Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Engineering Drawing Lab | 26CEP101 | 0 0 2 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To develop fundamental knowledge of engineering drawing principles, conventions, standards, and graphical communication.
To develop the ability to visualize and represent points, lines, planes, and three-dimensional objects using standard projection techniques.
To enable students to prepare and interpret orthographic, auxiliary, sectional, and isometric views of engineering components.
To develop basic proficiency in using AutoCAD for preparing accurate two-dimensional engineering drawings.

COURSE OUTCOMES:

CO1 : Be able to construct projections of points, lines, planes, and simple engineering solids.

CO2 : Be able to apply orthographic and auxiliary projection techniques for representing engineering objects.

CO3 : Be able to prepare and interpret sectional and development views of simple engineering components.

CO4 : Be able to construct and interpret isometric views from given orthographic projections.

CO5 : Be able to use basic AutoCAD commands and tools to create and modify two-dimensional engineering drawings.

SYLLABUS:

EXPERIMENT I (6 Hours): • Introduction to Engineering Drawing and its importance in engineering communication. • Introduction to AutoCAD software, interface, coordinate systems, and basic drawing commands. • Types of projections and standard projection systems. • Orthographic projection and principles of orthographic views.

EXPERIMENT II (6 Hours): • Projection of lines inclined to one or both reference planes. • Determination of true length and true inclinations of lines. • Traces of lines and their applications.

EXPERIMENT III (4 Hours): • Projection of planes and regular plane figures. • Planes inclined to one or both reference planes. • Concept of auxiliary planes. • Application of auxiliary planes in orthographic projections and determination of true shape.

EXPERIMENT IV (6 Hours): • Classification of solids. • Projection of prisms, pyramids, cylinders, and cones. • Projection of solids with axes perpendicular,

parallel, or inclined to reference planes.

EXPERIMENT V (4 Hours): • Introduction to axonometric projection. • Principles of isometric projection and isometric scale. • Isometric projection and isometric views of simple engineering objects. • Conversion of orthographic views into isometric views.

EVALUATION

Final grades will be weighted average of performance in

Continuous Assessment	60%
Midterm Exam	20%
Endterm Exam	20%

depending on the institute's academic policy.

Textbook(s):

1. 1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House. 2. K. Venugopal, Engineering Drawing and Graphics + AutoCAD, New Age International.

Reference book(s):

1. 1. P. S. Gill, A Textbook of Engineering Drawing, S. K. Kataria & Sons. 2. D. A. Jolhe, Engineering Drawing with an Introduction to AutoCAD, Tata McGraw-Hill. 3. Warren J. Luzadder and Jon M. Duff, Fundamentals of Engineering Drawing, Prentice Hall. 4. AutoCAD User Guide and official Autodesk documentation.

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Environmental Science | 26CET101 | 1 0 0 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To develop students' understanding of contemporary environmental challenges, environmental monitoring approaches and technologies, and engineering solutions for sustainable development, with emphasis on key environmental issues, monitoring systems, resource management, and sustainable engineering practices.

COURSE OUTCOMES:

CO1 : Explain emerging environmental challenges from an engineering perspective.

CO2 : Interpret environmental quality indicators using modern monitoring technologies, and environmental data.

CO3 : Evaluate engineering solutions for environmental protection, resource efficiency, circular economy, and sustainable development goals.

SYLLABUS:

UNIT I (3 Lectures): Current environmental issues, Selected National and International Environmental Case Studies

UNIT II (4 Lectures): Air pollution and Air Quality Index (AQI), Indoor Environmental Quality, Environmental Sensors, CPCB Continuous Monitoring Systems: Air, water and soil, Climate change and its impacts.

UNIT III (6 Lectures): Sustainable Development Goals (SDGs), Introduction to Environmental Impact Assessment (EIA), Sustainable Buildings, Renewable Energy Technologies, Electric Vehicles and Sustainable Transportation, Water Reuse and Rainwater Harvesting, Waste Management including Plastic Waste and E-waste Management, Circular Resource Recovery, Introduction to Net Zero and Carbon Neutrality, Indias LiFE Mission.

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	40%
Midterm Exam	0%
Endterm Exam	60%

depending on the institute's academic policy.

