**2nd Year Course Outcome**

**Odd Semester**

**KCE 301 ENGINEERING MECHANICS (L-T-P 3-1-0) Credit – 4**

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

 1. Use scalar and vector analytical techniques for analyzing forces in statically determinate

 structures

 2. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple,

 practical problems.

 3. Apply basic knowledge of mathematics and physics to solve real-world problems.

 4. Understand basic dynamics concepts – force, momentum, work and energy;

 5. Understand and be able to apply Newton’s laws of motion;

**KCE 302 SURVEYING & GEOMATICS (L-T-P 3-1-0) Credit – 4**

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

1. Describe the function of surveying and work with survey instruments, take observations, and prepare plan, profile, and cross-section and perform calculations.

2. Calculate, design and layout horizontal and vertical curves.

3. Operate a total station and GPS to measure distance, angles, and to calculate differences in

 elevation. Reduce data for application in a geographic information system.

4. Relate and apply principles of photogrammetry for surveying.

5. Apply principles of Remote Sensing and Digital Image Processing for Civil Engineering problems

**KCE 303 FLUID MECHANICS (L-T-P 3-0-0) Credit – 3**

Course Outcomes: At the end of this course the student will be able to1. Understand the broad principles of fluid statics, kinematics and dynamics

2. Understand definitions of the basic terms used in fluid mechanics

3. Understand classifications of fluid flow

4. Apply the continuity, momentum and energy principles

5. Apply dimensional analysis

**Even Semester**

**KCE 401 Materials, Testing & Construction Practices (L-T-P 3-0-0) Credit – 3**

Course Outcomes: At the end of this course the student will be able to1. Identify various building materials and to understand their basic properties.

2. Understand the use of non-conventional civil engineering materials.

3. Study suitable type of flooring and roofing in the construction process.

4. Characterize the concept of plastering, pointing and various other building services.

5. Exemplify the various fire protection, sound and thermal insulation techniques, maintenance

and repair of buildings

**KCE 402 INTRODUCTION TO SOLID MECHANICS (L-T-P 3-1-0) Credit – 4**

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

 1. Describe the concepts and principles of stresses and strains

 2. Analyze solid mechanics problems using classical methods and energy methods

 3. Analyze structural members subjected to combined stresses

 4. Calculate the deflections at any point on a beam subjected to a combination of loads

5. Understand the behavior of columns, springs and cylinders against loads.

**KCE 403 HYDRAULIC ENGINEERING & MACHINES (L-T-P 3-1-0) Credit – 4**

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

1. Apply their knowledge of fluid mechanics in addressing problems in open channels.

2. Solve problems in uniform, gradually and rapidly varied flows in steady state conditions.

3. Have knowledge in hydraulic machineries like pumps and turbines

**3rd Year Course Outcome**

**Odd Semester**

**KCE 501 GEOTECHNICAL ENGINEERING (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Classify the soil and determine its Index properties.

CO-2 Evaluate permeability and seepage properties of soil.

CO-3 Interpret the compaction and consolidation characteristics & effective stress concept of soil.

CO-4 Determine the vertical and shear stress under different loading conditions and explain the phenomenon of soil liquefaction.

CO-5 Interpret the earth pressure and related slope failures.

**KCE502 STRUCTURAL ANALYSIS (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Explain type of structures and method for their analysis.

CO-2 Analyze different types of trusses for member forces.

CO-3 Compute slope and deflection in determinate structures using different methods.

CO-4 Apply the concept of influence lines and moving loads to compute bending moment and shear force at different sections.

CO-5 Analyze determinate arches for different loading conditions.

**KCE 503 QUANTITY ESTIMATION AND CONSTRUCTION MANAGEMENT (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the importance of units of measurement and preliminary estimate for administrative approval of projects.

CO-2 Understand the contracts and tender documents in construction projects.

CO-3 Analyze and assess the quantity of materials required for civil engineering works as per specifications.

CO 4 Evaluate and estimate the cost of expenditure and prepare a detailed rate analysis report.

CO-5 Analyze and choose cost effective approach for civil engineering projects.

**KCE 051 CONCRETE TECHNOLOGY (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the properties of constituent material of concrete.

CO-2 Apply admixtures to enhance the properties of concrete.

CO-3 Evaluate the strength and durability parameters of concrete.

CO-4 Design the concrete mix for various strengths using difference methods.

CO-5 Use advanced concrete types in construction industry.

**KCE 052 MODERN CONSTRUCTION MATERIALS (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the use of modern construction materials.

CO-2 Use geosynthetics and bituminous materials in constructions.

CO-3 Apply knowledge of modern materials in production of variety of concrete.

CO-4 Apply knowledge of composites and chemicals in production of modern concrete.

CO-5 Use modern water proofing and insulating materials in constructions.

**KCE‐053 : OPEN CHANNEL FLOW (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Apply knowledge of fluid flow for designing of channel sections.

CO-2 Analyze the gradually varied flow in channel section.

\CO-3 Analyze the rapidly varied flow in channel sections.

CO-4 Apply numerical methods for profile computation in channels.

CO-5 Design channels for sub critical and super critical flows.

**KCE 054 ENGINEERING GEOLOGY (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the scope of geological studies.

CO-2 Understand the rocks and its engineering properties.

CO-3 Understand the minerals and constituents of rocks.

CO-4 Understand the rock deformations, their causes effects and preventive measures.

CO-5 Understand the ground water reserves, Geophysical exploration methods and site selection for mega projects.

**KCE055 ENGINEERING HYDROLOGY (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the basic concept of hydrological cycle and its various phases.

CO-2 Understand the concept of runoff and apply the knowledge to construct the

hydrograph.

CO-3 Apply the various methods to assess the flood.

CO-4 Assess the quality of various forms of water and their aquifer properties.

CO-5 Understand the well hydraulics and apply ground water modelling techniques.

**KCE 056 SENSOR AND INSTRUMENTATION TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Analyze the errors during measurements

CO-2 Describe the measurement of electrical variables

CO-3 Describe the requirements during the transmission of measured signals

CO-4 Construct Instrumentation/Computer Networks

CO-5 Suggest proper sensor technologies for specific applications

CO-6 Design and set up measurement systems and do the studies

**KCE 057 AIR & NOISE POLLUTION CONTROL (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand air pollutants and their impacts.

CO-2 Explain air pollution chemistry and meteorological aspects of air pollutants.

CO-3 Demonstrate methods for controlling particulate air pollutants.

CO-4 Demonstrate methods for controlling gaseous air pollutants.

CO-5 Understand automotive emission standards.

CO-6 Apply methods for controlling noise pollution

**KCE 058 GIS AND ADVANCE REMOTE SENSING (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the concepts of Photogrametry and compute the heights of objects

CO-2 Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies .

CO-3 Understand the basic concept of GIS and its applications, know different types of data representation in GIS

CO-4 Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are

CO-5 Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems

CO-6 Apply knowledge of GIS and understand the integration of Remote Sensing and GIS

**Even Semester**

**KCE 601 DESIGN OF CONCRETE STRUCTURE (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Analyse and Design RCC beams for flexure by IS methods.

CO-2 Analyse and Design RCC beams for shear by IS methods.

CO-3 Analyse and Design RCC slabs and staircase by IS methods.

CO-4 Design the RCC compression members by IS methods.

CO-5 Design various types of footings and cantilever retaining wall

**KCE 062 TRANSPORTATION ENGINEERING (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the history of road development, their alignment & Survey.

CO-2 Design the various geometric parameters of road.

CO-3 Study the traffic characteristics & design of road intersections & signals.

CO-4 Examine the properties of highway materials & their implementation in design of

pavements.

CO-5 Learn methods to construct various types of roads.

**KCE 603 ENVIRONMENTAL ENGINEERING (L-T-P 3-1-0) Credit – 4**

Course Outcomes: After completion of the course student will be able to:

CO-1 Assess water demand and optimal size of water mains.

CO-2 Layout the distribution system &amp; assess the capacity of reservoir.

CO-3 Investigate physical, chemical &amp; biological parameter of water.

CO-4 Design treatment units for water and waste water.

CO-5 Apply emerging technologies for treatment of waste water.

**KCE 061 ADVANCE STRUCTURAL ANALYSIS (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Analyze indeterminate structure to calculate unknown forces, slope and deflections by different methods.

CO-2 Apply principle of influence lines to analyze indeterminate beams and arches.

CO-3 Analyze and design cable structure with their influence line diagram.

CO-4 Apply basics of force and stiffness methods of matrix analysis for beams, frames and trusses.

CO-5 Apply the basic of plastic analysis to analyze the structure by using different mechanism.

**KCE062 RIVER ENGINEERING (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Explain river morphology and its classification.

CO-2 Explain hydraulic geometry and behavior of river.

CO-3 Explain socio-cultural influences and ethics of stream restorations.

CO-4 Analyze flow and sediment transport in rivers and channels.

CO-5 Design guide band, embankments and flood protection systems.

**KCE063 REPAIR AND REHABILITATION OF STRUCTURES (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand the fundamentals of maintenance and repair strategies.

CO-2 Identify for serviceability and durability aspects of concrete.

CO-3 Know the materials and techniques used for repair of structures.

CO-4 Decide the appropriate repair and retrofitting techniques.

CO-5 Use appropriate health monitoring technique and demolition methods

**KCE 064 FOUNDATION DESIGN (L-T-P 3-0-0) Credit – 3**

Course Outcomes: After completion of the course student will be able to:

CO-1 Understand various methods of Soil Exploration and its importance.

CO-2 Analyze bearing capacity and settlement of soil for shallow foundation.

CO-3 Design the various types of shallow foundation and understand the basics of deep foundation.

CO-4 Understand the characteristics of well foundations and retaining wall.

CO-5 Understand the concept of soil reinforcement.

**4rth Year Course Outcome**

**Odd Semester**

**KCE070 Railway, Waterway and Airway Engineering 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Explain the importance of railway infrastructure.

CO-2. Identify the factors governing design of railway infrastructures.

CO-3. Analysis and design the railway track system.

CO-4. Understand the concepts of airport engineering and design components of airport.

CO-5. Associate with the concepts of water transport system.

**KCE071 Sustainable Construction Methods 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Classify the sustainable construction materials.

CO-2. Apply cutting-edge construction technologies.

CO-3. Evaluate different sustainable construction methods.

CO-4. Apply different rating systems of construction/buildings as a professional.

CO-5. Apply life cycle approach to optimize the performance of green construction materials

**KCE072 Probability Methods in Civil Engineering 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Apply probabilistic techniques for the analysis of complex Civil Engineering structures using advanced techniques.

CO-2. Demonstrate mathematical and statistical knowledge and skills to be applied in various civil engineering structures.

CO-3. Apply the laws of logic to mathematical statements.

CO-4. Develop mathematical thinking in the conduct of different experiments and presentation of results precisely.

**KCE073 Advance Concrete Design 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Understand the design criteria as well as design concept of circular and rectangular tanks.

CO-2. Design the Intz tank, RC domes and beams, cylindrical and rectangular tanks.

CO-3. Understand the concept of pre tensioning and post tensioning and different systems used in pre tensioning.

CO-4. Analysis and design the simple prestressed beams.

CO-5. Design deep beams and corbel as per IS 456.

**KCE074 Solid Waste Management 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO--1. Understand the concept of solid waste management.

CO-2. Explain handling and processing of solid waste.

CO-3. Apply the concept of landfilling for disposal of solid waste.

CO-4. Design composting and other solid waste conversion units.

CO-5. Understand the various hazardous waste, risk assessment and legislation

**KCE075 Design of Steel Structures 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Understand properties of steel and types of loads acting on steel structures.

CO-2. Design welded and bolted type of connections for elementary steel structures.

CO-3. Design tension members for elementary steel structures.

CO-4. Design compression members such as simple columns, braced and latticed columns and column bases.

CO-5. Design flexural members such as beams, purlins and girders

**KCE076 Urban Transportation Planning 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Understand the basic concepts of planning at urban and regional levels.

CO-2. Distinguish between the Conventional and current approaches for travel demand estimation.

CO-3. Implement various types of models and trip generation.

CO-4. Analyze the urban travel markets.

CO-5. Evaluate the transport planning proposals

**KCE077 Geo-synthetics and Reinforced Soil Structures 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Identify the type of Geosynthetic and their relevance.

CO-2. Analyze &compute different properties of Geosynthetics.

CO-3. Understand the emerging trends of Geosynthetic in geotechnical applications.

CO-4. Design the Reinforced Earth Walls using Geosynthetic material.

CO-5. Design the Reinforced Foundation using Geosynthetic materials

**KCE078 Irrigation and Water Resource Engineering 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Describe the components of hydrological cycle, evaporation process and consumptive use.

CO-2. Apply the knowledge of stream flow measurement techniques and hydrograph theory for

computation of run-off.

CO-3. Design different types of irrigation channels and water logging preventive measures.

CO-4. Design the regulatory and control systems of canal and irrigation outlets.

CO-5. Apply the knowledge of ground water hydrology and determination of discharge through

wells.

**KCE079 Disaster Preparedness and Management 3L:0T:0P 3Credits**

Course Outcomes: At the end of this course students will demonstrate the ability to:

CO-1. Understand the basic concepts of disasters and hazards

CO-2. Classify the natural disasters.

CO-3. Analyze the impacts of disaster on various societal components

CO-4. Understand the components of disaster management cycle and roles of various agencies its risk reduction

CO-5. Understand the process of recovery, reconstruction and development methods

**HSMC & OPEN ELECTIVES II LIST 2021-22**

**KHU701/KHU801 RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO-1. Students can understand the definitions, concepts and components of Rural Development

CO-2. Students will know the importance, structure, significance, resources of Indian rural economy.

CO-3. Students will have a clear idea about the area development programmes and its impact.

CO-4. Students will be able to acquire knowledge about rural entrepreneurship.

CO-5. Students will be able to understand about the using of different methods for human resource planning

**KHU702/KHU802 PROJECT MANAGEMENT & ENTREPRENEURSHIP 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO-1. Entrepreneurship

CO-2. Entrepreneurial Idea and Innovation

CO-3. Project Management

CO-4. Project Financing

CO-5. Social Entrepreneurship

**KOE071 FILTER DESIGN 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO1 Choose an appropriate transform for the given signal.

CO2 Choose appropriate decimation and interpolation factors for high performance filters.

CO3 Model and design an AR system.

CO4 Implement filter algorithms on a given DSP processor platform.

**KOE072 BIOECONOMICS 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

1. Students will be able to understand basic concept of Bioeconomics, challenges, opportunities& regulations

2. Students will be able to understand development and innovation in terms of bioeconomy towards

sustainable development

3. Students will be able to understand Inter- and transdisciplinarity in bioeconomy &research

approaches

4. Students will be able to explain biobased resources ,value chain, innovative use of biomass and

biological knowledge to provide food, feed, industrial products

**KOE073 MACHINE LEARNING 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO-1. Introduction to Well defined learning problems

CO-2. Student get the knowledge of decision tree and artificial neural network

CO-3. Estimating Hypotheses Accuracy, Basics of sampling Theory

CO-4. Computational Learning Theory: Sample Complexity for Finite Hypothesis spaces

CO-5. Genetic Algorithms: an illustrative example, Hypothesis space search, Genetic Programming

**KOE074 RENEWABLE ENERGY RESOURCES 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO-1. Introduction to conventional and non-conventional energy

CO-2. Solar Thermal Energy: Solar radiation, flat plate collectors

CO-3. Geothermal Energy: Resources of geothermal energy

CO-4. Thermo-electrical and thermionic Conversions

CO-5. Bio-mass: Availability of bio-mass and its conversion theory

**KOE075 OPERATIONS RESEARCH 3L:0T:0P 3Credits**

COURSE OUTCOME: After completion of the course student will be able to:

I Introduction:

II Transportation Problems

III Network Techniques

IV Theory of Games

V Inventory Control

**KOE-076 VISION FOR HUMANE SOCIETY 3L:0T:0P 3 Credits**

COURSE OUTCOME: After completion of the course student will be able to:

CO-1. The methodology of this course is exploration and thus universally adaptable. It involves a

systematic and rational study of the human being vis-à-vis the rest of existence.

CO-2. It is free from any dogma or set of do’s and don’ts related to values.

CO-3. It is a process of self-investigation and self-exploration, and not of giving sermons.

Whatever is found as truth or reality is stated as a proposal and the students are facilitated

and encouraged to verify it in their own right, based on their Natural Acceptance and

subsequent Experiential Validation.

CO-4. This process of self-exploration takes the form of a dialogue between the teacher and the

students to begin with, and then to continue within the student leading to continuous selfevolution.

CO-5. This self-exploration also enables them to critically evaluate their pre- conditionings

and present beliefs

**KOE077 DESIGN THINKING 3L:0T:0P 3Credits**

Course Outcome: After successful completion of the course the students will be able to:

1. Develop a strong understanding of the design process and apply it in a variety of business

settings

2. Analyze self, culture, teamwork to work in a multidisciplinary environment and exhibit

empathetic behavior

3. Formulate specific problem statements of real time issues and generate innovative ideas

using design tools

4. Apply critical thinking skills in order to arrive at the root cause from a set of likely causes

5. Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims

and arguments.