

S1:

### **MAT 101 LINEAR ALGEBRA AND CALCULUS**

CO1: solve systems of linear equations, diagonalize matrices and characterise quadratic forms

CO2: compute the partial and total derivatives and maxima and minima of multivariable functions

CO3: compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas

CO4: perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent

CO5: determine the Taylor and Fourier series expansion of functions and learn their applications

### **CYT 100 ENGINEERING CHEMISTRY**

CO1: Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.

CO2: Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.

CO3: Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.

CO4: Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.

CO5: Study various types of water treatment methods to develop skills for treating wastewater.

### **EST 100 ENGINEERING MECHANICS**

CO1: Recall principles and theorems related to rigid body mechanics

CO2: Identify and describe the components of system of forces acting on the rigid body

CO3: Apply the conditions of equilibrium to various practical problems involving different force system.

CO4: Choose appropriate theorems, principles or formulae to solve problems of mechanics.

CO:5 Solve problems involving rigid bodies, applying the properties of distributed areas and masses

### **EST 130: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

CO1: Apply fundamental concepts and circuit laws to solve simple DC electric circuits

CO2: Develop and solve models of magnetic circuits

CO3: Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state

CO4: Describe working of a voltage amplifier

### **HUN 101 LIFE SKILLS**

CO1: Define and Identify different life skills required in personal and professional life

CO2: Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.

CO3: Explain the basic mechanics of effective communication and demonstrate these through presentations.

### **CYL 120 ENGINEERING CHEMISTRY LAB**

CO1: Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses

CO2: Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs

CO3: Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds

CO4: Acquire the ability to understand, explain and use instrumental techniques for chemical analysis  
CO5: Learn to design and carry out scientific experiments as well as accurately record and analyse the results of such experiments

### **ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP**

CO 1 Demonstrate safety measures against electric shocks.

CO 2 Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols

CO 3 Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings

CO 4 Identify and test various electronic components

## **MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS**

CO1: Compute the derivatives and line integrals of vector functions and learn their applications

CO2: Evaluate surface and volume integrals and learn their inter-relations and applications.

CO3: Solve homogeneous and non-homogeneous linear differential equation with constant coefficients

CO4: Compute Laplace transform and apply them to solve ODEs arising in engineering

CO5: Determine the Fourier transforms of functions and apply them to solve problems arising in engineering

## **PHT 100 ENGINEERING PHYSICS A (FOR CIRCUIT BRANCHES)**

CO 1 Compute the quantitative aspects of waves and oscillations in engineering systems.

CO 2 Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.

CO 3 Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.

CO 4 Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems

## **EST 120 BASICS OF CIVIL & MECHANICAL ENGINEERING**

CO 1 Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering. CO 2 Explain different types of buildings, building components, building materials and building construction

CO 3 Describe the importance, objectives and principles of surveying.

CO 4 Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps

CO 5 Discuss the Materials, energy systems, water management and environment for green buildings.

## **EST 110 ENGINEERING GRAPHICS**

CO 1 Draw the projection of points and lines located in different quadrants

CO 2 Prepare multiview orthographic projections of objects by visualizing them in different positions CO 3 Draw sectional views and develop surfaces of a given object

CO 4 Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.

CO 5 Convert 3D views to orthographic views

CO 6 Obtain multiview projections and solid models of objects using CAD tools

### **EST 102 PROGRAMING IN C**

CO 1 Analyze a computational problem and develop an algorithm/flowchart to find its solution

CO 2 Develop readable\* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.

CO 3 Write readable C programs with arrays, structure or union for storing the data to be processed

CO 4 Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem

CO 5 Write readable C programs which use pointers for array processing and parameter passing

CO 6 Develop readable C programs with files for reading input and storing output

### **HUN 102 PROFESSIONAL COMMUNICATION**

CO 1 Develop vocabulary and language skills relevant to engineering as a profession

CO 2 Analyze, interpret and effectively summarize a variety of textual content

CO 3 Create effective technical presentations

CO 4 Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus

CO 5 Identify drawbacks in listening patterns and apply listening techniques for specific needs

CO 6 Create professional and technical documents that are clear and adhering to all the necessary conventions

### **PHL 120 ENGINEERING PHYSICS LAB**

CO 1 Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories

CO 2 Understand the need for precise measurement practices for data recording

CO 3 Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations

CO 4 Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics

### **ESL 120 CIVIL & MECHANICAL WORKSHOP**

CO 1 Name different devices and tools used for civil engineering measurements

CO 2 Explain the use of various tools and devices for various field measurements

CO 3 Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.

CO 4 Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing. CO 5 Compare different techniques and devices used in civil engineering measurements

### **S3:**

#### **MAT201 COURSE NAME PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS**

CO 1 Understand the concept and the solution of partial differential equation.

CO 2 Analyse and solve one dimensional wave equation and heat equation.

CO 3 Understand complex functions, its continuity differentiability with the use of Cauchy Riemann equations.

CO 4 Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function

#### **CET201: MECHANICS OF SOLIDS**

CO1: Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies.

CO2: Explain the behaviour and response of various structural elements under various loading conditions.

CO3: Apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain energies in structural elements subjected to axial/transverse loads and bending/twisting moments.

CO4: Choose appropriate principles or formula to find the elastic constants of materials making use of the information available.

### **CET 203: Fluid Mechanics and Hydraulics**

CO1: Recall the relevant principles of hydrostatics and hydraulics of pipes and open channels

CO2: Identify or describe the type, characteristics or properties of fluid flow

CO3: Analyse or compute the flow through open channels, perform the design of prismatic channels

### **CET205: SURVEYING & GEOMATICS**

CO1: Apply surveying techniques and principles of levelling for the preparation of contour maps, computation of area-volume and sketching mass diagram

CO2: Apply the principles of surveying for triangulation

CO3: Apply different methods of traverse surveying and traverse balancing

CO4: Identify the possible errors in surveying and apply the corrections in field measurements

### **MCN201: SUSTAINABLE ENGINEERING**

CO1: Understand the relevance and the concept of sustainability and the global initiatives in this direction

CO2: Explain the different types of environmental pollution problems and their sustainable solutions

CO3: Discuss the environmental regulations and standards

### **HUT 200: PROFESSIONAL ETHICS**

CO1: Understand the core values that shape the ethical behaviour of a professional

CO2: Adopt a good character and follow an ethical life

CO3: Explain the role and responsibility in technological development by keeping personal ethics and legal ethics

CO4: Solve moral and ethical problems through exploration and assessment by established experiments.

### **CEL 201: CIVIL ENGINEERING PLANNING & DRAFTING LAB**

CO1: Illustrate ability to organise civil engineering drawings

CO2: Prepare building drawings as per the specified guidelines.

CO3: Assess a complete building drawing to include all necessary information

CO4: Create a digital form of the building plan using any drafting software

### **CEL 203 SURVEY LAB**

CO1: Plot the given area using chain/tape and compass and compute its area.

CO2: Determine the reduced levels of the given points in the field with respect to the Bench Mark of RL=100.00

CO3: Find out the distance between two inaccessible points A and B. Baseline measurement is allowed.

CO4: Compute the area of a given plot using total station.

### **S4:**

#### **CET202 Engineering Geology**

CO1: Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions.

CO2: Identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions.

CO3: Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions.

CO4: Analyze and classify geological processes, earth materials and groundwater.

#### **CET 204 GEOTECHNICAL ENGINEERING – I**

CO1: Explain the fundamental concepts of basic and engineering properties of soil

CO2: Describe the laboratory testing methods for determining soil parameters

CO3: Solve the basic properties of soil by applying functional relationships

CO4: Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics

CO5: Analyze the soil properties to identify and classify the soil

## **CET206 TRANSPORTATION ENGINEERING**

CO1: Apply the basic principles of Highway planning and design highway geometric elements

CO2: Apply standard code specifications in judging the quality of highway materials; designing mixes and pavements

CO3: Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities

CO4: Understand about railway systems, tunnel, harbour and docks

## **EST 200: DESIGN AND ENGINEERING**

CO1: Explain the different concepts and principles involved in design engineering.

CO2: Apply design thinking while learning and practicing engineering.

CO3: Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.

## **MAT 202: PROBABILITY, STATISTICS AND NUMERICAL METHODS**

CO1: Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.

CO2: Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.

CO3: Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population

CO4: Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques

## **MCN202: CONSTITUTION OF INDIA**

CO1: Explain the background of the present constitution of India and features.

CO2: Utilize the fundamental rights and duties.

CO3: Understand the working of the union executive, parliament and judiciary.

CO4: Understand the working of the state executive, legislature and judiciary.

CO5: Utilize the special provisions and statutory institutions.



### **CEL 202 MATERIAL TESTING LAB – I**

CO1: The understand the behaviour of engineering materials under various forms and stages of loading.

CO2: Characterize the elastic properties of various materials.

CO3: Evaluate the strength and stiffness properties of engineering materials under various loading conditions.

### **CEL 204 FLUID MECHANICS LAB**

CO1: Apply fundamental knowledge of Fluid Mechanics to corresponding experiments

CO2: Apply theoretical concepts in Fluid Mechanics to respective experiments

CO3: Analyse experimental data and interpret the results

CO4: Document the experimentation in prescribed manner

**S5**

**CET 301 : STRUCTURAL ANALYSIS I**

CO 1 ; Apply the principles of solid mechanics to analyse trusses.

CO 2 ; Apply various method to determine deflections in statically determinate structures.

CO 3 ; Identify the problems with static indeterminacy and tackling such problems by means of the method of consistent deformations and energy principles.

CO 4 ; Apply specific method such as slope deflection and moment distribution methods of structural analysis for typical structures with different characteristics.

CO 5 ; Apply suitable methods of analysis of various types of structures including cables , suspension bridges and arches.

CO 6 ; Analyse the effects of moving loads on structures using influence lines.

## CET 303 DESIGN OF CONCRETE STRUCTURES

- CO 1 ; Recall the fundamental concepts of limit state design and code provisions for design of concrete members under bending, shear, compression and torsion.
- CO 2 ; Analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression.
- CO 3 ; Design and detail beams, slab, stairs and footings using IS code provisions.
- CO 4 ; Design and detail columns using IS code and SP 16 design charts.
- CO 5 ; Explain the criteria for earthquake resistant design of structures and ductile detailing of concrete structures subjected to seismic forces.

## **CET 305 GEOTECHNICAL ENGINEERING II**

CO 1; Understand soil exploration methods.

CO 2 ; Explain the basic concepts, theories and methods of analysis in foundation engineering.

CO 3 ; Calculate bearing capacity, pile capacity, foundation settlement and earth pressure.

CO4 ; Analyse shallow and deep foundations.

CO 5 ; Solve the field problems related to geotechnical engineering.

## **CET 307 HYDROLOGY & WATER RESOURCES ENGINEERING**

- CO 1 ; Describe and estimate the different components of hydrologic cycle by processing hydro meteorological data.
- CO 2 ; Determine the crop water requirements for the design of irrigation canals by recollecting the principles of irrigation engineering.
- CO 3 ; Perform the estimation of streamflow and or describe the behaviour and control structures.
- CO 4 ; Describe and apply the principle of reservoir engineering to estimate the capacity of reservoirs and their useful life.
- CO 5 ; Demonstrate the principle of groundwater engineering and apply them for computing the yield of aquifers and wells.

## **CET 309 CONSTRUCTION TECHNOLOGY AND MANAGEMENT**

CO 1 ; Describe the properties of materials used in construction.

CO 2 ; Explain the properties of concrete and its determination.

CO 3 ; Describe the various elements of building construction.

CO 4 ; Explain the technologies for construction.

CO 5 ; Describe the procedure for planning and executing public works.

CO 6 ; Apply scheduling techniques in project planning and control.

## **MCN 301 DISASTER MANAGEMENT**

CO 1 ; Define and use various terminologies in use in disaster management parlance and organise Each of these terms in relation to the disaster management cycle.

CO 2 ; Distinguish between different hazard types and vulnerability types and do assessment.

CO 3 ; Identify the components and describe the process of risk assessment and apply appropriate Methodologies to assess risk

CO 4 ; Explain the core elements and phases of Disaster risk management and develop Possible measures to reduce disaster risk across sector and community

CO 5 ; Identify factors that determine the nature of disaster response and discuss the various Disaster response actions.

CO 6 ; Explain the various legislations and best practices for disaster management and risk Reduction at national and international level.

## **CEL 331 MATERIAL TESTING LAB II**

CO 1 ; To describe the basic properties of various construction materials

CO 2 ; Characterise the mechanical and physical properties of various construction material

CO 3 ; Interpret the quality of various construction materials as per IS Codal provisions.

## **CEL 333 GEOTECHNICAL ENGINEERING LAB II**

CO 1 ; Identify and classify soil based on standard geotechnical experimental methods.

CO 2 ; Perform and analyse permeability tests.

CO 3 ; Interpret engineering behaviour of soil based on test result.

CO 4 ; Perform laboratory compaction, CBR and in place density test for fill control in  
The field.

CO5 ; Evaluate the strength of soil by performing various tests viz direct shear test,  
unconfined compressive strength test and triaxial shear test.

CO 6 ; Evaluate settlement characteristics of soils.



**CET 302 STRUCTURAL ANALYSIS II**

CO 1 ; Understand the principles of plastic theory and its applications in structural analysis.

CO 2 ; Examine the type of structure and decide on the method of analysis.

CO 3 ; Apply approximate methods of analysis for framed structures to ascertain framed structures.

CO 4 ; Apply the force method to analyse framed structures.

CO 5 ; Apply the displacement method to analyse framed structures.

CO 6 ; Remember basic dynamics, understand the basic principles of structural dynamics and apply  
The same to simple structures.

## **CET304 ENVIRONMENTAL ENGINEERING**

CO1 ; To appreciate the role of environmental engineering in improving the quality of environmental.

CO 2 ; To plan for collection and conveyance of water and waste water.

CO 3 ; To enhance natural water purification processes in an engineered environment.

CO 4 ; To decide on appropriate technology for water and waste water treatment.

## **CET306 DESIGN OF HYDRAULIC STRUCTURES**

- CO 1 ; Elucidate the causes of failure, principles of failures of design of different components Of hydraulic structures.
- CO 2 ; Describe the features of canal structures and perform the design of alluvial canals.
- CO 3 ; Perform the hydraulic design of minor irrigation structures such as cross drainage works, Canal falls, cross regulator.
- CO 4 ; Prepare the scaled drawings of different minor irrigation structures.
- CO 5 ; Describe the design principle and features of dams and perform the stability analysis of gravity dams.

## **CET 308 COPMPREHENSIVE COURSE WORK**

CO 1 ; Learn to prepare for a competitive examination.

CO 2 ; Comprehend the questions in civil engineering field and answer them with confidence.

CO 3 ; Communicate effectively with faculty in scholarly environments.

CO 4 ; Analyse the comprehensive knowledge gained in basic courses in the fiels of civil engineering.

## **CET 352 ADVANCED CONCRETE TECHNOLOGY**

CO 1 ; To recall the properties and testing procedure of concrete materials as per IS code

CO 2 ; To describe the procedure of determining the properties of fresh and hardened concrete

CO 3 ; To design concrete mix using IS Code methods

CO 4 ; To explain non destructive testing of concrete

CO 5 ; To describe the various special types of concretes

## **HUN300 INDUSTRIAL ECONOMICS & FOREIGN TRADE**

CO 1 ; Explain the problem of scarcity of resources and consumer behaviour and to evaluate the Impact of government policies on the general economic welfare.

CO 2 ; Take appropriate decisions regarding volume of output and to evaluate the social cost of Production.

CO 3 ; Determine the functional requirement of a firm under various competitive conditions.

CO 4 ; Examine the overall performance of the economy and the regulation of economic fluctuations and its impact on various sections in the society.

CO 5 ; Determine the impact of changes in global economic policies on the business opportunities Of a firm.

## **CEL332 TRANSPORTATION ENGINEERING LAB**

CO 1 ; Analyse the suitability of soil as a pavement subgrade material

CO 2 ; Assess the suitability of aggregates as a pavement construction material

CO 3 ; Characterise bitumen based on its properties so as to recommend it as a pavement construction Material

CO 4 ; Design bituminous mixes for pavement layers

CO 5 ; Assess functional adequacy of pavements based on roughness of pavement surface

## **CEL334 CIVIL ENGINEERING SOFTWARE LAB**

CO 1 ; To undertake analysis and design of multi-storied framed structures, schedule a given set of project activities using a software

CO 2 ; To prepare design details of different structural components, implement plan for a project

CO 3 ; To prepare a technical document on engineering activities like surveying, structural design And project planning