Textbook(s):

1. 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, 2024 6. Daniel Vallero, Environmental Engineering, CRC Press, Latest Edition. 7. G. Tyler Miller & Scott Spoolman, Environmental Science, Cengage Learning, Latest Edition. 8. IPCC Sixth Assessment Report (Selected Chapters). 9. National Clean Air Programme (NCAP), Ministry of Environment, Forest and Climate Change. 10. UNEP Global Environment Outlook Reports. 11. NITI Aayog Sustainable Development Goals India Index.

Reference book(s):

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Surveying-I | 26CET102 | 2 0 0 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To develop proficiency in applying plane surveying principles and measurement techniques using
classical instruments like the Compass, Theodolite, and Dumpy Level to solve civil engineering
problems, including traverse balancing, coordinate computations, and area calculations relevant to
topographical mapping and engineering surveys.

COURSE OUTCOMES:

CO1 : Understand the basic skills of surveying work, including distance and angle measurement

CO2 : Be able to choose and justify a particular type of survey and equipment suitable for a particular engineering application.

CO3 : Be able to use different types of surveying equipment like Compass, Theodolite, levels etc., for direction measurement, angle measurement, differential levelling and contouring

CO4 : Be able to prepare a surveying map using collected surveying data.

SYLLABUS:

UNIT I (2 Lectures): Basic principles, Different units and their conversion.

UNIT II (3 Lectures): Maps, their scales, referencing system and uses, plotting accuracy.

UNIT III (9 Lectures): Compass, Measurement of distances and directions, Theodolite, Temporary and permanent adjustments of Theodolite.

UNIT IV (8 Lectures): Traversing, Computation of coordinates, Adjustment of survey data, Area calculation,

UNIT V (6 Lectures): Levelling and contouring, Tacheometery, Trigonometrical levelling.

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	20%
Midterm Exam	30%
Endterm Exam	50%

depending on the institute's academic policy.

Textbook(s):

1. 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.

Reference book(s):

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Surveying-II | 26CET151 | 2 0 0 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To develop proficiency in applying geodetic principles and advanced mathematical adjustments
using aerial photography, field astronomy networks, and digital geoinformatics tools to solve
macro-scale civil engineering problems, including triangulation scheme adjustments,
photogrammetric parallax measurements, and celestial coordinate calculations relevant to high-
precision position determination and map preparation.

COURSE OUTCOMES:

CO1 : Be able to plan and execute triangulation surveying schemes and survey.

CO2 : Be able to make measurements on satellite images and aerial photographs using photogrammetric concepts.

CO3 : Be able to employ advance surveying equipment for preparation of maps determination of positions.

CO4 : Be able to measure time and other astronomical observations.

SYLLABUS:

UNIT I (7 Lectures): Theory of errors, Adjustment of surveying observations, Triangulation and Trilateration, Various triangulation schemes, Type of triangulations, Triangulation measurements, Adjustment of triangulation scheme, transmission and signals.

UNIT II (7 Lectures): Principles of photogrammetry, Aerial photography, Interpretation, Measurements from aerial photographs.

UNIT III (7 Lectures): Introduction to astronomy, Terms of reference planes and astronomical coordinates, Astronomical triangle / shortest distance determination, Time in astronomy.

UNIT IV (7 Lectures): Uses of Total Station and other Advance surveying instruments, Introduction of Remote sensing, Global positioning system (GPS), Geographical Information System (GIS).

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	20%
Midterm Exam	30%
Endterm Exam	50%

depending on the institute's academic policy.

Textbook(s):

1. 1. Wolf, P. R., A text book on Photogrammetry, 4th edition, 2012. 2. C.D. Burnside, Electromagnetic Distance Measurement, Crosby Lockwood and Son Ltd., London. 3. Punmia, B.C., Surveying Vol. II & III, 2005.

Reference book(s):

1. 1. Kavanagh, B., Surveying Principles and Applications, Seventh Edition, Prentice Hall, 8th edition, 2008. 2. G.L. Hosmer, Geodesy, John Wiley & Sons, New York, 1946.

