suitability of a site for a Civil Engineering project.
4. Gain awareness and knowledge about modern technology and tools available for collecting geological information from the field

Text Books and References

1. Parbin Singh, "Engineering and General Geology", 8e, SK Kataria & Sons
2. Subinoy Gangopadhyay, 2013, "Engineering Geology", OUP
3. Carla Montgomery, "Environmental Geology", 10e, McGraw Hill (India)
4. Press, Seiver, Jordan, Grotzinger, "Understanding Earth", 5e, WH Freeman
5. Duggal, Pandey, Rawat, "Engineering Geology", McGraw Hill Education

UG/PG: UG	**Department:** Civil Engineering
Course Code: 22CEP108	**Course Name:** Geology Laboratory
Credit: 1	**L-T-P: 0-0-2**
Pre-requisite Course:	

LIST OF EXPERIMENTS

Lab #	Name of the Experiment
1	Space Exploration – Recent developments in India and the world
2	Geologic Maps – I: Subsurface Profiles for Horizontal Rock Beds
3	Geologic Maps – II: Subsurface Profiles for Uniformly Dipping Rock Beds (2-point and 3-point methods)
4	Geologic Maps – III: Uniformly and Non-Uniformly Dipping Rock Beds
5	Geologic Maps – IV: Complex Geologic Features
6	Dip and Strike Calculations
7	Stereonets – I: Plotting and reading planes and lineations on a stereonet
8	Stereonets – II: Applications in Structural Geology and Seismology
9	Mineralogy and crystallography
10	Rocks – Identification, Engineering properties
11	Dams – Engineering features
12	Tunnels – Engineering features

Course Outcomes

1. To be able to derive relevant information from geologic maps
2. To be able to draw, read, and derive relevant information from stereographic projections
3. To perform calculations of dip and strike of rock beds
4. To be able to identify common mineral and rock samples and specify their engineering properties

References

1. NW Gokhale, 1996, “Exercises on Geologic Maps and Dip and Strike Problems”, CBS Publishers
2. RJ Lisle & PR Leyshon, “Stereographic Projection Techniques for Geologists and Civil Engineers”, 2e, Cambridge University Press
3. Subinoy Gangopadhyay, 2013, “Engineering Geology”, Oxford University Press