PROGRAM STRUCTURE
AND
DETAILED SYLLABUS (Volume – II)

CIVIL ENGINEERING

FOR

CBCS BASED B.TECH FOUR YEAR DEGREE PROGRAM
(Applicable for the batches admitted from the AY 2016-17)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Cheeryal (V), Keesara (M), Medchal (Dist.), Telangana – 501301
(Affiliated to JNTU, Hyderabad/ AICTE Approved / UGC Autonomous/ NAAC ‘A’ Grade)
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Total 16 3 12 270 630 900 24

Total Periods Per Week 31

*ME BoS specified the syllabus for EWS while CSE BoS specified the syllabus for ITWS.

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**Total Periods Per Week** 31
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**Total Periods Per Week**: 32
## Third Year – Semester II

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Comparison of AICTE Guidelines for Curriculum Structure for B.Tech Degree Program in Civil Engineering Vis-à-vis GCET Program

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<th>Course Description</th>
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<td>BS - Basic Sciences</td>
<td>Includes courses related to Mathematics, Physics, Chemistry and Biology.</td>
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<td>ES - Engineering Sciences</td>
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<td>15% - 20%</td>
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<td>Core Courses (CoC)</td>
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<td>30% - 40%</td>
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<td>Elective Courses (EIC)</td>
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<td>SC - Soft Core</td>
<td>Includes core elective courses of the parent discipline with the associated laboratory</td>
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<td>OE - Open Electives</td>
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<td>Include inter-disciplinary elective courses in an area outside the Parent Discipline/ Department/ Specialization/ Branch of Engineering.</td>
<td>5% - 10%</td>
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<td>Core Courses (CC)</td>
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<td>Industrial Training/ Internship/ UG Mini-project</td>
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<td>Project Work</td>
<td>B.Tech Project or UG Project or UG Major Project</td>
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<td>Technical Seminar</td>
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**Open Elective II**

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**Open Elective IV**

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16CE4101 – ESTIMATION, COSTING & CONTRACTS

IV Year. B.Tech. CE – I Semester.

Prerequisite(s):
16CE2202 Concrete Technology
16CE3102 Design of Reinforced Concrete Structures
16CE3201 Design of Steel Structures

Course Objectives:
Develop ability to:
1. Gain knowledge on the process of estimations required for various works in construction.
2. Understand the rate analysis for various items of work and to prepare an abstract estimate.
3. Prepare a contract document.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain various estimation methods and standard principles.
CO 2: Identify units for various quantities of items of work
CO 4: Prepare earthwork quantity for roads and canals.
CO 5: Analyze rates for various items of work.
CO 6: Prepare a specification report and valuate a building construction.
CO 7: Explain the various types of contracts.

UNIT – I

UNIT – II
Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT – III
Earthwork for roads and canals.

UNIT – IV
Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-V
Valuation of buildings -Standard specifications for different items of building construction.

NOTE: NUMBER OF EXERCISES PROPOSED:
1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – Three Nos.
Text Books:

Reference Books:
IV Year. B.Tech. CE– I Semester.

Prerequisite(s):
16CE3101–STRUCTURAL ANALYSIS

Course Objectives:
Develop ability to:
1. Understand KANI’S method, concept of analyzing cables and suspension bridges.
3. Understand plastic analysis of beams and portal frames.
4. Study multi-storey frames subjected to lateral loads
5. Understand methods of analysis of intermediate trusses for the external loads and influence line concept for indeterminate structures.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain analysis of single bay single storey and two storey structure using KANI’S method, able to draw SFD and BMD for the frames.
CO 2: Apply the method of analyzing suspension cables subjected to different loads.
CO 3: Able to understand about the static and kinematic indeterminacies, also able to analyze continuous beams, pin jointed frames using stiffness and flexibility method.
CO 4: Explain the plastic analysis & its mechanism for beams and frames.
CO 5: Analysis of multi storey frames for lateral loads by different methods like cantilever method, portal frame method etc.
CO 6: Able to draw ILD for indeterminate beams & analysis of trusses for single and two degree indeterminacy.

UNIT – I
Cables and Suspension Bridges: Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads. Length of Cable. Suspension cable supports. Suspension Bridges. Analysis of Three Hinged Stiffening Girder, Suspension Bridges.

UNIT - II
UNIT – III

UNIT – IV

UNIT – V
Influence Lines for Indeterminate Beams: Introduction – ILD for two span continuous beams with constant and variable moments of inertia. ILD for propped cantilever beams. Muller Breslau’s principle.

Indeterminate Trusses: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies- Castigliano’s second theorem

Text Books:

References Books:
IV Year. B.Tech. CE– I Semester.

Prerequisite(s):
16CE3104 Transportation Engineering.

Course Objectives:
Develop ability to:
1. Enable the students to know the Aircraft performance characteristics.
2. Understand design principles of Airport.
3. Understand various aspects of Water Transportation Systems i.e. Ports and Harbours.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Fix the orientation of the runways.
CO 2: Carryout geometrical design of the airport infrastructure.
CO 3: Prepare structural designs of runway, taxiway, and apron-grate area.
CO 4: Prepare a plan of the airport terminal area.
CO 5: Prepare a plan of the sea port.
CO 6: Provide solution to protect coastal erosion.

UNIT-I

UNIT-II
Geometric Design of the Airfield - Airport classification: utility airports, transport airports, Runways: runway configurations, runway orientation, wind rose, estimating runway length, sight distance and longitudinal profile, transverse gradient, Taxiways and taxi lanes: widths and slopes, taxiway and taxi lane separation requirements, sight distance and longitudinal profile, location of exit taxiways, design of taxiway curves and intersections, end-around taxiways, Aprons: holding aprons, terminal aprons and ramps, surface gradients, Control tower visibility requirements.

UNIT-III
Structural Design of Airport Pavements - Soil investigation and evaluation: CBR, plate bearing test, Young’s modulus, FAA pavement design methods: equivalent aircraft, cumulative damage failure, Design of flexible and rigid airport pavements.

UNIT-IV
Airport Lighting, Marking, and Signage - Requirements of visual aids, approach lighting system configurations, visual approach slope aids, threshold lighting, Runway and taxiway lighting and marking, airfield signage.
Terminal Area - Passenger terminal system and its components, Apron gate system: number of gates, gate size, aircraft parking type, apron layout, apron circulation, passenger conveyance to aircraft.

UNIT-V
Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification, ship characteristics, Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals.

Text Books:

Reference Books:
16CE4104 – GROUND IMPROVEMENT TECHNIQUES
PROFESSIONAL ELECTIVE - I

IV Year. B.Tech. CE– I Semester.

Prerequisite(s):
16CE3105 Geotechnical Engineering

Course Objectives:
Develop ability to:

1. Understand the importance of ground improvement
2. Understand various ground improvement techniques involved in improving the bearing capacity of soil.
3. Gain knowledge on grouting.
4. Understand the concepts of compaction.
5. Gain knowledge on soil reinforcement.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Identify suitable ground improvement technique for any given site condition.
CO 2: Explain in detail the different grouting methods.
CO 3: Explain soil stabilization method.
CO 4: Explain soil reinforcement by using geosynthetic materials.
CO 5: Explain the importance of soil compaction.

UNIT I
Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterise problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

UNIT II
Stabilisation - Method of stabilisation –Mechanical stabilisation, cement, lime, bituminous and Chemical stabilisation

UNIT III
UNIT IV
Physical and Chemical Modification – Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing.

UNIT V
Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

Text Books:

Reference Books:
IV Year. B.Tech. CE– I Semester.
Prerequisite(s):
16CE3103 – Engineering Hydrology.
16CE3204 – Irrigation Engineering.