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Surveying lab | 26CEP151 | 0 0 2 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To develop proficiency in applying plane surveying principles and field measurement techniques
using classical and advanced instruments like the Compass, Theodolite, Dumpy Level, Total
Station, and handheld GPS to solve civil engineering field mapping and land surveying problems,
including executing horizontal controls, performing traverse network positioning, conducting fly
levelling, and executing terrain contouring relevant to real-world data collection, coordinate
computation, and topographical map preparation.

COURSE OUTCOMES:

CO1 : Understand the working of different type of surveying equipment.

CO2 : Be able to choose surveying equipment in field for measurement of distance, direction and elevation.

CO3 : Be able to adjust the traverse and calculation of coordinates i.e., latitude and departures.

CO4 : Be able to prepare maps using surveying data.

SYLLABUS:

EXPERIMENT I (2 Hours): To measure horizontal angles and magnetic bearings of lines using a surveyors and prismatic compass.

EXPERIMENT II (2 Hours): To measure horizontal and vertical angles using theodolite.

EXPERIMENT III (2 Hours): To perform a closed/open compass traverse to establish horizontal control points in the field.

EXPERIMENT IV (2 Hours): To perform a theodolite traverse for network positioning and coordinate calculation.

EXPERIMENT V (2 Hours): To determine the horizontal distance and vertical height of an inaccessible object using the tangential tacheometry method.

EXPERIMENT VI (2 Hours): To determine tacheometric constants and compute horizontal and vertical distances using a stadia diaphragm.

EXPERIMENT VII (2 Hours): To determine the reduced level (RL) of distant ground stations using fly levelling.

EXPERIMENT VIII (2 Hours): To prepare a profile section for the given road section.

EXPERIMENT IX (2 Hours): To conduct contouring using the radial line method to map terrain elevations and variations.

EXPERIMENT X (2 Hours): To utilize a Total Station to measure sloped distances, horizontal angles, and vertical heights directly.

EXPERIMENT XI (2 Hours): To generate a comprehensive contour map of a designated field area using coordinate data from a Total Station.

EXPERIMENT XII (2 Hours): To perform real-time navigation and spatial feature collection using a handheld GPS in mapping and surveying configurations.

EVALUATION

Final grades will be weighted average of performance in

Continuous Assessment	60%
Midterm Exam	20%
Endterm Exam	20%

depending on the institute's academic policy.

Textbook(s):

Reference book(s):

1. 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. Global Positioning System: Signal, Measurement & Performance by Per Enge and Pratap Misra.

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Construction Materials | 26CET103 | 3 0 0 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To provide students with an understanding of the properties, classification, manufacturing, and applications of basic, conventional, and modern eco-friendly construction materials, such as stones, bricks, timber, cement, aggregates, concrete, steel, glass, and composites, for selection and usage in civil engineering projects.

COURSE OUTCOMES:

CO1 : Be able to understand application of basic building materials.

CO2 : Understand characteristics of conventional building materials like stone, brick, timber etc.

CO3 : Be able to demonstrate knowledge of construction materials and their usages in projects.

CO4 : Learn about Eco friendly construction materials and their characteristics.

SYLLABUS:

UNIT I (8 Lectures): Basic Building Materials – Engineering Properties of materials, Stones: classification and properties, Bricks: composition, manufacturing, classification and tests as per BIS, Fly ash bricks, Light weight bricks (AAC), Tiles: types and usages.

UNIT II (6 Lectures): Timber, Lime and Mortar – Timber: classification, seasoning, application, defects, Lime: classification and usages, Mortar: Cement and lime mortar, properties and applications.

UNIT III (7 Lectures): Cement and Aggregates – Cement: Chemical composition, manufacturing, hydration of cement, types of cement, Tests as per IS codes, Aggregates: Fine and coarse aggregates, properties and usages.

UNIT IV (11 Lectures): Cement and lime mortar, properties and applications, Concrete: Properties of fresh and hardened concrete, effect of w/c ratio, admixture, curing of concrete, various concrete mixes and their usages, Steel: types, properties, structural steel sections.

UNIT V (3 Lectures): Miscellaneous and Modern Materials – Types of glass and its usages, applications of Aluminum and PVC in buildings, Eco-friendly materials, Epoxies, Fiber based materials.

