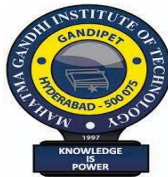**B.Tech.**
in
CIVIL ENGINEERING (CE)

Scheme of Instruction, Examination and Syllabi
of
III and IV Semesters

Academic Year: 2022-23

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution)
Affiliated to JNTUH; Accredited by NAAC with 'A' Grade; 6 U.G. Programs
Accredited by NBA
Kokapet (Village), Gandipet (Mandal), Hyderabad-500075, Telangana
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MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Civil Engineering
Scheme of Instruction and Examination

III Semester

S.No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	CE301PC	Surveying and Geomatics	3	0	0	30	70	3	3
2	CE302PC	Engineering Geology	2	0	0	30	70	3	2
3	CE303PC	Strength of Materials -I	3	1	0	30	70	3	4
4	CE304PC	Building Materials, Construction and Planning	3	0	0	30	70	3	3
5	CE305PC	Fluid Mechanics	3	1	0	30	70	3	4
6	MC301HS	Constitution of India	3	0	0	30	70	3	0
7	CE351PC	Surveying Lab	0	0	3	30	70	3	1.5
8	CE352PC	Engineering Geology Lab	0	0	2	30	70	3	1.0
9	CE353PC	Strength of Materials Lab	0	0	3	30	70	3	1.5
10	EN351HS	Finishing School- I	0	0	2	30	70	3	1
		Total Hours/Marks/Credits	**17**	**2**	**10**	**300**	**700**	**--**	**21**

L: Lecture   **T**: Tutorial   **D**: Drawing   **P**: Practical
CIE - Continuous Internal Evaluation   **SEE** - Semester End Examination

L	T	P	C
3	0	0	3

III Semester Syllabus
CE301PC: Surveying and Geomatics

Course Objectives

- The importance and fundamentals of surveying for measuring field parameters using traditional and modern instruments involved in civil construction.
- To know the basics of levelling and the odolite survey in elevation and angular measurements.
- Develop skills to conduct traverse survey & to find the area.
- To provide knowledge of Total Station & advanced surveying instruments.
- The programming tools of perspective geometry for preparing 3D geographical maps using aerial and terrestrial photogrammetric surveying.

Course Outcomes

- Apply the knowledge to calculate angles, distances and levels.
- Identify data collection methods and prepare field notes.
- Understand the working principles of survey instruments, measurement errors and corrective measures.
- Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.
- Illustrate the various types of Photogrammetric techniques and measurements.

Unit – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape-corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

Unit – II

Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes - Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

Unit – III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

Unit – IV

Curves: Types of curves and their necessity, elements of simple, compound and reverse, setting out simple curves.

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station-advantages and applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and applications.

Unit – V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Suggested Readings:

1. Chandra .A. M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi.
2. Duggal S K, "Surveying (Volume–1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Reference Books:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Subramanian.R, Surveying and leveling, Oxford university press, New Delhi
3. Arora K .R, "Surveying (Volume 1, 2 & 3), Standard Book House, Delhi.
4. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain Surveying (Volume 1, 2 & 3), Laxmi Publications (P) ltd., New Delhi.

L	T	P	C
2	0	0	2

III Semester Syllabus
CE302PC: Engineering Geology

Course Objectives

- To give the basics knowledge of Geology that is required for constructing various Civil Engineering structures, basic Geology, Geological Hazardous and Environmental Geology
- To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects

Course Outcomes

- Understand weathering process and mass movement
- Distinguish geological formations
- Identify geological structures and processes for rock mass quality
- Identify subsurface information and groundwater potential sites through geophysical investigations
- Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels

Unit – I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite".

Unit – II

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

Unit – III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their

important types and case studies. Their importance In-situ and drift soils, common types of soils, their origin and occurrence in India, Stabilization of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

Unit – IV
Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and landslides. Importance of Geophysical Studies: Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

Unit – V
Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

Suggested Readings:
1. Chennakesavulu.N, Engineering Geology, McMillan, India Ltd. 2005.
2. Venkat Reddy. D., Engineering Geology, Vikas Publishers 2015.
3. Duggal S K, Pandey H K, Engineering Geology, Mc Graw Hill Education Pvt. Ltd 2014.

Reference Books:
1. Bell F.G., Fundamental of Engineering, B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution.
3. Gangopadhyay Subinoy, Engineering Geology by, Oxford university press.
4. Varghese PH. P.C., Engineering Geology for Civil Engineers.
5. Gokhale. K.V.G.K, Principles of Engineering Geology, B.S publications.

L	T	P	C
3	1	0	4

III Semester Syllabus
CE303PC: Strength of Materials – I

Course Objectives

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
- To calculate the elastic deformation occurring in simple members for different types of loading.
- To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
- To know different failure theories adopted in designing of structural members

Course Outcomes

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
- Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
- Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress;
- Frame an idea to design a system, component, or process

Unit-I: Simple Stresses and Strains

Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses.
Strain Energy – Resilience – Gradual, sudden, and impact loadings – simple applications.

Unit-II: Shear Force and Bending Moment

Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

Unit-III: Flexural and Shear Stresses

Flexural Stresses:
Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.
Shear Stresses:
Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle and channel sections.

Unit-IV: Deflection of Beams

Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple -Mohr's theorems – Moment area method – Application to simple cases. Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.

Unit-V: Thin and Thick Cylinders

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.
Thick Cylinders: Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae, distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

Suggested Readings:

1. Rajput R. K, Strength of Materials, S. Chand & Company Ltd., 4th Edition, 2007.
2. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, Mechanics of Materials, Lakshmi Publications, 2001.

Reference Books:

1. Hibbeler R.C., Mechanics of Material, Prentice Hall publications, 10th edition, 2016.
2. Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall publications, 2nd Edition 1998.
3. Bansal R.K., Strength of Materials, Lakshmi Publications House Pvt. Ltd.2007.
4. Basavarajaiah B.S. and Mahadevappa P.,Strength of Materials, Orient Blackswan, 3rd Edition, 2010.
5. Subramanian R., Strength of Materials, Oxford University Press, 3rd edition, 2016.

L	T	P	C
3	0	0	3

III Semester Syllabus
CE304PC: Building Materials, Construction and Planning

Course Objectives

- List the construction material.
- Explain different construction techniques
- Understand the building bye-laws
- Highlight the smart building materials

Course Outcomes

- Define the Basic terminology that is used in the industry
- Categorize different building materials, properties and their uses
- Understand the Prevention of damage measures and good workmanship
- Explain different building services
- Understand the various design principles

Unit-I

Stones and Bricks, Tiles: Building stones – classifications and quarrying – properties – structural requirements – dressing.Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.

Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminium, Plastics.

Unit-II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration -field & lab tests. Admixtures – mineral & chemical admixtures – uses.

Unit-III

Building Components: Lintels, Arches, walls, stair cases – types of floors, types of roofs –flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types.

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations:
Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics –characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire resistant materials and constructions

Unit-IV

Mortars, Masonry and Finishing's Mortars: Lime and Cement Mortars Brick masonry – types –bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.

Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

Form work: Types; Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

Unit-V

Building Planning: Principles of Building Planning, Classification of buildings and Building by laws.

Suggested Readings:

1. Arora & Bindra , Building Materials and Construction, Dhanpat Rai Publications.
2. Sahu G C, Building Materials and Construction, McGraw hill Pvt Ltd 2015.
3. Punmia B. C., Ashok Kumar Jain and Arun Kumar Jain, Building Construction, Laxmi Publications (P) ltd., New Delhi.

Reference Books:

1. Duggal, Building Materials, New Age International.
2. Varghese P. C., Building Materials, PHI.
3. Varghese PC, Building Construction, PHI.
4. Chubby R., Construction Technology Vol - I & II, Longman UK.

L	T	P	C
3	1	0	4

III Semester Syllabus
CE305PC: Fluid Mechanics

Course Objectives

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- Learn about the application of mass, energy and momentum conservation laws for fluid flows
- Train and analyze engineering problems involving fluids with a mechanistic perspective.
- To obtain the velocity and pressure variations in various types of simple flows
- To prepare a student to build a good fundamental background useful in the application of intensive courses covering hydraulics, hydraulic machinery and hydrology.

Course Outcomes

- Apply and understand the broad principles of fluid statics.
- Understand classifications of fluid flow and apply the broad principles of kinematics and dynamics
- Able to apply the continuity, momentum and energy principles.
- Able to understand the various minor and major losses in pipe flow to analyze and design simple pipe systems.
- Able to understand the analysis of real fluid for laminar and turbulent flows

Unit-I: Properties of Fluid, Pressure measurement and Statics

Properties of Fluid: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.
Fluid Pressure: Pressure at a point, Hydrostatic law, Pascal's law, pressure variation with altitude. Piezometer, U-Tube Manometer, single Column Manometer, differential Manometers, micro manometers, pressure gauges.
Fluid Statics: Hydrostatic pressure force for horizontal, vertical, inclined and curved surfaces.

Unit-II: Fluid Kinematics & Dynamics

Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow, compressible and incompressible flow; ideal and real fluid flow; one, two, and three-dimensional flows.
Stream line, path line, streak line and stream tube, one, two and three-dimensional continuity equations in Cartesian coordinates, stream function and velocity potential function. flow net and its applications & uses, acceleration and its types.

Fluid Dynamics: Surface and Body forces -Euler's and Bernoulli's equation to real fluid flows. Navier-Stokes equation of motion, momentum principle and momentum equation, Forces exerted by fluid flow on pipe bend. Energy correction factor and Momentum correction factor and their applications. Practical applications of Bernoulli's equation.

Unit-III: Measurement of fluid flow

Discharge through tanks and pipes: Orifice and various orifices, Venturimeter and orifice meter.
Discharge through Channels and streams: Notches and weirs and classification, Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach concepts and flow through broad crested weir.
Velocity measurement: Pitot tube and Pradtl Pitot Static tube

Unit-IV: Analysis of flow through Pipes

Flow through Pipes: Reynold's number and Reynold's experiment, Characteristics of laminar and turbulent flows, Loss of head in laminar flow through circular pipes and parallel plates. Loss of head through pipes in Turbulent Flow, various minor losses, Pipes in series, equivalent pipes, pipes in parallel, total energy line, hydraulic grade line, power transmission through pipes. Water hammer in pipes and its control measures.

Unit-V: Analysis of real fluid

Boundary Layer: Definition and concepts of boundary layer and its characteristics. Thickness of boundary-layer, displacement, momentum & energy thickness, Momentum integral equation of boundary layer, analysis of laminar and Turbulent boundary layers on a flat plate, laminar sub-layer, boundary-layer on rough surfaces. Separation and methods to control of boundary layer separation. Definition and expressions for drag and lift and types of drag, drag on sphere and cylinder, lift on cylinder and Magnus effect.

Suggested Readings:
1. Modi .P.N. and. Seth. S.M, Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, 2009.
2. Rajput R.K., Fluid Mechanics and Hydraulic machines, S.Chand & Company, 2010.
3. Jain. A. K., Fluid Mechanics including Hydraulic Machines, Khanna Publishers (rs), 2004.
Reference Books:
1. Bansal. R. K, Fluid Mechanics and Hydraulic Machines, Laxmi Publication Pvt. Ltd, 2010.
2. Subramanya. K, Fluid Mechanics and Hydraulic Machines problems and solutions, McGraw Hill Education Pvt. Ltd, 2014.

L	T	P	C
3	0	0	0

III Semester Syllabus
MC301HS: Constitution of India
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

- Students will get to know about the history of Indian Constitution
- Students will get to know about President election and his Powers
- Students will get to know about Council of Ministers and their election Procedure and their Powers and Responsibilities
- Students will get know about Judicial System in India
- Students will get know about Panchayat-raj System in India

Course Outcomes

- This enables the Students to know about the Rights of Citizen.
- This enables the Students to know about Fundamental Duties of People.
- This enables the Students to Know the Directive principles of State Policy.
- This enables the Students to know about Functioning of Parliament and its Powers.
- This enables the Students to know about various Constitutional bodies in India.

Course Content

1. Meaning of the constitution, law and constitutionalism
2. Historical perspective of the Constitution of India
   - Drafting Committee
3. Salient features and characteristics of the Constitution of India
   - Preamble
   - Salient Features
   - Major Sources of Indian Constitution
4. Scheme of the fundamental rights
   - Article 13 to 32
   - Scheme of the Fundamental Right to Equality
   - Scheme of the Fundamental Right to certain Freedom
   - Scope of the Right to Life and Personal Liberty
5. The scheme of the Fundamental Duties and its legal status
   - List of Fundamental Duties
   - Justifiability of Fundamental Duties
6. The Directive Principles of State Policy – Its importance and implementation
   - Categories - Gandhian, Socialist and Liberal Principles
   - Significance of Directive Principles of State Policy
   - Relation between Fundamental rights and Directive Principles of State Policy
7. Federal structure and distribution of legislative and financial powers between the Union and the States
   - Union List
   - State List

- Concurrent List
- Residuary Powers
8. Parliamentary Form of Government in India.
9. The constitutional powers and status of the President of India vs the constitutional powers and status of the Council of ministers headed by the Prime Minister
10. Amendment of the Constitution and its Procedure
    - Procedure of Amendment to Constitution of India
    - Important Amendments
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
    - Urban local Self Government
    - Rural local Self Government
13. Important Constitutional Bodies
    - Election Commission of India
    - Finance Commission of India
    - Union Public Service Commission
    - C-AG

Suggested Readings:
1. Subhash Kashyap, Our Constitution, National Book Trust, 5th Edition, Reprint-2017.
2. V. N Shukla, The Constitution of India, Law literature Publication, 11th Edition, 2020.

Reference Books:
1. M P Jain, Indian Constitutional Law, Lexis Nexis, 8th Edition, 2018.
2. Samaraditya Pal, Indian Constitution-Origin& Evolution, Lexis Nexis, 1st Edition, 2019.

L	T	P	C
0	0	3	1.5

III Semester Syllabus
CE351PC: Surveying Lab

Course Objectives

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.'s areas and volumes
- To set out Curves
- To stake outpoints
- To traverse the area
- To draw Plans and Maps

Course Outcomes

At the end of the course, the student will be able to:
- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, using different measuring equipment at field level
- Write a technical laboratory report
- Drawing plans and contour maps

List of Experiments:

1. Surveying of an area by chain and compass survey (closed traverse) & plotting
2. Determination of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey
4. Levelling – Longitudinal and cross-section leveling and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using total station
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station
12. Setting out Curve using total station.

L	T	P	C
0	0	2	1

III Semester Syllabus
CE352PC: Engineering Geology Lab

Course Objectives

- To identify physical properties of minerals and rocks.
- Learn to draw geological maps, showing faults, uniformities etc.

Course Outcomes

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.

List of Experiments:

1. Study of physical properties of minerals.
2. **Identification of minerals**: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
3. **Identification of rocks (Igneous Petrology):** Acidic Igneous rock: Granite and its varieties, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties.
4. **Identification of rocks (Sedimentary Petrology**): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
5. **Identification of rocks (Metamorphic Petrology**): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
6. Study of topographical features from Geological maps. Identification of symbols in maps.
7. Simple structural Geology Problems (Folds, Faults & Unconformities)
8. Electrical resistivity meter.

Lab Examination Pattern:

1. Description and identification of SIX minerals.
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks).
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

L	T	P	C
0	0	3	1.5

III Semester Syllabus
CE353PC: Strength of Materials Lab

Course Objectives

- Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments, equipment, devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

Course Outcomes

- Configure & Operate a data acquisition system using various testing machines of solid materials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements.
- Write a technical laboratory report

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

L	T	P	C
0	0	2	1

III Semester Syllabus
EN351HS: Finishing School-I
(Common to all Branches)

Course Overview

In view of the growing importance of English as a tool for global Communication and the consequent emphasis on training students to acquire language skills, this syllabus has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

Course Objectives

The main objective of this finishing school curriculum is to provide content for developing the LSRW skills of language learning and to facilitate proficiency in both receptive and productive skills, among students.

Methodology:

- Every Session will have activities on all the four skills-Listening, Speaking, Reading and Writing.
- To personalize the learning a variety of case studies and structured problem solving activities will be given to small groups and the teachers will facilitate peer reviews.
- Continuous grading, peer review and positive reinforcement will be emphasized
- Vocabulary exercises will also be a part of every session
- All sessions are designed to be student-centric and interactive.

Unit-I: Fundamentals of Communication

Unit Overview:

This is an introductory module that covers the fundamentals of communication. This module is intended to enable the students to communicate using greetings and small sentences/queries.

Learning Outcomes:

The students should be able to:
- Respond to questions
- Engage in informal conversations.
- Speak appropriately in formal situations
- Write formal and informal emails/letters

Competencies:

- Greeting appropriately
- Introducing themselves, a friend
- Situational Dialogue writing
- Responding to simple statements and questions both verbally and in writing
- Writing an email with appropriate salutation, subject lines, introduction and purpose of mail.
- Using appropriate vocabulary for both formal and informal situations.

- JAM sessions.

Sessions:
1. Introduction to Formal and Informal Conversations (Listening Activity)
2. Informal Conversations
3. Informal Conversations - Writing
4. Formal Conversations
5. Formal Conversations – Writing
6. Grammar-Prepositions
7. Adjectives and Degrees of Comparison
8. Word formation: Prefixes and Suffixes

Unit–II: Rational Recap

Unit Overview:

The module enables the participants to organize their communication, structure their speaking and writing, explain their thoughts/ideas, and summarize the given information.

Learning Outcomes:

The students should be able to:
- Classify content and describe in a coherent form
- Recognize and list the key points in a topic/message/article.
- Compare and contrast using appropriate structure
- Explain cause and effect
- Use appropriate transitions in their presentations and written assignments

Competencies:
- Organizing the communication based on the context and audience
- Structuring the content based on the type of information.
- Explaining a technical/general topic in detail.
- Writing a detailed explanation/process
- Recapitulating

Sessions:
1. Introduction to Mind maps
2. Classification
3. Sequencing
4. Description and Enumeration

Unit-III: Narrations and Dialogues

Unit Overview:

The Module is intended to develop the desired level of language competence that enables them to narrate and participate in casual dialogues.

Learning Outcomes:

The students should be able to
- Narrate a message/story/incident, both verbally and in writing.
- Describe an event/a session/ a movie/ an object / image
- Understand Vocabulary in context

Competencies:
- Framing proper phrases and sentences to describe in context

- Reading Stories and articles and summarizing.
- Speaking fluently with clarity
- Listening for main ideas and reformulating information in his/her own words
- Drawing and write appropriate conclusions, post reading a passage.
- Speaking Reading and Writing descriptive sentences and paragraphs
- Using appropriate tenses, adjectives and adverbs in conversations and written tasks

Sessions:

Grammar: Verb, Tenses

1. Recalling and Paraphrasing
2. Describing Events
3. Describing Objects/ Places
4. Story Telling
5. Describing Hypothetical events

Unit-IV: Technical Expositions and Discussions

Unit Overview:

The module enables the students to build strategies for effective interaction and help them in developing decisive awareness and personality, maintaining emotional balance.

Learning Outcomes:

The students should be able to:

- Participate in Professional discussions by providing factual information, possible solutions, and examples.

Competencies:

- Comprehending key points of a topic and identifying main points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes and effects

Sessions:

 Based on Case Studies

1. Compare and Contrast
2. Cause and Effect
3. Problem and Solution

Unit-V: Drawing Conclusions

Unit Overview:

This module is intended to provide necessary inputs that enable the students to draw conclusions out of a discussion and provide reports.

Learning Outcomes:

Students should be able to:

- Provide logical conclusions to the topics under discussion.

- Prepare, present, and analyze reports.

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.
- Analyzing the points discussed.

- Connecting all points without gaps.
- Connectives
- Communicating the decisions

Sessions:
1. Report Writing
2. Reasoning
3. Analyzing
4. Generalization and Prediction
5. Précis writing

Reference Books:
1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007.
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. Mc Murrey & amp; Joanne Buckley. 2012 Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.
10. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition.

IV Semester

S.No.	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	**T**	**P/D**	**CIE**	**SEE**		
1	MA408BS	Probability and Statistics	3	1	0	30	70	3	4
2	EE431ES	Basic Electrical and Electronics Engineering	3	0	0	30	70	3	3
3	ME431ES	Basic Mechanical Engineering for Civil Engineers	2	0	0	30	70	3	2
4	CE401PC	Strength of Materials -II	3	0	0	30	70	3	3
5	CE402PC	Hydraulics and Hydraulic Machinery	2	0	0	30	70	3	2
6	CE403PC	Structural Analysis -I	3	0	0	30	70	3	3
7	EE461ES	Basic Electrical and Electronics Engineering Lab	0	0	2	30	70	3	1
8	CE451PC	Computer Aided Civil Engineering Drawing	0	0	2	30	70	3	1
9	CE452PC	Hydraulics and Hydraulic Machinery Lab	0	0	2	30	70	3	1
10	EN452HS	Finishing School- II	0	0	2	30	70	3	1
11	MC451HS	Gender Sensitization Lab	0	0	2	30	70	3	0
Total Hours/Marks/Credits			**16**	**1**	**10**	**330**	**770**	**--**	**21**

L: Lecture   **T**: Tutorial   **D**: Drawing   **P**: Practical
CIE - Continuous Internal Evaluation   **SEE** - Semester End Examination

L	T	P	C
3	1	0	4

IV Semester Syllabus
MA408BS: Probability and Statistics

Course Objectives

To learn
- The ideas of probability and random variables
- Discrete Probability Distributions and their properties.
- Continuous Probability Distributions and their properties
- The sampling theory, testing of hypothesis and making inferences.
- The basic ideas of statistics including measures of central tendency, Curve fitting, correlation and regression.

Course Outcomes

After learning the contents of this paper the student must be able
- Formulate and solve problems involving random variables
- Understanding the theoretical distributions
- Apply statistical methods for analyzing experimental data.

Unit-I: Basic Probability

Probability spaces, conditional probability, independent events, and Bayes' theorem.
Random variables: Discrete and continuous random variables, Expectation of Random Variables, Moments, Variance of random variables, Chebyshev's Inequality

Unit-II: Discrete Probability distributions

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution

Unit-III: Continuous Random variable & Distributions

Continuous random variables and their properties, distribution functions, Normal, exponential and gamma distributions, evaluation of statistical parameters for these distributions

Unit-IV: Testing of Hypothesis

Theory of Estimation, Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means; Test for single mean, difference of means for small samples, test for ratio of variances for small samples.

Unit-V: Applied Statistics

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves; Correlation and regression – Rank correlation.

Suggested Readings:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9th Edition, Pearson Publications.
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor.

Reference Books:

1. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

L	T	P	C
3	0	0	3

IV Semester Syllabus
EE431ES: Basic Electrical and Electronics Engineering
(Common to CE, ME & MME)

Prerequisites: Nil

Course Objectives

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

Unit–I: DC Circuits & AC Circuits

DC Circuits: The SI System of Units, Electrical circuit elements (Resistor, Inductor & Capacitor), V-I Characteristics of circuit elements, Colour Coding of Resistors, Ohm's Law, voltage and current sources (Independent and Dependent), Power, Energy, Kirchhoff's Voltage Law & Kirchhoff's Current Law, Voltage Division Rule, Current Division Rule, Analysis of Series - Parallel Circuits with DC excitation - Mesh (Loop) Analysis, Nodal Analysis, Delta-Star & Star Delta Conversion

A.C. Circuits: Representation of sinusoidal waveforms, peak value and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits with phasor diagrams, Three-phase balanced circuits, voltage and current relations in star and delta connections

Unit–II: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Residual Current Circuit Breaker (RCCB), Residual Current Circuit Breaker (RCCB), Residual Current Circuit Breaker with Over current Protection (RCBO), Types of Wires and Cables: PVC, XLPE, Rubber, cable sizing. Earthing, Necessity of Earthing, Types of earthing, Batteries, Working Principle, Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption.

Unit-III: Electrical Machines

Working principle of Single-phase transformer, equivalent circuit, phasor diagram of transformer at no load and load, losses in transformers, open circuit and short circuit test on transformer, efficiency & regulation calculation. Three-phase transformer connections. Construction and working principle of DC generators, Types of Dc generators: Separately excited, Self Excited (Shunt, Series, Compound), EMF equation. Working principle of DC motors, Types of Dc motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Slip, Torque equations, Torque Slip Characteristics, and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

Unit-IV: Diodes, Rectifiers and Filters

Diodes : Principle of Operation, Forward bias, Reverse bias, Diode equation, Static Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Operation of Zener diode, Characteristics of zener diode and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor, Peak Inverse Voltage, Efficiency – Full Wave Rectifier, Bridge Rectifier, Mid Point Rectifier, Ripple Factor, Peak Inverse Voltage, Efficiency, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

Unit-V: Transistors

Bipolar Junction Transistor (BJT) - Construction, Principle of Operation, NPN and PNP Transistor, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Input and Output Characteristics, Comparison of CE, CB and CC configurations. Transistor Application: Transistor as Amplifier & Transistor as Switch.

Field Effect Transistor (FET): Construction, Principle of Operation of JFET, Output Characteristics, Transfer Characteristics, JFET applications: JFET as Amplifier & JFET as a Switch, Comparison of Bipolar Junction Transistor and Field Effect Transistor, Biasing of FET.

Suggested Readings:
1. M S Sukija, TK Nagasarkar Basic Electrical and Electronics Engineering – Oxford University.
2. D P Kothari, I J Nagrath, Basic Electrical and Electronics Engineering - McGraw Hill Education.

Reference Books:
1. R. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, PEI/PHI, 9th Ed, 2006.
2. J. Millman and C. C. Halkias, Satyabrata Jit, Millman's Electronic Devices and Circuits, TMH, 2/e, 1998.
3. William Hayt and Jack E. Kemmerly, Engineering circuit analysis, McGraw Hill Company, 6th edition.

4. Raymond A. De Carlo and Pen-Min-Lin, Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition, Oxford University Press, 2004.

5. N. C. Jagan & C. Lakshminarayana, Network Theory, B.S. Publications.

6. Sudhakar, Shyam Mohan Palli, Network Theory, TMH.

7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

L	T	P	C
2	0	0	2

IV Semester Syllabus
ME431ES: Basic Mechanical Engineering for Civil Engineers

Course Objectives

To familiarize civil engineering students with the
* Basic machine elements,
* Power transmission elements, material handling equipment,
* Basics of Power Generating and cooling systems and mechanisms of heat transfer
* Basic manufacturing processes like forming, casting and welding
* Various Machine tools and operations performed on them

Course Outcomes

* To understand the mechanical equipment for the usage at civil engineering systems,
* To familiarize with the various ways of power transmission in machines and material handling equipments
* To understand the basic principles and working of power generation, modes of heat transfer and refrigeration systems
* To understand the basic manufacturing methods such as forming, casting and welding
* To know about machine tools and machining techniques

Unit - I

Machine Elements: Cams: Types of cams and followers
Introduction to engineering materials-Metals, ceramics, composites-Heat treatment of metals
Riveted joints- methods of failure of riveted joints-strength equations-efficiency of riveted joints - eccentrically loaded riveted joints.

Unit - II

Power Transmission Elements: Gears terminology of spur, helical and bevel gears, gear trains. Belt drives (types). Chain drives.
Material Handling Equipment: Introduction to Belt conveyors, cranes, industrial trucks, bull dozers.

Unit - III

Energy: Power Generation: External and internal combustion engines (layouts, element/component description, advantages, disadvantages, applications).
Refrigeration: Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system, details and principle of operation –calculation of COP
Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

Unit - IV

Manufacturing Processes: Sheet Metal Work: Introduction – Equipments – Tools and accessories – Various processes (applications, advantages / disadvantages).
Welding: Types – Equipments –Techniques employed –welding positions-defects-applications, advantages/ disadvantages – Gas cutting – Brazing and soldering.
Casting: Types, equipments, applications.

Unit - V:

Machine Tools: Introduction to lathe, drilling machine, milling machine, grinding machine-Operations performed.

Suggested Readings:

1. Kumar, T., Leenus Jesu Martin and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai, 2007.

Reference Books:

1. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., Basic Mechanical Engineering, SciTech Publications, Chennai, 2000.
2. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., Elements of Workshop Technology Vols. I & II, Indian Book Distributing Company Calcutta, 2007.
3. Nag, P.K., Power Plant Engineering, Tata McGraw-Hill, New Delhi, 2008.
4. Rattan, S.S., Theory of Machines, Tata McGraw-Hill, New Delhi, 2010**.**

L	T	P	C
3	0	0	3

IV Semester Syllabus
CE401PC: Strength of Materials – II

Course Objectives

- To understand the nature of stresses developed in simple geometries shafts, springs, columns & cylindrical and spherical shells for various types of simple loads
- To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry.

Course Outcomes

- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression;
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
- Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses;
- Understand and evaluate the shear center and unsymmetrical bending.
- Frame an idea to design a system, component, or process

Unit-I: Torsion & Springs

Torsion of Circular Shafts: Theory of pure torsion – Derivation of Torsion equation - Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure.

Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

Unit-II: Direct and Bending Stresses

Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

Unit-III: Columns and Struts

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

Beam Columns: Laterally loaded struts – subjected to uniformly distributed and concentrated loads

Unit-IV: Principal Stresses & Theory of Failures

Introduction to principal stresses– Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.
Introduction to theory of failures – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

Unit-V: Unsymmetrical Bending

Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis. Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections.

Suggested Readings:

1. Rajput R.K, Strength of Materials, S. Chand & Company Ltd. 4th Edition, 2007.
2. Punmia B. C., Ashok Kumar Jain and Arun Kumar Jain, Mechanics of Materials, Laxmi Publications, 2005.

Reference Books:

1. Hibbeler R.C., Mechanics of Materials, Pearson Education. 9th Edition, 2014.
2. Popov E.P, Engineering Mechanics of Solids, Prentice-Hall Ltd, 2nd Edition, 1998.
3. Bansal R. K., Strength of Materials, Lakshmi Publications House Pvt. Ltd. 2007.
4. Gambhir M. L., Fundamentals of Solid Mechanics, PHI Learning Pvt. Ltd, 1st Edition, 2009.
5. Subramanian R., Strength of Materials Oxford University Press, 3rd Edition, 2016.

L	T	P	C
2	0	0	2

IV Semester Syllabus
CE402PC: Hydraulics and Hydraulic Machinery

Course Objectives

- Define the fundamental principles of water conveyance in open channels.
- Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
- Study the characteristics of hydroelectric power plant and its components.
- Study of models and Analyze the impact of jet on vanes and their applications
- Analyze and design of hydraulic machinery and its modeling

Course Outcomes

- Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery
- Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
- Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems and also to analyze the impact of jet on various vanes.
- Acquire knowledge on different types of turbines and its principles that will be utilized for practical usages.
- Acquire knowledge on Centrifugal pumps and its principles that will be utilized for practical usages and learn the concepts of hydropower development using turbines.

Unit-I: Open Channel Flow- Uniform flow

Open Channel Flow-I: Introduction to open channel flow, comparison between open channel flow and pipe flow, classification of open channels and open channel flows, velocity and pressure distribution. Uniform flow, characteristics of uniform flow, Chezy's, Manning's, Bazin's and Stickler's formulae for uniform flow, factors affecting Manning's roughness coefficient, analysis of most economical sections.
Computation of Uniform flow: Normal depth, Froude's Number, and types of flow, critical, sub critical and super critical flows, concept of specific energy, critical depth, computation of critical depth, Applications of specific energy to channel transitions.

Unit-II: Open Channel Flow- Non Uniform flow

Gradually Varied Flow (G.V.F): Dynamic equation for G.V.F under various considerations, classification of channel bottom slopes, Classification and characteristics of Surface profiles, various methods of integration of varied flow equation, computation of water surface profiles using Direct step method.
Rapidly varied flow (R.V.F): Hydraulic Jump, elements and characteristics of hydraulic jump in rectangular channel, location of hydraulic jump, types and applications, Energy dissipation due to hydraulic jump, surge definition and classification.

Unit-III: Dimensional analysis, similitude and basics of machinery

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity – Rayleigh's method and Buckingham-∏-methods, dimensionless numbers. similitude, model studies and model laws, application of dimensional analysis and model studies to fluid flow problems. Types of models, undistorted models and distorted models.
Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency, angular momentum principle and its applications.

Unit-IV: Analysis of Hydraulic Turbines

Hydraulic Turbines-I: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines under various considerations-Pelton wheel, Francis turbine, Kaplan turbine – working, working proportions, velocity triangle diagrams, work done and efficiency, hydraulic design. Draft tube and its types, functions and efficiency.
Hydraulic Turbines-II: Unit quantities such as Unit speed, Unit discharge and Unit power, Specific speed, Selection of turbines, Performance characteristics, geometric similarity, cavitation, governing of turbines, surge tanks and its types.

Unit-V: Analysis of Centrifugal Pumps and Hydro power Engineering

Centrifugal Pumps: Centrifugal pump definition and classification, components, work done, manometric head, various losses and efficiencies, minimum starting speed, specific speed. Multistage pumps-pumps in series and parallel, geometric similarity, performance of pumps, characteristic curves, NPSH, cavitation.
Hydropower Engineering: Definition of hydro power, comparison between hydro power and thermal power, estimation of hydropower potential, storage, pondage, flow duration curve, Classification of Hydropower plant under various considerations, definition of terms-firm power, secondary power, load factor, utilization factor, capacity factor, various components of hydro power development.

Suggested Readings:

1. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics including Hydraulic
   Machines, Standard Book House, 2009.
2. Rajput R.K., Fluid Mechanics and Hydraulic machines, S.Chand & Company, 2010.
3. Jain A. K., Fluid Mechanics including Hydraulic Machines, Khanna Publishers (rs),
    2004.

Reference Books:

1. Bansal R. K, Fluid Mechanics and Hydraulic Machines, Laxmi Publication Pvt. Ltd, 2010.
2. Subramanya K., Fluid Mechanics and Hydraulic Machines problems and solutions, Mc-
   Graw Hill Education Pvt. Ltd, 2014.
3. Som SK, Gautam Biswas, Suman Chakraborthy, Introduction to Fluid Mechanics and
   Fluid Machines, McGraw Hill Education Pvt. Ltd, 2014.

L	T	P	C
3	0	0	3

IV Semester Syllabus
CE403PC: Structural Analysis – I

Course Objectives

- Differentiate the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads.
- Analyze the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems.
- Evaluate the Influence on a beam for different static & moving loading positions.

Course Outcomes

- Analyze the statically indeterminate bars and continuous beams.
- Draw strength behavior of members for static and dynamic loading.
- Calculate the stiffness parameters in beams and pin jointed trusses.
- Understand the indeterminacy aspects to consider for a total structural system.
- Identify, formulate, and solve engineering problems with real time loading.

Unit-I: Analysis of Perfect Frames

Types of frames - Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads.

Unit-II: Energy Theorems & Three Hinged Arches

Introduction to Energy theorems-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's theorem-Unit Load Method - Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

Introduction to Three hinged arches – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches.

Unit-III: Propped Cantilever and Fixed Beams

Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

Unit-IV: Continuous Beams

Introduction-Continuous beams – Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang – effect of sinking of supports.

Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports – Determination of static and kinematic indeterminacies for frames – Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway – Shear force and bending moment diagrams and Elastic curve.

Unit-V: Moving Loads and Influence Lines

Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load- Focal length – Definition of influence line for shear force and bending moment – load position for maximum shear force and maximum bending Moment at a section – Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

Suggested Readings:

1. Vazirani V.N. and Ratwani M.M., Structural Analysis Vol –I & II, Khanna publishers, 17th Edition, 1999.
2. Ramamrutham.S and Narayana.R., Theory of Structures, Dhanpath Rai, Publishing & Co, 9th edition, 2014.

Reference Books:

1. Muthu K. U., Azmi Ibrahim, Vijayanand M. and Janardhana M., Basic Structural analysis, I K International Publishing House, Second Edition, 2015.
2. Devdas Menon, Structural Analysis, Narosa Publishers, 2008.

L	T	P	C
0	0	2	1

IV Semester Syllabus
EE461ES: Basic Electrical and Electronics Engineering Lab
(Common to CE, ME & MME)

Prerequisites: Nil

Course Objectives

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications

Course Outcomes

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:
Part A: Electrical
1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer

    (ii) Verification of Relationship between Voltages and Currents in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

Part B: Electronics
1. Study and operation of (i) Multi-meters (ii) Function Generator (iii) RPS (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

Any 5 experiments from PART-A and 5 experiments from PART-B are to be conducted.

L	T	P	C
0	0	2	1

IV Semester Syllabus
CE451PC: Computer Aided Civil Engineering Drawing

Course Objectives

- The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, especially in building drawing

Course Outcomes

- Use the Autocad commands for drawing 2D & 3D building drawings required for different Civil Engineering applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings   b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

Suggested Readings:

1. Sesha Praksh M. N. and Servesh G. S.,Computer Aided Design Laboratory, Laxmi Publications.

L	T	P	C
0	0	2	1

IV Semester Syllabus
CE452PC: Hydraulics and Hydraulic Machinery Lab

Course Objectives

- To **identify** the behavior of analytical models introduced to the actual behavior of real fluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the various flow related experiments
- To **illustrate** the students with the components and working principles of the hydraulic machines such as different types of turbines and pumps.
- To **analyze** the laboratory measurements and to document the results in an appropriate format

Course Outcomes

- **Describe** the basic measurement techniques of fluid mechanics and its appropriate application.
- **Discover** the practical working of hydraulic machines such as different turbines, pumps and other miscellaneous hydraulics machines.
- **Interpret** the results obtained in the laboratory for various experiments.

List of Experiments:

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of coefficient of contraction (Minor loss) in pipe flow
6. Determination of Friction factor in a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on various vanes
10. Performance characteristics of Pelton wheel turbine
11. Performance characteristics of Francis turbine
12. Performance characteristics of Kaplan Turbine
13. Performance characteristics of a single stage / multi stage centrifugal Pump
14. Reciprocating Pump- **Demonstratio**n.
15. Water hammer- **Demonstration.**

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IV Semester Syllabus
EN452HS: Finishing School- II
(Common to all Branches)

Course Overview

In view of the growing importance of English as a tool for global Communication and the consequent emphasis on training students to acquire language skills, this syllabus has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

Course Objectives

The main objective of this finishing school curriculum is to provide content for developing the LSRW skills of language learning and to facilitate proficiency in both receptive and productive skills, among students.

Methodology:

- Students will be given Reading/Listening exercises that they would have to do as a prerequisite for the class room intervention
- Every Session will have activities on all the four skills. Listening, Speaking, Reading and Writing
- Vocabulary exercises will also be part of every session
- Students will be asked to summarize their takeaways in every class in three sentences.

- The students will be given a self study plan for language enhancement and will be given extra reading and writing exercises as and when necessary.

- To personalize learning, a variety of case studies and structured problem solving activities will be given in small groups and the trainers will facilitate peer reviews.

Unit-I: Discussions and Debates

Module Overview:

The module enables the students to build strategies for effective group interaction. It focuses on developing decisive awareness and positive personality while maintaining emotional balance.

Learning Outcomes:

The students should be able to:
- Participate in group discussions by providing factual information, real time solutions, and examples.
- Debate on a topic by picking up the key points from the arguments offered.

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills
- Identifying key points of the debate.
- Problem solving ability

- Constructing a logical chain of arguments and presenting winning view points.

Sessions:
1. Six Thinking Hats
2. Initiation Techniques
3. Generating points
4. Summarization Techniques

Unit-II: Powerful Presentations

Unit Overview:

Presentations need to be clear and logical. This Module is designed to introduce students to an ideal structure for a presentation

Learning Outcomes:

Students should be able to:
- Prepare, present, and analyze reports
- Analyze the points discussed
- Connect all points logically with coherence
- Connectives
- Communicate the decisions
- Provide logical conclusions

Sessions:
1. Persuasion skills
2. Cultivate appropriate body language and group dynamics
3. Debating Structure and Content
4. Case Study based Group Discussions

Unit-III: Effective Technical Writing

Unit Overview:

Organizing the writing in a logical order, using headings, linkers and sequence markers. This module is designed to give the students inputs on how to organize using Information Mapping. The students are also given inputs to correct spelling, language and Punctuation errors, as part of editing.

Learning Outcomes:

The Students should be able to choose appropriate words and tone to present accurate, specific, and factual written documents

Competencies:
- Reporting an incident
- Writing/Presenting an essay
- Language and Vocabulary

Sessions:
1. Information Mapping
2. Report writing
3. Memos
4. SoP (Statement of Purpose)
5. MoM (Minutes of the Meeting)

Unit-IV: Reading for Content and Context

Unit Overview:

This course is designed to develop and improve reading and study skills needed for employability. Topics include identifying main idea and supporting details, determining author's purpose and tone, distinguishing between fact and opinion, identifying patterns of organization in a paragraph or passage and the transition words associated with each pattern. Also recognizing the relationship between sentences, puzzling out meanings in context, identifying logical inferences and conclusions.

Learning Outcomes:

Upon completion of the course, students should be able to:

1. Compose a summary of a given text.
2. Apply reading skills appropriate to different genres

Competencies:

- Distinguish facts from opinions.
- Make inferences
- Identify author's purpose, point of view, tone, and perspective.
- Comprehend the use of figurative language.
- Synthesize information gathered from reading in order to give informed opinion.

Sessions:

1. Skimming and Scanning Techniques
2. Recognition of author's purpose
3. Awareness of stylistic differences
4. Evaluation and Discernment of fact and opinion

Unit-V: Critical Reading Skills

Unit Overview:

Research shows that good reading skills can lead to well written assignments. In this unit, students will learn reading strategies to understand and retain information, organization of reading passages, and strategies for learning and retaining vocabulary. Building on these basic strategies, students will develop skills to critically analyze texts. In addition, students will practice and develop paraphrasing and summarizing skills. Students' feedback is integral to the learning process.

Learning Outcomes:

- Recognition of propaganda techniques
- Present vocabulary building methods
- Use comprehension and vocabulary strategies to improve reading skills.

Competencies:

The students will develop enhanced ability to apply the following critical thinking skills when reading:

a. Understand the meaning of new vocabulary through:
1. Context clues, e.g., synonyms, antonyms, examples, definitions and restatements, etc.
2. Roots and affixes
b. Analyze text (simple outlining and note taking) summarize, draw conclusions, and apply information to personal experiences.

Sessions:

1. Contextual Vocabulary-One-word substitutes

2. Homophones, Homonyms and Homographs
3. Idioms and Phrases
4. Synonyms, Antonyms and Phrasal verbs
5. Note making and Inference
6. Main idea identification
7. Précis Writing.

Reference Books:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan, Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson, 2007 Cengage Learning Pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. Mc Murrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.
10. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd, 2nd Edition.

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IV Semester Syllabus
MC451HS: Gender Sensitization Lab
(An Activity-based Course)
[Common to CE, EEE, ECE, ME, MCT & MME]

Course Objectives

This course aims:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debate on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and

strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Unit-I: Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit-II: Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

Unit-III: Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

Unit–IV: Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life….".

Unit – V: Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of **English Literature** or Sociology or Political Science or **any other qualified faculty who has expertise in this field from engineering departments.**

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

Suggested Readings:

- The Textbook, "Towards a World of Equals: A Bilingual Text Book on Gender" written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment and Grading:

- Discussion & Classroom Participation: 20%.
- Project/Assignment: 30%.
- End Term Exam: 50%.