Course Objectives:
Develop ability to:
1. Acquire the knowledge of preparing flow duration curves and power duration curves.
2. Understand performance factors of hydro turbines.
3. Comprehend the hydraulics of turbines, cavitation problems and remedies.
4. Understand the design principles of penstocks.
5. Evaluate the need for gates and surge tanks.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Analyse stream flow and prepare hydrographs.
CO 2: Estimate hydropower potential.
CO 3: Determine electrical load on hydro turbines.
CO 4: Identify types of hydropower plants.
CO 5: Design penstocks and surge shaft.
CO 6: Plan the layout of a hydropower plant and carry out its structural design.

UNIT–I
Stream flow analysis, Hydrograph, Mass curve, Runoff estimation methods, Estimation of hydropower potential, flow duration curves, power duration curves, pondage and storage.

UNIT–II
Electrical load on hydro turbines, load curves, load duration curves, Performance factors.

UNIT–III
Types of hydropower plants, Storage power plant, Runoff River plant, Pumped storage plant, two units and three unit arrangements, Reversible pump turbines, types of turbines, hydraulics of turbines, cavitation in turbines, efficiency of pumped storage plants.

UNIT–IV
Intakes, losses in intakes, air entrainment at intake, inlet aeration, Water conveyance systems, forebay, canals, Tunnels and Penstocks, classification of penstocks, design criteria of penstock, economical diameter of penstock, Anchor blocks, Conduit valves, type of valves, bends and manifolds.
UNIT–V
Water hammer, resonance in penstocks, channel surges, Gates, Surge tanks, Power house layout, lighting and ventilation, variations in design of power house, underground power house, structural design of power house.

Text Books:

Reference Books:
Course Objectives:
Develop ability to:
1. Impart knowledge of Prestressed concrete, its advantages and disadvantages.
2. Understand pre and post tensioning of simple structures & their systems.
3. Understand analysis of flexure and shear.
4. Understand losses of prestress in pretensioned & post tensioned members.
5. Understand composite beams & deflections.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain the principle of prestressing, pretensioning & post tensioning, its limitations & characteristics also the different methods and system of prestressing.
CO 2: Explain about the losses of prestress in pretensioned & post tensioned members.
CO 3: Analyse the sections for flexural and shear can be known.
CO 4: Describe transfer of prestress in pretensioned and posttensioned members, BIS Provision.
CO 5: Explain composite beams, like propped and unpropped members, deflection - short term & long term deflections.

UNIT-I:
Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT-II:
Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses IS 1343-2012 code provisions

UNIT-III:
Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections- Kern line – Cable profile and cable layout.
Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

UNIT-IV:

UNIT-V
Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long term deflections- IS code requirements.

Text Books:
2. Precast Concrete Structures, Hubert Bachmann and Alfred Steinle, Wiley India Pvt. Ltd., 2018.

Reference Books:
1. Prestressed Concrete, N. Rajagopalan, Narosa Publishing House, 2014
16CE4107–HEALTH MONITORING AND RETROFITTING OF STRUCTURES
PROFESSIONAL ELECTIVE - II

IV Year. B.Tech. CE– I Semester.
Prerequisite(s):
16CE3102 Design of Reinforced Concrete Structures

Course Objectives:
Develop ability to:
1. Understand the concepts of distress in structures, types of damages and repairs.
2. Understand corrosion of steel reinforcement & its causes.
3. Understand inspection & testing.
5. Understand health monitoring of structures.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain the deterioration of structures, damage occurrence and mechanism of damages.
CO 2: Assess strength and materials deficiency in concrete structures, corrosion of steel reinforcement causes and prevention.
CO 3: Suggest techniques used in repairing /strengthening the existing concrete structures.
CO 4: Know the inspection and testing, non-destructive testing (NDT)
CO 5: Apply effective retrofitting strategies for the health monitoring of structures.

UNIT – I

UNIT – II

UNIT – III
Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

UNIT – V
Health Monitoring of Structures – Use of Sensors – Building Instrumentation.
Text Books:
2. Non-Destructive Evaluation of Concrete Structures, J.M. Bungey, Surrey University.

Reference Books:
16CE4108 - SOLID WASTE MANAGEMENT
PROFESSIONAL ELECTIVE - II

IV Year. B.Tech. CE– I Semester.
Prerequisite(s): None.

Course Objectives:

Develop ability to:
1. Understand sources of solid waste generation, contamination and its impact on environment.
2. Understand different solid waste processing technologies.
3. Understand physical, chemical and thermal treatment of hazardous waste.
4. Understand the concepts of radioactive wastes and its management.
5. Understand recycling of e-waste.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Identify the physical and chemical composition of wastes.
CO 2: Analyse the functional elements for solid waste management.
CO 3: Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.
CO 4: Identify and design waste containment systems.
CO 5: Design landfill systems and understand its operation and maintenance aspects.
CO 6: Management of biomedical waste.
CO 7: Explain e-waste characteristics and its regulations.

UNIT–I

UNIT–II

UNIT–III
and incineration. Hazardous waste land fills – Site selections, design and operation. HW reduction, recycling and reuse, Regulatory aspects of HWM/ HWM rules.

UNIT–IV
**Biomedical Waste Management:** Classification, collection, segregation treatment and disposal. Radioactive waste: Definition, Low level and high level radioactive wastes and their management, Radiation standards.

UNIT–V
**E-Waste Management:** Waste characteristics, generation, collection, transport and disposal, regulatory aspects of e-waste, global strategy, recycling.

**Text Books:**

**Reference Books:**
5. Central Pollution Control Board (CPCB) guidelines: [http://cpcb.nic.in/](http://cpcb.nic.in/)
16CE4109 - GROUNDWATER DEVELOPMENT AND MANAGEMENT
PROFESSIONAL ELECTIVE - II

IV Year. B.Tech. CE– I Semester.

Pre Requisites:
16CE3103 Engineering Hydrology

Course Objectives:
Develop ability to:
1. Enable the students to know about groundwater occurrence.
2. Grasp the knowledge of various theories and methods of knowing the groundwater levels.
3. Understand the methods of artificial recharge of groundwater.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Determine the availability of Groundwater, its movement and its contour applications.
CO 2: Estimate yield of aquifers.
CO 3: Explain the methods of artificial recharge of groundwater.
CO 4: Explain Groundwater movement and Well construction.

UNIT – I
Groundwater Occurrence: Groundwater hydrologic cycle, origin of groundwater, rock properties effecting groundwater, vertical distribution of groundwater, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT – II
Groundwater Movement: Permeability, Darcy’s law, storage coefficient. Transmissivity, differential equation governing groundwater flow in three dimensions derivation, groundwater flow equation in polar coordinate system. Groundwater flow contours their applications.

UNIT – III
Steady groundwater flow towards a well in confined and unconfined aquifers – Dupuit’s and Theim’s equations, Assumptions, Formation constants, yield of an open well interface and well tests – Recuperation Test.

UNIT – IV

UNIT – V
Well Construction – Drilling Equipment used for Well Construction – Bore log – Interpretation of Log Data.


Text Books:

Reference Books:
IV Year. B.Tech. CE – I SEMESTER
Pre requisites: None

Course Objectives:
Develop ability to:
1. Distinguish the different functional areas in businesses management; understand the cross functional integrations and map supply chains of various business sectors.
2. Identify different types of distribution/ modes of transport/ network design.
3. Analyze the operational issues in SCM.
4. Recognize the drivers of supply chain.
5. Interpret the importance of relationships with suppliers and customers.

Course Outcomes(COs):
At the end of the course, student would be able to:
CO1 Understand the role of an Engineer as well as Manager in Supply chain management
CO2 Appreciate the importance of logistics in integrating different functional areas.
CO3 Integrate operations with functional areas.
CO4 Visualize the role of logistics and distribution as supply chain drivers
CO5 Understand the importance of supplier and customer relationship management.

UNIT - I:
Introduction to Supply Chain Management
Understanding the Supply Chain, Supply Chain Performance: Achieving Strategic Fit and Scope including: Customer and Supply Chain Uncertainty, Competitive and Supply Chain Strategies, Product development strategy, Marketing and sales strategy, Supply chain strategy, Scope of strategic fit; Supply Chain Drivers and Metrics.

UNIT - II:
Logistics Management
Designing distribution networks and applications to e-Business, Network design in the Supply Chain, Designing global supply chain, network design, 3 PL, 4 PL, Transportation in supply chain management.

UNIT - III:
Planning and managing inventories
Managing Economies of Scale in a Supply Chain: Cycle Inventory, Managing Uncertainty in a Supply Chain: Safety Inventory, Determining the Optimal Level of Product Availability. Demand Forecasting in a Supply Chain, Aggregate Planning in a Supply Chain, Sales and Operations Planning: Planning Supply and Demand in a Supply Chain, Coordination in a Supply Chain. E-Procurement, Global alliances.
UNIT - IV:
Managing Cross-Functional Drivers in a Supply Chain
Importance of sourcing decisions in Supply Chain Management, Price and Revenue management, role of Information Technology in a Supply Chain, Sustainability and the Supply Chain. Customer Relationship management.

UNIT - V:
Logistics and supply chain relationships

Text Books:

Reference Books:
1. The Toyota Way Paperback by Jeffrey Liker.
Course Objectives:
Develop ability to:
1. Understand Knowledge Management systems for access and coordination of knowledge assets.
2. Understand technologies namely, intranets, groupware, weblogs, instant messaging, content management systems and email in both individual and organizational contexts.
3. Use case studies, research methods of knowledge organization.

Course Outcomes:
At the end of the course, the student would be able to:
CO1. Evaluate and implement Knowledge Management Systems to facilitate individual and group work.
CO2. Develop a thorough review of Knowledge Management concepts, both historical and speculative.
CO3. Originate and distribute research on a Knowledge Management System topic.
CO4. Analyze and design KM processes and systems.

UNIT - I
Knowledge Management

UNIT - II
Knowledge Management System Life Cycle

UNIT - III
Capturing Knowledge
UNIT – IV
Knowledge Codification

UNIT - V
Knowledge Transfer And Sharing

Text Book(s):

Reference Books:
IV Year. B.Tech. CE – I Semester

Prerequisite: None

Course Objectives:
Develop ability to:
1. Understand different basic terms related to Indian Energy Scenario and Energy Conservation Act.
2. Understand the principles of energy conservation, audit and management.
3. Understand energy conservation in different mechanical utilities.
4. Understand efficient heat and electricity utilization, saving and recovery in different thermal and electrical systems.
5. Understand different basic terms related to Energy economy, Financial Management and to understand the role of Energy Service Companies.

Course Outcomes:
At the end of the course, student would be able to:
CO1. Perform energy accounting and balancing
CO2. Prepare energy audit report for different energy conservation instances.
CO3. Suggest energy saving methodologies.
CO4. Evaluate the energy saving and conservation in different mechanical utilities.
CO5. Evaluate the energy saving and conservation in different electrical utilities.

UNIT-I
Energy Scenario, Conservation Act and related policies

UNIT-II
Energy Management and Audit
Principles of Energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting – Energy management qualities and functions, language Questionnaire – check list for top management. Definition, energy audit, need, types of energy audit. Energy management (audit) approach – understanding energy costs, Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering.
UNIT-III
Energy Efficient Systems-I

Power Factor Improvement, Lighting and Energy Instruments
Power factor – methods of improvement, location of capacitors, power factor with non-linear loads, effect of harmonics on power factor, power factor motor controllers – Good lighting system design and practice, lighting control, lighting energy audit – energy instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC’s.

UNIT-IV
Energy Efficient Systems-II
Thermal utilities and systems: Boilers – types, combustion in boilers, performances evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities. Boiler efficiency calculation, evaporation ratio and efficiency for coal, oil and gas, soot blowing and soot deposit reduction.

Heat Exchangers: Types, networking, pinch analysis, multiple effect evaporators, condensers, distillation column, etc.,

Waste Heat Recovery: Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential

Cogeneration: Definition, need, application, advantages, classification, saving potentials, heat balance, steam turbine efficiency, tri-generation, micro turbine.

UNIT-V
Energy Economics
Discount rate, payback period, internal rate of return, net present value, life cycle costing, role of energy service companies (ESCOs), investment – need, appraisal and criteria, financial analysis techniques, simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts.

Text Books:

Reference Books:
8. Bureau of Energy Efficiency Reference book: No.1, 2, 3 4
IV Year. B.Tech. CE – I Semester

Pre-requisites: None

Note: Only Block Diagram Approach with Qualitative Treatment of the topics is required. Detailed mathematical treatment is not required.

Course Objectives:
1. Introduce the students to modulation and various analog and digital modulation schemes.
2. They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.

Course Outcomes:
After completion of this course, the students would be able to:
CO1. Distinguish various types of modulations.
CO2. Explain different communication modules and their implementation.
CO3. Distinguish various wireless and cellular, mobile and telephone communication systems.

Unit I:
Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

Unit II:

Unit III:
Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony,

Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

Unit IV:

Unit V: Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.

Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:

Reference Books:
IV Year. B.Tech. ECE – I Semester

Pre-requisites: None

Course Objectives:
1. Understand about sand casting and metal casting techniques.
2. Impart the knowledge of various welding processes.
3. Understand about the importance rolling, forging and sheet metal operations.
4. Understand about the processing of plastics.

COURSE OUTCOMES:
At the end of the course, the student will be able to:

CO1. Analyze and select the suitable casting technique for making the components.
CO2. Differentiate the different types of welding processes are needed for various materials and importance of welding
CO3. Recognize and adopt the methods involved in forming processes, sheet metal operations, rolling, forging etc.,
CO4. Perform the methods involved in press work
CO5. Know the various manufacturing methods in processing of plastics.

UNIT - I:
Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.
Methods of Melting - Crucible melting and cupola operation – Defects in castings;

UNIT - II:
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.
Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non-destructive testing of welds.

UNIT - III:
Forming: Hot working, cold working, strain hardening, recovery, recrystallization and grain growth.
UNIT - IV:
Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT - V:

Text Book(s):
1. Manufacturing Technology / P.N. Rao/TMH

Reference Books:
1. Production Technology / R.K. Jain
2. Metal Casting / T.V Ramana Rao / New Age
4. Welding Process / Parmar /
5. Production Technology /Sarma P C /
Course Objectives:
Develop ability to:
1. Learn the importance of banking business and its functions.
2. Understand the services in banking sector.
3. Examine the importance of RBI and its significance.
4. Understand the insurance sector.
5. Identify regulatory framework of insurance sector.

Course Outcomes (COs):
At the end of the course, student would be able to:
CO1 Acquire the knowledge of banking system.
CO2 Acknowledge banking services and types of banks.
CO3 Absorb regulation pattern on banking sector.
CO4 Identify the need of insurance sector and its significance.
CO5 Acknowledge IRDA and other insurance patterns in India.

UNIT-I:
Introduction to banking business: Concept and history of banking system in India, banking structure – types of accounts, advances and deposit system in India-cheque process and clearing system.

UNIT-II:
Card System and classification of banks: Types of cards and its importance (Debit, credit, smart-card) net banking, mobile banking , KYC system, Nationalization of banks- commercial, private, public and foreign banks- regional rural banks and local bankers- money lenders and pawn brokers.

UNIT-III:
Reserve Bank of India Act 1934: Establishment of RBI Act and Banking Regulation Act 1949-features-functions- Mint (coin printing) -money control, deficiencies in Indian banking system-problem and challenges, Non-Performing Assets (NPA’s).

UNIT-IV:
Introduction to Insurance sector: Concept and nature of insurance- principles of insurance- new insurance products, bank assurance. Types of plans pricing and underwriting documentation. Channels of distribution- policy servicing and settlement of clients.
UNIT-V:
Insurance Regulatory Development Authority 1999: History –features- importance of IRDA-
general insurance Act 1972- feature and functions– LIC Act 1956, features and functions. Non life
insurance and its kinds – difference between general insurance and life insurance.

Text Books:

Reference Books:
2. VarshneyP.N., “Banking law and Practice”, Sultan Chand & Sons, New Delhi
Course Objectives

Develop ability to:
1. Learn and practice data modeling using entity-relationship and develop database design.
2. Understand the features of database management systems and Relational database.
3. Understand Structured Query Language (SQL) and learn SQL syntax.
4. Understand normalization process of a logical data model and correct any anomalies.
5. Understand needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcomes

After completion of the course, student would be able to:
CO1. Design and describe data models and schemas in DBMS.
CO2. Use SQL - the standard language of relational databases, for database processing.
CO3. Implement Transaction and Query processing techniques for data storage and retrieval.
CO4. Use backup and recovery techniques for handling the databases.
CO5. Use PL/SQL for database administration and performance optimization.

UNIT I
Introduction- Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction , Instances and Schemas , Data Models ,Introduction to Data base design , ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets , Relationships and Relationship sets , Additional features of ER Model , Conceptual Design with the ER Model , Conceptual Design for Large enterprises, database Access for applications Programs ,Data Storage and Querying,– data base Users and Administrator ,data base System Structure ,History of Data base Systems. Database Languages – DDL, DML, DCL.

UNIT II

UNIT III
Form of Basic SQL Query – Examples of Basic SQL Queries , Introduction to Nested Queries, Correlated Nested Queries Set – Comparison Operators – Aggregative Operators , NULL values – Comparison using Null values – Logical connectivity’s – AND, OR and NOT – Impact on SQL Constructs ,Outer Joins , Disallowing NULL values.
UNIT IV


Concurrency Control - Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.


UNIT V

PL/SQL and Database Administration

Text Books:

Reference Books:
4. Introduction to Database Systems, C.J.Date Pearson Education
IV Year. B.Tech. CE– I Semester.
Pre Requisites: None.

Course Objectives:
Develop ability to:
1. Understand semiconductors and solid mechanics used to fabricate MEMS devices.
2. Understand basics of Micro fabrication techniques.
3. Understand various sensors and actuators
4. Understand different materials used for MEMS
5. Understand applications of MEMS to disciplines beyond Electrical and Mechanical engineering.

Course Outcomes:
At the end of the course, student would be able to:

CO1. Identify different types of semiconductor and solid mechanic materials that are used to fabricate MEMS devices.
CO2. Apply basic science, circuit theory, Electro-magnetic field theory, control theory in Micro fabrication techniques
CO3. Distinguish between different sensors and actuators
CO4. Distinguish between various processes involved in Micro machining
CO5. Apply the knowledge of MEMs to other advanced applications such as polymer and optical MEMs

UNIT-I

UNIT-II

UNIT-III
UNIT –IV
Micromachining: Silicon Anisotropic Etching, Anisotropic Wet Etching, Dry Etching of Silicon, Plasma Etching, Deep Reaction Ion Etching (DRIE), Isotropic Wet Etching, Gas Phase Etchants, Case studies, Basic surface micro machining processes, Structural and Sacrificial Materials, Acceleration of sacrificial Etch, Striction and Antistriction methods

UNIT –V
Polymer and Optical MEMS: Polymers in MEMS, Polimide, SU-8, Liquid Crystal Polymer (LCP), PDMS, PMMA, Parylene, Fluorocarbon, Application to Acceleration, Pressure, Flow and Tactile sensors, Optical MEMS, Lenses and Mirrors, Actuators for Active Optical MEMS.

TEXT BOOKS:

REFERENCE BOOKS:
Principles of Wireless Communication Systems

IV Year B.Tech. CE-I Semester.
Pre Requisites: None.

Note: No detailed mathematical treatment is required.

Course Objectives:
1. To discuss the fundamentals of cellular mobile wireless networks.
2. To provide an overview of various approaches to communication networks.
3. To study the numerous different-generation technologies with their individual pros and cons.
4. To discuss about the principles of operation of the different access technologies like FDMA, TDMA, SDMA and CDMA and their pros and cons.

Course Outcomes:
After completion of this course, students would be able to:
CO1. Explain different generations of Cell phone technology
CO2. Explain different cellular, communication networks and different access techniques
CO3. Distinguish between different personal communication services
CO4. Explain the development of Wireless technologies beyond 2 G
CO5. Explain mobile data services and short range networks.

UNIT I - Transmission Fundamentals
Cell phone Generations: 1G, 2G, 2.5G, 3G & 4G

UNIT II - Network Concepts
Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM
Cellular Networks: Cells, duplexing, multiplexing, voice coding
Multiple Access Techniques: FDMA, TDMA, SDMA, CDMA, spectral efficiency.

UNIT III - Personal Communication Services
GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

UNIT IV - 3G and Beyond
IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.
UNIT V - Mobile Data Services & Short-Range Networks

Mobile Data Services: Messaging, wireless web, WAP, site design
Short-Range Wireless Networks: Unlicensed spectrum, WLANs, cordless telephony, IrDA, Bluetooth
Smart Phones: Future phones, mobile OSs, smart phone applications.

Text Books:

Reference Books:
Course Objectives:
1. To apply the Energy conservation principles to electronic devices.
2. To apply the conduction, convection and radiation principles to electronic devices.
3. To apply the Refrigeration and Air conditioning concepts to industrial applications.
4. To perform the heat dissipation analysis on electronic devices.

Course Outcomes:
At the end of the course, the student will be able to:
CO1. Analyze conduction, convection and radiation heat transfer modes in electronically controlled units.
CO2. Analyze heat generation in electronically controlled units.
CO3. Analyze conduction and dissipation in electronically controlled units.
CO4. Analyze the cooling load capacity in electronically controlled units.

UNIT-I: Conduction Heat transfer: Modes of heat transfer, Fourier’s law of steady state heat conduction (one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, Convective heat transfer, Newton’s law of cooling, electrical analogy and overall heat transfer coefficient, numerical problems.

UNIT-II: Convective and radiation Heat transfer:
Dimensional analysis as a tool for experimental investigation, Buckingham pi theorem and method, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann’s law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff’s law, Wien’s displacement law, numerical problems.

UNIT – III: Cooling of Electronic equipment:
Introduction and history, manufacturing of electronic equipment, cooling load of electronic equipment, thermal environment, electronics cooling in different applications, conduction cooling, air cooling: natural convection and radiation, air cooling: forced convection, liquid cooling, immersion cooling, heat pipes, cooling of chips, PCBs, computers, logic chips etc.


Text books:
3. A course in Refrigeration and Air conditioning – SC Arora and &Domkundwar / Dhanpatrai

Reference books:
IV Year. B.Tech. CE– I Semester.
Pre Requisites: None.

Course Objectives:
Develop ability to:
1. Recognize and pronounce French alphabet
2. Apply grammatical concepts in both oral and written communication.
3. Appreciate the culture of Francophone countries.
4. Read authentic texts.

Course Outcomes:
At the end of the course, student would be able to:
CO 1. Demonstrate competence in basic vocabulary and grammar
CO 2. Understand the culture of Francophone countries.
CO 3. Read with accurate pronunciation.
CO 4. Understand short and simple oral and written communication.

UNIT–I
Functional Aspects:
Greetings, introductions, asking/giving information, pronunciation and Spellings of Francophonic names, family relations, professions, days of the week and months, nationalities, languages, cardinal numbers and ordinal numbers, descriptions.

Grammatical Aspects:
Definite and Indefinite articles, numbers, adjectives, interrogation, negation, conjugation of the verbs in the present tense.

UNIT–II
Functional Aspects:
Intonation, vowels, orals and nasals, Inviting and responding to invitations, describing people.

Grammatical Aspects:
Past Tense- verbs used

UNIT–III
Functional Aspects:
Polite expressions-expressing opinions, making suggestions, expressing ideas and dislikes, agreeing and disagreeing.
Describing places, professions, dress and monuments of Paris and other public places.

Grammatical Aspects:
Regular and irregular verbs, conjugations, writing simple sentences using the verbs in present and past tense.
UNIT–IV
Functional Aspects:
Semi-vowels, consonant sounds, Invitations, accepting and refusing invitations, fixing appointments, Inviting through telephone and e-mail.

Grammatical Aspects:
Partitif articles, adjectives, demonstrative and possessive, prepositions and adverbs of quantity and quality.

UNIT–V
Functional Aspects:
Asking for information in a restaurant, Ordering food in a restaurant, appreciating, describing leisure of Francophone cultures.

Grammatical Aspects:
Future Tense-Verbs used

Text Books:

Reference Books:
1. Alter Ego I & II. Published by Hachette
2. Connexion I & II. Published by Didier
3. Echo I & II. Clé International publishers
4. Latitude I & II. Published by Didier
Course Objectives:
Develop ability to:
1. Identify Spanish sounds and participate in social interactions.
2. Read authentic texts in Spanish.
3. Write small and simple messages in Spanish.
4. Understand the nuances of Hispanic culture.

Course Outcomes:
At the end of the course, student would be able to:
CO 1. Apply basic vocabulary and grammatical structures in Spanish.
CO 2. Demonstrate competence in functional and grammatical structures of the language.
CO 3. Read with accurate pronunciation.
CO 4. Participate in simple conversations based on everyday situations.

UNIT–I
Functional Aspects:
Greetings, introductions, asking/giving information, pronunciation and Spellings - Hispanic names, family relations, professions, days of the week and months, nationalities, languages.

Grammatical Aspects:
Basic structure of spelling and pronunciation; present indicative of the regular verbs (‘ar/er/ir) and ‘querer”; subject pronouns; interrogative sentences with ‘Porque’, and ‘quien”; causal phrase with ‘porque”; ‘ser’ and ‘estar”; negative sentences; adjectives of nationality.

UNIT–II
Functional Aspects:
Ordinal and cardinal numbers, quantities, shopping, describing things (material, colour, size etc.) and people (food habits, dress etc.)

Grammatical Aspects:
Gender and number of nouns and adjectives; the verb ‘tener”; interrogative Sentences; demonstrative and qualitative adjectives.

UNIT–III
Functional Aspects:
Polite expressions- expressing opinions, making suggestions, expressing ideas and dislikes, agreeing and disagreeing.
Grammatical Aspects:
Qualitative adjectives, forms and usage, gradations, superlative adjectives, exclamatory sentences; the verb ‘gustar’, forms and syntax; personal Pronouns; definite and indefinite pronouns, direct object pronouns, Prepositions; verbs like ‘parecer’ and ‘encontrar and preferir, their form and syntax, interrogative pronouns.

UNIT–IV
Functional Aspects:
Invitations; accepting and refusing invitations; fixing an appointment; Inviting through telephone and or e-mail.

Grammatical Aspects:
Present indicative of irregular verbs, expressions with ‘tener’ and ‘estar’; Prepositional pronouns; interrogative sentences.

UNIT–V
Functional Aspects:
Expression of time; Making comparisons - Indian and Hispanic. Describing events - festivals - Indian and Hispanic

Grammatical Aspects:
Time with ‘ser’, expression s relating to festivals.

Text Book:
1. NOUVEAU ELE INICIAL 1

Reference Books:
1. Espanol sin Fronteras, A. Sanchez, M. Rios, J.A. Metella, SGEL. Madrid, 1997
2. Entre Nosotros A. Sanchez, M. Rios, J.A. Metella, SGEL. Madrid, 1997
IV Year. B.Tech. CE– I Semester.
Pre Requisites: None.

Course Objectives:
Develop ability to:
1. Understand and participate in social interactions in everyday situations.
2. Write simple messages in German on topics related to personal interest and everyday life.
3. Read authentic texts in German.
4. Demonstrate insight into significant cultural products and historical events in German.

Course Outcomes:
At the end of the course, student would be able to:
CO 1. Converse in day to day situations.
CO 2. Demonstrate proficiency in writing.
CO 3. Read with accurate pronunciation.
CO 4. Display greater insight of German culture.

UNIT–I
Functional Aspects:
Greetings, introductions, asking/giving information, pronunciation and Spellings – German names, family relations, professions, days of the week and months, nationalities, languages.

Grammatical Aspects:
Definite and Indefinite articles (including negation)
Noun: Gender and Plural forms, cases (nominative, accusative, dative & genitive)

UNIT–II
Functional Aspects:
Ordinal and cardinal numbers, quantities, shopping, describing things (material, colour, size etc.) and people (food habits, dress etc.)

Grammatical Aspects:
Verb: Strong and Weak verbs, Verbs with separable and inseparable prefixes, modal verbs, position of verb in the main and subordinate clauses, auxiliary verbs, reflexive verbs in accusative and dative cases, imperative constructions

UNIT–III
Functional Aspects:
Polite expressions- expressing opinions, making suggestions, expressing ideas and dislikes, agreeing and disagreeing.

Grammatical Aspects:
Pronouns: personal, possessive, reflexive, interrogative and demonstrative, Prepositions: with the accusative, dative and with both these cases
UNIT–IV
Functional Aspects:
Invitations; accepting and refusing invitations; fixing an appointment; Inviting through telephone and or e-mail.

Grammatical Aspects:
Adjective: declension with the Indefinite article, Definite article, without article, with the indefinite pronoun, Degrees of comparison (also adverbs), ordinal numbers, adjectives as nouns
Conjunctions: subordinating and coordinating with respect to the position of the verb.

UNIT–V
Functional Aspects:
Expression of time; Making Comparison - Indian and Germanic. Describing events - festivals - Indian and Germanic.

Grammatical Aspects:
Negation: of a sentence and words therein. Sentence structure: general principles observed in German Language.

Text Book

Reference Book(s)
2. Tangram aktuell 1 –Lektion 1-4, Lektion 5 - 8
IV Year. B.Tech. CE-I Semester
Pre Requisites:
16CE3101 STRUCTURAL ANALYSIS

Course Objectives:
Develop ability to:
1. Understand fundamental concepts of theory of the finite element methods.
2. Understand the proficiency in the application of the finite element method (modeling, analysis, and interpretation of results) to realistic engineering problems through the use of a major commercial general-purpose finite element code.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Understand the fundamental theory of the FEA method
CO 2: Understand the theoretical foundations of the advanced finite element methods (FEM) applied in civil engineering
CO 3: Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements
CO 4: Understand the main assumptions and features of specialized structural elements and analysis types (such as linear and nonlinear static, eigenvalue and time-dependent problems)
CO 5: Ability to apply the most relevant advanced finite element methods in civil engineering by implementing well-structured programs for solving basic engineering problems
CO 6: Ability to critically utilize advanced finite element software tools.

UNIT – I

UNIT – II
Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix – stress – strain relation

UNIT – III
FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

UNIT – IV
Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis -formulation of CST element.
UNIT-V

Text Books:

Reference Books:
5. Concepts and applications of Finite Element Analysis, Robert D. Cook et al., Wiley India Pvt. Ltd, 2002.
Course Objectives:
Develop ability to:
1. Understand the concepts used to analyze flexible - rigid pavements.
2. Appreciate design of flexible & rigid pavement using IRC approach.
3. Apply the various types of construction procedures for pavement layers.
4. Learn factors affecting pavement design, material characteristics, design of flexible, rigid pavements and low volume roads.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain design factors for flexible and rigid pavements.
CO 2: Explain the assumptions in pavement layers and carryout design of flexible and rigid pavement.
CO 3: Discriminate methods of highway constructions used in pavement layers.
CO 4: Carryout evaluation pavement design.

UNIT – I

UNIT – II
Stresses in Rigid Pavements: Westergaard’s Theory and Assumptions - Stresses due to Curling, Stresses and Deflections due to Loading - Frictional Stresses - Stresses in Dowel Bars & Tie Bars.

UNIT – III
UNIT - IV
Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute’s Methods with HMA and other Base Combinations- AASHTO, IRC Methods

Design of Rigid Pavements: Calibrated mechanistic design process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement design.

UNIT – V


Text Books:

Reference Books:
4. IRC Codes for Flexible and Rigid Pavements design.
16CE41L1–COMPUTER AIDED STRUCTURAL DRAFTING LABORATORY

IV Year. B.Tech. CE– I Semester.

Prerequisite(s):
16ME1101-Engineering Drawing
16CE3102- Design of Reinforced Concrete Structures
16CE3201-Design of Steel Structures

Course Objectives:
Develop ability to:
1. Provide hands on experience for structural drafting.
2. Understand different commands in Auto CAD.
3. Understand plans, sections and elevations of the building.
4. Draw the structural detailing of RCC and STEEL structures as per IS specifications.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Draw the basic geometrical sections using different commands in AutoCAD.
CO 3: Draft structural detailing of RCC elements like beams, columns & slabs.
CO 4: Draft structural detailing of STEEL-connections, compression members, plate girders.

LIST OF EXERCISES:

1) Introduction to computer aided drafting.
2) Commands in CAD.
3) Basic practice exercises on CAD,
4) Drawing of plans & elevations of
   (a) Single storey building.
   (b) Multi-storey building.
5) Reinforcing detailing of RCC singly reinforced, doubly reinforced beams.
6) Structural detailing of one way slab, two way slab.
7) RCC detailing of square, rectangular columns.
8) Drawing of STEEL-bolted, welded connections.
9) Detailing of compression members i.e., column (laced & batten).
10) Detailing of plate girder.
IV Year. B.Tech. CE-I Semester.

Prerequisite(s): None.

Course Objectives:

Develop ability to:
1. Apply vector mechanics as a tool for problem solving.
2. Understand the need in Design for the Finite Element Method.
3. Tie his/her understanding of mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently.

Course Outcomes:

At the end of the course, student would be able to:
CO 1: Demonstrate the ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general-purpose software;
CO 2: Model multi-dimensional heat transfer problems using ANSYS;
CO 3: Demonstrate the ability to evaluate and interpret FEA analysis results for design and evaluation purposes;
CO 4: Develop basic understanding of the limitations of the FE method and understand the possible error sources in its use.

LIST OF EXERCISES:

Analysis of:
1. Bars of constant cross-section area.
2. Bars of tapered cross-section area.
4. Trusses.
5. Simply supported beam with point load.
6. Simply supported beam with UDL.
7. Simply supported beam with UVL.
8. Beam with moment and overhang
9. Cantilever beam with point load.
10. Cantilever beam with UDL
11. Beam with inclined loads, one end hinged and at other end roller support.
12. Rectangular plate with a circular hole.
13. Continuous beam.
14. Fixed beam.
16CE41L3 - PAVEMENT ANALYSIS AND DESIGN LAB
SOFT CORE – II LAB

IV Year. B. Tech. CE – I Semester.
Prerequisite(s):
16CE3104 Transportation Engineering

Course Objectives:
Develop ability to:
1. Creation and annotation of 3D project models - Interoperable data base
2. Creation and analysis - Digital terrain data base.
3. Integration with google earth.
4. Tackling the design of any type of road, large or small.

Course Outcomes:
At the end of the course, student would be able to:
CO1: Create design alternatives to achieve the “ideal” road system and then automate the design detailing process, saving time and money.
CO2: Create and analyse horizontal and vertical alignment of a road.
CO3: Calculate volume and quantity of extraction (earthwork calculations).
CO4: How to design 2D, 3D drainage design.
CO5: Design and analyse the road and junction.

LIST OF EXERCISES:
1. Introduction to MX Roads-String Modelling
2. Survey data input and import
3. String names and drawing styles, point selection methods
4. Surface checker and editing data- surface analysis
5. String creation and editing
6. Earth work calculation
7. Alignment creation
   a. Horizontal alignment
   b. Vertical alignment
8. Design of rule based super elevation
9. Junction design
Course Objectives:
Develop ability to:
1. Understand how to deal with overall planning, coordination and control of projects.
2. Impart knowledge of construction technology, scheduling, optimizing methods involving the construction of structures.
3. Understand scientific principles involved in construction, an understanding of the behaviour of construction materials and fundamentals of structural mechanics, construction practices.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Handle project planning and scheduling.
CO 2: Identify methods of project management for completion within stipulated time.
CO 3: Explain the equipment involved and technology used in the construction a projects.
CO 4: Apply qualitative methods of construction for a given project.

UNIT-I

UNIT-II

UNIT-III
Resource Planning - planning for manpower, materials, costs, equipment. Labour - Scheduling .Forms of scheduling - Resource allocation, budget and budgetary control methods

UNIT-IV
UNIT-V

Text Books:

Reference Books:
IV Year. B.Tech. CE– II Semester.

Prerequisite(s):
16CE3101 Structural Analysis
16CE4102 Advanced Structural Analysis

Course Objectives:
Develop ability to:
1. Understand different methods to analyze structures subjected to any kind of dynamic excitation and computing quantities like displacements, forces, stresses, etc.
2. Understand analytical methods and procedures in a way that emphasize physical insight.
3. Apply structural dynamics theory to real-world problems like seismic analysis and design of structures.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Apply the knowledge of mathematics, science, and engineering by developing the equations of motion for vibratory systems and solving for the free and forced response.
CO 2: Explain the dynamic response on various beams.
CO 3: Interpret dynamic analysis results for design, analysis and research purposes.
CO 4: Apply structural dynamics theory to earthquake analysis, response, and design of structures.

UNIT-I
Introduction: Mass- spring-damper idealization of structural systems, equation of motion for SDOF system, solution of the differential equations viscous damping, under-damped, critically damped and over-damped systems, logarithmic decrement, determination of damping in the system.

UNIT-II
Lumped mass MDOF systems: Rayleigh method of determination of natural frequencies, Stodola-Vianelle method, Rayleigh method, Modified Rayleigh-Ritz method; multistorey rigid frames subjected to lateral loads, damping in multi degree systems.

UNIT-III
Structures with distributed mass and load: Introduction, free vibration, frequency and motions of simply supported beam, cantilever beam, fixed beam, propped cantilever beam, forced vibration of beams, Beams, with variable cross-section and mass.

UNIT-IV
Approximate design methods; Idealized system; transformation factors; dynamic reaction response calculations;
Design example (RC beam, steel beam), Stiffness method and flexibility method.
UNIT-V

Response to impulse loading: General nature of impulsive loading, sine-wave impulse, Rectangular impulse, square pulse of finite duration, triangular impulse, response to general force pulse, greens function, forced vibration.

Text Books:

Reference Books:
16CE4203–SOIL DYNAMICS AND MACHINE FOUNDATION
PROFESSIONAL ELECTIVE - III

IV Year. B.Tech. CE– II Semester.

Prerequisite(s):
16CE3105 Geotechnical Engineering
16CE3202 Foundation Engineering

Course Objectives:
Develop ability to:
1. Familiarize students with wave propagation and the dynamic properties of soil
2. Understand importance of designing machine foundation for reciprocation and impact machines
3. Understand mechanism of liquefaction.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain theory of vibrations and its characteristics.
CO 2: Explain the method of determining the Natural frequency of foundation soil.
CO 3: Design different types of machine foundation.
CO 4: Determine liquefaction potential of soil.
CO 5: Explain properties of isolation materials.

UNIT–I

UNIT–II
Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits, Stress-strain behaviour of cyclically loaded soils, Strength of cyclically loaded soils, Dynamic soil properties - field testing techniques, Natural frequency of foundation soil system- Barkan’s and I.S methods of determining natural frequency. Tschebotarioff’s reduced natural frequency

UNIT–III
Liquefaction of soils: Definitions, Mechanism of liquefaction, laboratory studies, Dynamic triaxial tests, cyclic simple shear test, comparison of cyclic stress causing liquefaction under triaxial and shear tests. Standard curves and correlation for liquefaction,

UNIT–IV
UNIT-V
Design of Machine Foundations: Types of machine foundation. General requirements, permissible amplitudes and bearing pressures. Analysis and design requirements of foundations for rotary, reciprocating and impact type of machines as per I.S code

Text Books:

Reference Books:
Course Objectives:
Develop ability to:
1. Understand various aspects of Environmental Impact Assessment methodologies.
2. Comprehend the impact of development activities on environment.
3. Understand the impact of a project on surface water, air and biological environment.
4. Assess the role of Environmental legislation.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Identify the environmental attributes to be considered for the EIA study.
CO 2: Formulate objectives of the EIA studies.
CO 3: Identify suitable methodology and prepare rapid EIA.
CO 4: Prepare EIA reports and environmental management plans.
CO 5: Plan the methodology to monitor and review the relief and rehabilitation works.

UNIT–I
Basic concepts of EIA: Initial environmental examination, Elements of EIA – factors affecting EIA.

UNIT–II
Assessment of Impact of development activities on Vegetation and wildlife, environmental impact of deforestation – Causes and effects of deforestation.

UNIT–III
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT–IV
Environmental Audit and Environmental legislation, Objectives of Environmental Audit, Types of environmental audit, Audit protocol, stages of Environmental audit, onsite activities, evaluation of audit data and preparation of Audit report, Post audit activities.

UNIT–V
Text Books:

Reference Books:
IV Year. B. Tech. CE–II Semester.
Prerequisite(s):
16CE3104 Transportation Engineering

Course Objectives:
Develop ability to:
1. Understand the basics and design of various components of Railway Engineering.
2. Understand the requirements for designing the railway tracks and the material required for the construction of permanent way.
3. Apply the design concepts of super elevation of railway curves.
4. Understand the types and functions of track, junctions and railway stations.

Course Outcomes:
At the end of the course, student would be able to:
CO 1: Explain the importance of railway infrastructure planning and design.
CO 2: Identify the factors governing design of railway infrastructures.
CO 3: Design and analyze the railway track system.
CO 4: Explain the process of execution of railway projects.

UNIT-I
Introduction to Railways: Role of Indian Railways in national development – Railways for Urban Transportation – LRT, Mono Rail, Metro Rail & MRTS. Engineering Surveys for track alignment.

UNIT – II

UNIT – III

Signalling and Interlocking: Classification of Signals - Signalling System - Necessity and Functions of Interlocking- Track Circuiting -working principles- Track Maintenance.

UNIT-IV

Railway Stations and Yards: Classification – Site Selection for Railway Stations and Yards – Lay Outs of Different Types of Stations – Functions of Different Types of Yards.
UNIT-V

Design of Tracks for High Speeds: Geometrical Requirements, Challenges, Ballasted or Ballast less, Design methodology, Structural model, Dynamics analysis, Maintenance considerations.

Text Books:

Reference Books:
IV Year. B.Tech. CE–II Semester.
Prerequisite(s): None.

Course Objectives:
Develop ability to:
1. Understand the mindset of the entrepreneurs.
2. Analyze the financial aspects of establishing an enterprise.
3. Learn entrepreneurial activities and determine strategies for launching.
4. Identify the challenges of entrepreneurship and develop an idea on the entrepreneurial framework.
5. Apply strategic perspectives in entrepreneurship.

Course Outcomes:
At the end of the course, student would be able to:
  CO1 Explore and identify the entrepreneurial traits.
  CO2 Identify various funding agencies and role of IPR.
  CO3 Imagine and identify opportunities to launch new ventures.
  CO4 Address entrepreneurial challenges.
  CO5 Develop strategies for bringing stability and growth in business.

UNIT-I: Introduction to Entrepreneurship
Meaning, importance, entrepreneurship characteristics, women entrepreneurs, classifications of entrepreneurs, myths of entrepreneurship, qualities of entrepreneurship, competencies, attitude function and nature of forms of entrepreneurship.

UNIT-II: Promotion and financial aspects of entrepreneurship
Idea generation- opportunities- SWOT analysis, patents and trademark, intellectual property rights, source of capital, debt capital, seed capital, venture capital- informal agencies in financing entrepreneurs. Government grants and subsidies, types of investors and private offerings.

UNIT-III: Launching entrepreneurial ventures
Opportunities identification- entrepreneurial imagination and creativities – the nature of the creativity process innovation and entrepreneurial- methods to initiate venture creating, new ventures-acquiring and established entrepreneurial venture, franchising hybrid-disadvantage of franchising.

UNIT-IV: Legal challenges of entrepreneurship
 Intellectual property protection patents, copy rights-trademarks and trade secret. Avoiding pitfalls-formulation of the entrepreneurial plan-the challenges of new venture startups-poor financial understanding-critical factors for new venture development, the evaluation process, feasibility criteria approach.
UNIT-V: Strategic perspectives in entrepreneurship
Strategic planning-strategic actions-strategic positioning-business stabilization-building the adoptive firms-understanding the growth stage unique managerial concern of growing ventures.

Text Books:

Reference Books:
Course Objectives
Develop ability to:
1. Understand the basic web concepts and Internet protocols
2. Understand XML and processing of XML data
3. Understand client side scripting with Javascript and DHTML
4. Understand server side programming with PHP
5. Understand file handling and database connectivity with PHP

Course Outcomes (COs):
At the end of the course, student would be able to:
CO1. Create dynamic and interactive web sites
CO2. Write and execute client side scripts using Javascript and DHTML.
CO3. Write, parse and execute XML schemas.
CO4. Write, implement, deploy and execute server side programs and components using PHP.
CO5. Handle files, store, retrieve and process data using database connectivity with PHP.

UNIT I:
HTML: Common Tags – List, Tables, images, forms, frames; Cascading Style Sheets.

CLIENT SIDE Scripting: Introduction to JavaScript: JavaScript language – declaring variables, Scope of variables, functions, event handlers (on click, on submit etc.), Document Object Model, Form validation.

UNIT II:
XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definitions, XML Schemas, Document Object Model, XHTML

Parsing XML Data – DOM and SAX Parsers in Java.

UNIT III:
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Http sessions and cookies.

UNIT IV:
File Handling PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.
UNIT V:
Connecting to Database (MYSQL as reference), executing simple queries, Storing form data into tables, handling results.

Text Books:

Reference Books:
3. Java Script, D.Flanagan, O"Reilly, SPD
4. Beginning Web Programming – Jon Duckett WROX.
6. Internet and world wide web – How to program, Dietel and Nieto, Pearson.
IV Year. B.Tech. CE– II Semester.
Prerequisite(s): None.

Course Objectives:
Develop ability to:
1. Understand the basic concepts of solar energy
2. Understand the methods of storage of solar energy
3. Understand basic concepts of wind energy, biomass energy.
4. Understand basic concepts of geothermal energy and ocean energy
5. Understand the need of direct energy conversion.

Course Outcomes:
At the end of the course student would be able to:
CO1. Get thorough knowledge on various types of renewable energy sources
CO2. Develop storage systems of solar energy for different applications.
CO3. Get thorough knowledge on hybrid energy systems
CO4. Get thorough knowledge on principles of direct energy conversion
CO5. Apply the above conceptual things to real world electrical and electronic problems

UNIT-I
Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
Solar Energy Collection, Storage & Applications:
Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Storage & Applications: Different methods, sensible, latent heat and stratified storage, solar ponds.
Solar applications - solar heating / cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT -III
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Bertz criteria.
UNIT- IV
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.


UNIT-V
Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, and principles of DEC.

Text Books:
2. Introduction to renewable energy, Vaughn Neison, CRC Press (Taylor & Francis)

Reference Books:
Course Objectives:

Develop ability to:
1. Learn the basics of human physiology
2. Understand the basics of bio-medical transducers and recorders.
3. Understand the applications of measuring, recording and monitoring instruments.
4. Understand the concepts of various medical instruments
5. Understand the concepts of various supporting systems.

Course Outcomes:

At the end of the course, student would be able to:

CO1. Explain the functioning of different human physiological systems.
CO2. Explain the operations of transducers and recorders used for bio-medical applications.
CO3. Explain the principles of medical imaging systems.
CO4. Explain the principles of monitoring instruments used for bio-medical application
CO5. Explain the need for health supporting systems

UNIT I - Human Physiology

Introduction to generalized medical instrumentation system, components of instrumentation system, physiological system of human body, cardiovascular system. Respiratory system, Nervous system, generation of bioelectric potentials, Action potential, resting potential, Neuronal communication.

UNIT II - Bio-Potential Electrodes, Transducers And Recorders

The electrode – electrolyte interface, Polarization, Ag/Agcl Electrodes, Body surface electrodes, Internal Electrodes. Transducers in general, Pressure Transducers, Temperature transducers, pulse sensors, Basic recording systems.

UNIT III - Medical Imaging Systems

Basics of medical imaging systems, block diagrams and applications of - X-ray machine, Computer Tomography, Magnetic Resonance Imaging systems, Ultrasonic Imaging systems.

UNIT IV - Monitoring Systems

Basic principles of - Stethoscope, BP measuring Instrument, Electrocardiography(ECG), Electroencephalography( EEG) and Electromyography(EMG) recorders,

UNIT V - Supporting Systems

Basic principles of Pacemaker system, Transcutaneous Electrical Nerve stimulation (TENS), surgical diathermy, Heart lung machine, Hemo Dialysis, Lithotripsy.
Text Books:

Reference Books:
Course Objectives
1. To know the working principle of earth moving equipment
2. To study types and working principle of conveying and hoisting equipment
3. To understand the working principle of concrete producing, concrete screening and concrete mixing equipment
4. To know the principle of pneumatic equipment and tools

Course Outcomes:
At the end of the course, the student will be able to:

CO1 Understand the basics of material handling systems by using earth moving equipments.
CO2 Understand working principles of various conveying systems used in industries.
CO3 Understand the process of aggregating the materials with crushers and screens.
CO4 Understand the working principles of pneumatic equipments.
CO5 Apply the various methods for cost minimization along with maintenances

UNIT-I: Introduction: Material handling principles; material handling equipment and material handling systems.

Earth moving and Excavation Equipment-Shovels, Dragline, Clam shell, Cable Excavator, Bucket Wheel Excavator, Tractor, Bull - dozer, Scraper, Earth compactors.

UNIT-II: Conveying Equipment: Belt Conveyor, Screw Conveyor, Bucket Conveyor, Aerial ropeway,


UNIT-V: Cost minimization & Maintenance:
Cost minimization methods of material handling- Maintenance of Material Handling Equipments, Safety in material handling, Ergonomics of Material Handling equipment.
Text Books:

Reference Books:
Course Objectives:

Develop ability to:

1. Determine present and future values of investment projects, annuities and be able to compute outstanding principal (capital) as well as interest using loan schedules.
2. Provide a motivation, based on a normative theory of individual behavior in the face of uncertainty, for the study of insurance models.
3. Measure the number of deaths (in general, or due to a specific cause) in a particular population, scaled to the size of that population, per unit of time.
4. Understand benefits of life insurance, various insurance policies, payments and premiums.
5. Predict future trends and patterns in the data behavior of processes or metrics over a period of time using time series models. Fit a model and proceed to forecasting and monitoring.

Course Outcomes:

At the end of the course, the student would be able to:

CO1. Assess financial loss and profit of an organization or in any business, shares.
CO2. Apply an economic theory that explains the mathematical expectation of the insured loss and profit.
CO3. Organize to assess various risks involved in terms of mortality, claims which can be received, profitability analysis for organization and individuals.
CO4. Analyze Life Insurance policies, Pension plans and Health Care Plans.
CO5. Apply time series models in Economic, Sales, Weather forecasting, Budgetary and stock market analysis, Inventory and Utility studies etc.

UNIT-I : Financial mathematics

Rate of Interest; Normal and effective rates of interest and discount; Accumulated Value; Present value of cash flows; Valuing Cash Flows; Present Value Principals of compound interest; force of interest and discount compound interest; Annuities certain; Deferred annuities, Concepts of different annuities, annuities due, Redemption of Loans, Sinking Funds and Capital redemption assurance.

UNIT-II : Utility Theory

Insurance and Utility Theory; Models for Individual Claims and their sums; Approximations for the distribution of Sums; Application to Insurance; Survival function Time until-death for a person age x; Curate future life time.
UNIT-III : Mortality
Functions and laws of mortality tables; Select ultimate and aggregate mortality tables; Functions other than yearly policy Values; Surrender values and paid up Values; Bonus Special policies; Joint life and last survivor statuses; The Mortality tables.

UNIT-IV : Life Insurance and Premiums
Insurance payable at the moment’s of death and at the end of the year of death-level benefit insurance; endowment insurance; differed insurance and varying benefit insurances; recursions; commutation functions; Single payment.Net Premiums and Net Premium Reserves of insurance policies; Insurance policies with expenses and bonuses introduced; Gross premiums and Gross premium reserves of insurance policies.

UNIT-V : Time Series Analysis and Forecasting
Basic concepts of Time Series Analysis; Components of Time Series: Moving Averages, Exponential Smoothing, Autoregressive and Partial Autoregressive Functions; Forecasting Models: Moving/Autoregressive Moving Averages (MA,AR,ARMA and ARIMA); Prediction limits, Forecast Updating and Holt-Winter’s Methods; Box-Jenkins Method of modeling.

Text Books:

Reference Books:
1. Introduction to Time Series Analysis and Forecasting, Cheryl L. Jennings, Douglas C. Montgomery, and Murat Kulahci
5. Time series analysis, forecasting and control Book by George E. P. Box