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	0%
Midterm Exam	0%
Endterm Exam	0%

depending on the institute's academic policy.

Textbook(s):

1. 1. Building Materials by Gambhir Jamwal , McGraw Hill 2. Engineering Materials, Rangwala SC 3. Concrete technology by A. M. Neville, Pearson education India 4. Sustainable Construction: Green Building Design and Delivery by C. Kibert, Wiley 5. National Building Code of India, BIS, Delhi.

Reference book(s):

Online/E-Resourses:

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Construction Materials Lab | 26CEP102 | 0 0 2 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To provide hands-on experience in testing physical and engineering properties, such as strength, consistency, setting time, specific gravity, and workability, of key construction materials including cement, aggregates, concrete, bricks, and steel in accordance with relevant standard codes.

COURSE OUTCOMES:

CO1 : Able to identify different type of construction materials.

CO2 : Able to measure different engineering properties of building materials like strength, water absorption, etc

CO3 : Able to analyze and choose different type of suitable material for construction projects.

SYLLABUS:

EXPERIMENT I (2 Hours): To determine consistency of cement and setting times.

EXPERIMENT II (2 Hours): To determine fineness and compressive strength of cement.

EXPERIMENT III (2 Hours): To determine Specific gravity, fineness modulus, and water absorption of fine/coarse aggregates.

EXPERIMENT IV (2 Hours): To determine silt content and bulking of sand.

EXPERIMENT V (2 Hours): To determine slump, compaction factor of concrete and to cast specimen.

EXPERIMENT VI (2 Hours): To determine compression strength of concrete.

EXPERIMENT VII (2 Hours): To cast and test compressive strength of bricks/pavers.

EXPERIMENT VIII (2 Hours): To determine water absorption, efflorescence of bricks.

EXPERIMENT IX (2 Hours): To develop stress-strain curve of Steel.

EXPERIMENT X (2 Hours): Demonstration of Sustainable/Eco-friendly/recycled material.

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	0%
Midterm Exam	0%
Endterm Exam	0%

depending on the institute's academic policy.

Textbook(s):

Reference book(s):

Online/E-Resourses:

1. Relevant IS codes, BIS, Delhi

Malaviya National Institute of Technology Jaipur
Department of Civil Engineering

Course Details
Mechanics of Solids | 26CET152 | 3 1 0 0

PREREQUISITE:
NIL

COURSE OBJECTIVE(S):
To equip the students with basic knowledge of mechanical properties of materials, and introduce application of loads and its effect in deformable bodies.

COURSE OUTCOMES:

CO1 : To be able to estimate forces, stresses, and strains of different structural components subjected to axial and torsional loads

CO2 : To be able to analyze the structures and to draw shear force and bending moment diagrams

CO3 : To be able to determine bending and shear stress distribution in beams

CO4 : To be able to transform the stresses on an inclined element to obtain principal stresses and maximum shear stresses

CO5 : To be able to determine buckling load of long columns

SYLLABUS:

UNIT I (6 Lectures): Introduction: concept of stress and strain, shear stress and strain, stress-strain behaviour of ductile and brittle material in uniaxial state of stress, relationships between elastic constants, type of beams, type of supports, type of loads, equillibrium equations.

UNIT II (6 Lectures): Axially loaded members: free body diagrams, determination of axial-force, deformation of axial members, stiffness and flexibility, statically indeterminate structures, thermal effects. Analysis of truss: method of joints and method of section for analysis of determinate truss.

UNIT III (6 Lectures): 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.

UNIT IV (6 Lectures): Stresses in beams: assumption and derivation of simple bending theory, relation between bending moment, bending stress, and curvature of beam. Shear stresses in simple beams, shear stress distribution.

UNIT V (6 Lectures): Combined bending and direct stresses: eccentric load on column, kern of section, maximum and minimum stress. 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.

UNIT VI (6 Lectures): 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.

EVALUATION
Final grades will be weighted average of performance in

Continuous Assessment	20%
Midterm Exam	30%
Endterm Exam	50%

depending on the institute's academic policy.

Textbook(s):

1. 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

Reference book(s):

Online/E-Resourses: