Department of Computer Science & Engineering

Programme: B.Tech. Computer Science & Engineering

Course Outcomes (COs)

2nd Year (3rd Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KOE038	Electronics Engineering	CO1	Understand the concept of PN junction and special purpose diodes
		CO2	Study the application of conventional diode and semiconductor diode
		CO3	Analyze the I-V characteristics of BJT and FET
		CO4	Analyze the of Op-Amp, amplifiers, integrator, and differentiator
		CO5	Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope
KAS302	Maths-IV	CO1	The idea of partial differentiation and types of partial differential equations
		CO2	The idea of classification of second partial differential equations, wave, heat equation and transmission lines
		CO3	The basic ideas of statistics including measures of central tendency, correlation, regression and their properties

		CO4	The idea s of probability and random variables and various discrete and continuous probability distributions and their properties
		CO5	The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties
KAS301	**Technical Communication**	**CO1**	To understand the nature and objective of Technical Communication relevant for the work place as Engineers
		CO2	To utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions
		CO3	Imbibe inputs by presentation skills to enhance confidence in face of diverse audience
		CO4	Have a vast know-how of the application of the learning to promote their technical competence
		CO5	To evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics
KVE301	**Universal Human Values**	**CO1**	Understand value inputs, need, basic guidelines, content and process of value education in current scenario of the society
		CO2	Understand the meaning of Harmony in the Self the Co-existence of Self and Body
		CO3	Understand the value of harmony in human-human relationships and explore their role in ensuring a harmonious society
		CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature
		CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment during work
KCS301	**Data Structure**	**CO1**	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications
		CO2	Discuss the computational efficiency of the sorting and searching algorithms
		CO3	Implementation of Trees and Graphs and perform various operations on these data structure
		CO4	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion
		CO5	Identify the alternative implementations of data structures with respect to its performance to solve a real-world problem
KCS302	**Computer Organization and Architecture**	**CO1**	Study of the basic structure and operation of a digital computer system
		CO2	Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic

			operations.
		CO3	Implementation of control unit techniques and the concept of Pipelining
		CO4	Understanding the hierarchical memory system, cache memories and virtual memory
		CO5	Understanding the different ways of communicating with I/O devices and standard I/O interfaces
KCS303	**Discrete Structures and Theory of Logic**	**CO1**	Write an argument using logical notation and determine if the argument is or is not valid
		CO2	Understand the basic principles of sets and operations in sets
		CO3	Demonstrate an understanding of relations and functions and be able to determine their properties
		CO4	Demonstrate different traversal methods for trees and graphs
		CO5	Model problems in Computer Science using graphs and trees
KCS351	**Data Structure using C lab**	**CO1**	Demonstrate familiarity with major algorithms and data structures
		CO2	Calculate and analyze performance of algorithms
		CO3	Choose the appropriate data structure and algorithm design method for a specified application
		CO4	Identify which algorithm or data structure to use in different scenarios
		CO5	Familiar with writing recursive methods
KCS352	**Computer Organization Lab**	**CO1**	Illustrate HALF ADDER, FULL ADDER using basic logic gates and to learn various code conversions: Binary-to-Gray, Gray-to-Binary
		CO2	Design 3-8-line DECODER and Implementing 4x1 and 8x1 MULTIPLEXERS
		CO3	Demonstrate excitation tables of various FLIP-FLOPS and design of an 8-bit Input/ Output system with four 8-bit Internal Registers
		CO4	Design of an 8-bit ARITHMETIC LOGIC UNIT
		CO5	Designing of I/O using Registers, ALU and Control Unit and demonstrating the usage of Register Transfer Language (RTL)
KCS353	**Discrete Structure & Logic Lab**	**CO1**	Knowledge of logical notation to define and reason the fundamental mathematical concepts such as sets relations, functions, and integers
		CO2	Discuss various structures and properties of modern algebra
		CO3	Employ their logical ability such as reasoning able to setup mathematical model of real-life problem by applying advanced counting and computing techniques like generating function and recurrence relation
		CO4	Demonstrate problems in different areas of computer science

			using trees and graphs
		CO5	Design solution with the help of induction hypotheses, simple induction proofs and recurrences
KCS354	**Mini Project or Internship Assessment**	**CO1**	Discover potential research areas in the field of IT
		CO2	Compare and contrast the several existing solutions for research challenge
		CO3	Demonstrate an ability to work in teams and manage the conduct of the research study
		CO4	Formulate and propose a plan for creating a solution for the research plan identified
		CO5	To report and present the findings of the study conducted in the preferred domain
KNC301	**Computer System Security**	**CO1**	To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats
		CO2	To discover cyber-attack scenarios to web browsers and web servers and to explain how to mitigate such threats
		CO3	To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques.
		CO4	To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios
		CO5	To articulate the well-known cyber-attack incidents, explain the attack scenarios, and explain mitigation techniques.
KNC302	**Python Programming**	**CO1**	To read and write simple Python programs
		CO2	To develop Python programs with conditionals and loops
		CO3	To define Python functions and to use Python data structures – lists, tuples, dictionaries
		CO4	To do input/output with files in Python
		CO5	To do searching,sorting and merging in Python
KOE034	**Sensor and Instrumentation**	**CO1**	Apply the use of sensors for measurement of displacement, force and pressure
		CO2	Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level
		CO3	Demonstrate the use of virtual instrumentation in automation industries
		CO4	Identify and use data acquisition methods
		CO5	Comprehend intelligent instrumentation in industrial automation
KOE035	**Basics Data Structure and Algorithms**	**CO1**	Understand and analyze the time and space complexity of an algorithm
		CO2	Understand and implement fundamental algorithms (including

			sorting algorithms, graph algorithms, and dynamic programming)
		CO3	Discuss various algorithm design techniques for developing algorithms
		CO4	Discuss various searching, sorting and graph traversal algorithms
		CO5	Understand operation on Queue, Priority Queue, D-Queue
KOE036	**Introduction to Soft Computing**	**CO1**	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory
		CO2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
		CO3	Describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
		CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
		CO5	Develop some familiarity with current research problems and research methods in Soft Computing Techniques
KOE037	**Analog Electronics Circuits**	**CO1**	Understand the characteristics of diodes and transistors
		CO2	Design and analyze various rectifier and amplifier circuits
		CO3	Design sinusoidal and non-sinusoidal oscillators
		CO4	Understand the functioning of OP-AMP and design OP-AMP based circuits
		CO5	Design LPF, HPF, BPF, BSF

2nd Year (4thSemester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KAS402	**MathsIV**	**CO1**	The idea of partial differentiation and types of partial differential equations
		CO2	The idea of classification of second partial differential equations, wave, heat equation and transmission lines
		CO3	The basic ideas of statistics including measures of central tendency, correlation, regression and their properties
		CO4	The idea s of probability and random variables and various discrete and continuous probability distributions and their

			properties
		CO5	The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties
KVE401	**Universal Human Values**	**CO1**	Understand the significance of value inputs in a classroom, distinguish between values andskills, understand the need, basic guidelines, content and process of value education,explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
		CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body
		CO3	Understand the value of harmonious relationship based on trust, respect and other naturallyacceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
		CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature
		CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
KAS301	**Technical Communication**	**CO1**	Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers
		CO2	Students will utilize the technical writing for the purposes of Technical Communication and its exposure in various dimensions
		CO3	Students would imbibe inputs by presentation skills to enhance confidence in face of diverse audience
		CO4	Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence
		CO5	It would enable them to evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics
KCS401	**Operating Systems**	**CO1**	Understand the structure and functions of OS
		CO2	Learn about Processes, Threads and Scheduling algorithms
		CO3	Understand the principles of concurrency and Deadlocks
		CO4	Learn various memory management scheme
		CO5	Study I/O management and File systems
KCS402	**Theory of Automata and Formal**	**CO1**	Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars
		CO2	Analyse and design, Turing machines, formal languages, and

	Languages		grammars
		CO3	Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving
		CO4	Prove the basic results of the Theory of Computation
		CO5	State and explain the relevance of the Church-Turing thesis
KCS403	**Microprocessor**	**CO1**	Apply a basic concept of digital fundamentals to Microprocessor based personal computer system
		CO2	Analyze a detailed s/w & h/w structure of the Microprocessor
		CO3	Illustrate how the different peripherals (8085/8086) are interfaced with Microprocessor
		CO4	Analyze the properties of Microprocessors (8085/8086)
		CO5	Evaluate the data transfer information through serial & parallel ports
KCS451	**Operating Systems Lab**	**CO1**	Understand and apply knowledge of basic UNIX/LINUX commands to solve various software problems and to automate real time applications
		CO2	Understand and implement the concept of process synchronization tool like semaphore to solve mutual exclusion problem in order to coordinate concurrent process
		CO3	Apply knowledge of process management techniques to design and solve various processsynchronization problems like Producer Consumer problem, Reader Writer problem and dining philosopher's problem
		CO4	Compare and contrast among various CPU scheduling algorithms and apply knowledge to identify the best scheduling algorithm as per software requirement
		CO5	Understand and apply the concepts of deadlock in operating systems to design and implement various deadlock avoidance algorithms like Banker's algorithm used in banking system
		CO6	Understand and apply knowledge of basic UNIX/LINUX commands to solve various software problems and to automate real time applications
KCS452	**Microprocessor Lab**	**CO1**	Design and implement programs on 8085 microprocessor
		CO2	Design and implement programs on 8086 microprocessor
		CO3	Design interfacing circuits with 8085
		CO4	Design interfacing circuits with 8086
		CO5	Design and implement 8051 microcontroller based systems
KCS453	**Python Language Programming Lab**	**CO1**	Demonstrate familiarity with major algorithms and data structures
		CO2	Calculate and analyze performance of algorithms
		CO3	Choose the appropriate data structure and algorithm design

			method for a specified application
		CO4	Identify which algorithm or data structure to use in different scenarios
		CO5	Familiar with writing recursive methods
KNC402	**Python Programming**	**CO1**	To read and write simple Python programs
		CO2	To develop Python programs with conditionals and loops
		CO3	To define Python functions and to use Python data structures – lists, tuples, dictionaries
		CO4	To do input/output with files in Python
		CO5	To do searching, sorting and merging in Python
KNC401	**Computer System Security**	**CO1**	To discover software bugs that pose cyber security threats and to explain how to fix the bugs to mitigate such threats
		CO2	To discover cyber attack scenarios to web browsers and web servers and to explain how to mitigate such threats
		CO3	To discover and explain mobile software bugs posing cyber security threats, explain and recreate exploits, and to explain mitigation techniques
		CO4	To articulate the urgent need for cyber security in critical computer systems, networks, and world wide web, and to explain various threat scenarios
		CO5	To articulate the well-known cyber-attack incidents, explain the attack scenarios, and explain mitigation techniques
KOE044	**Sensor and Instrumentation**	**CO1**	Apply the use of sensors for measurement of displacement, force and pressure
		CO2	Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level
		CO3	Demonstrate the use of virtual instrumentation in automation industries
		CO4	Identify and use data acquisition methods
		CO5	Comprehend intelligent instrumentation in industrial automation
KOE045	**Basics Data Structure and Algorithms**	**CO1**	Understand and analyze the time and space complexity of an algorithm
		CO2	Understand and implement fundamental algorithms (including sorting algorithms, graph algorithms, and dynamic programming)
		CO3	Discuss various algorithm design techniques for developing algorithms
		CO4	Discuss various searching, sorting and graph traversal algorithms
		CO5	Understand operation on Queue, Priority Queue, D-Queue

KOE046	**Introduction to Soft Computing**	**CO1**	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory
		CO2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
		CO3	Describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
		CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
		CO5	Develop some familiarity with current research problems and research methods in Soft Computing Techniques
KOE047	**Analog Electronics Circuits**	**CO1**	Understand the characteristics of diodes and transistors
		CO2	Design and analyze various rectifier and amplifier circuits
		CO3	Design sinusoidal and non-sinusoidal oscillators
		CO4	Understand the functioning of OP-AMP and design OP-AMP based circuits
		CO5	Design LPF, HPF, BPF, BSF
KOE048	**Electronics Engineering**	**CO1**	Understand the concept of PN junction and special purpose diodes
		CO2	Study the application of conventional diode and semiconductor diode
		CO3	Analyze the I-V characteristics of BJT and FET
		CO4	Analyze the of Op-Amp, amplifiers, integrator, and differentiator
		CO5	Understand the concept of digital storage oscilloscope and compare of DSO with analog oscilloscope

3rdYear (5th Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KCS501	**Database Management System**	**CO1**	Apply knowledge of database for real life applications
		CO2	Apply query processing techniques to automate the real time problems of databases
		CO3	Identify and solve the redundancy problem in database tables using normalization
		CO4	Understand the concepts of transactions, their processing so they

			will familiar with broad range of database management issues including data integrity, security and recovery
		CO5	Design, develop and implement a small database project using database tools
KCS502	**Compiler Design**	**CO1**	Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers
		CO2	Understand the parser and its types i.e Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table
		CO3	Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes
		CO4	Acquire knowledge about run time data structure like symbol table organization and different techniques used in that
		CO5	Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization
KCS503	**Design and Analysis of Algorithm**	**CO1**	Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands
		CO2	Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate)
		CO3	Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms
		CO4	Apply classical sorting, searching, optimization and graph algorithms
		CO5	Understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy
KCS051	**Data Analytics**	**CO1**	Describe the life cycle phases of Data Analytics through discovery, planning and building
		CO2	Understand and apply Data Analysis Techniques
		CO3	Implement various Data streams
		CO4	Understand item sets, Clustering, frame works & Visualizations
		CO5	Apply R tool for developing and evaluating real time applications
KCS052	**Web Designing**	**CO1**	Understand principle of Web page design and about types of websites
		CO2	Visualize and recognize the basic concept of HTML and application in web designing
		CO3	Recognize and apply the elements of Creating Style Sheet (CSS)

		CO4	Understand the basic concept of Java Script and its application
		CO5	Introduce basics concept of Web Hosting and apply the concept of SEO
KCS053	**Computer Graphics**	**CO1**	Understand the graphics hardware used in field of computer graphics
		CO2	Understand the concept of graphics primitives such as lines and circle based on different algorithms
		CO3	Apply the 2D graphics transformations, composite transformation and Clipping concepts
		CO4	Apply the concepts of and techniques used in 3D computer graphics, including viewing transformations
		CO5	Perform the concept of projections, curve and hidden surfaces in real life
KCS054	**Object Oriented System Design**	**CO1**	Understand the application development and analyze the insights of object oriented programming to implement application
		CO2	Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural)
		CO3	Understand, analyze and apply oops concepts (i.e abstraction, inheritance)
		CO4	Understand the basic concepts of C++ to implement the object oriented concepts
		CO5	To understand the objectoriented approach to implement real world problem
KCS055	**Machine Learning Techniques**	**CO1**	To understand the need for machine learning for various problem solving
		CO2	To understand a wide variety of learning algorithms and how to evaluate models generated from data
		CO3	To understand the latest trends in machine learning
		CO4	To design appropriate machine learning algorithms and apply the algorithms to a real-world problems
		CO5	To optimize the models learned and report on the expected accuracy that can be achieved by applying the models
KCS056	**Application of Soft Computing**	**CO1**	Recognize the feasibility of applying a soft computing methodology for a particular problem
		CO2	Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing-based solutions for real-world and engineering problems
		CO3	Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem
		CO4	Apply fuzzy logic and reasoning to handle uncertainty and solve

			engineering problems
		CO5	Apply genetic algorithms to combinatorial optimization problems
KCS057	**Augmented and Virtual Reality**	**CO1**	To make students know the basic concept and understand the framework of virtual reality
		CO2	To understand principles and multidisciplinary features of virtual reality and apply it in developing applications
		CO3	To know the technology for multimodal user interaction and perception VR, in particular the visual, audial and haptic interface and behavior
		CO4	To understand and apply technology for managing large scale VR environment in real time
		CO5	To understand an introduction to the AR system framework and apply AR tools in software development
KCS058	**Human Computer Interface**	**CO1**	Understand and analyze the common methods in the user-centered design process and the appropriateness of individual methods for a given problem.
		CO2	Apply, adapt and extend classic design standards, guidelines, and patterns.
		CO3	Employ selected design methods and evaluation methods at a basic level of competence.
		CO4	Build prototypes at varying levels of fidelity, from paper prototypes to functional, interactive prototypes.
		CO5	Demonstrate sufficient theory of human computer interaction, experimental methodology and inferential statistics to engage with the contemporary research literature in interface technology and design.
KCS551	**Database Management Systems Lab**	**CO1**	Understand and apply oracle 11 g products for creating tables, views, indexes, sequences and other database objects.
		CO2	Design and implement a database schema for company data base, banking data base, library information system, payroll processing system, student information system
		CO3	Write and execute simple and complex queries using DDL, DML, DCL and TCL
		CO4	Write and execute PL/SQL blocks, procedure functions, packages and triggers, cursors.
		CO5	Enforce entity integrity, referential integrity, key constraints, and domain constraints on database.
KCS552	**Compiler Design Lab**	**CO1**	Identify patterns, tokens & regular expressions for lexical analysis
		CO2	Design Lexical analyser for given language using C and LEX /YACC tools

		CO3	Design and analyze top down and bottom up parsers
		CO4	Generate the intermediate code
		CO5	Generate machine code from the intermediate code forms
KCS553	**Design and Analysis of Algorithm Lab**	**CO1**	Implement algorithm to solve problems by iterative approach
		CO2	Implement algorithm to solve problems by divide and conquer approach
		CO3	Implement algorithm to solve problems by Greedy algorithm approach
		CO4	Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach
		CO5	Implement algorithm to solve problems by branch and bound approach
KCS554	**Mini Project or Internship Assessment**	**CO1**	Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task
		CO2	Writing requirements documentation, selecting appropriate technologies, identifying and creating appropriate test cases for systems
		CO3	Demonstrating understanding of professional customs & practices and working with professional standards
		CO4	Improving problem-solving, critical thinking skills and report writing
		CO5	Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes
KNC501	**Constitution of India, Law and Engineering**	**CO1**	Identify and explore the basic features and modalities about Indian constitution
		CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level
		CO3	Differentiate different aspects of Indian Legal System and its related bodies
		CO4	Discover and apply different laws and regulations related to engineering practices
		CO5	Correlate role of engineers with different organizations and governance models
KNC502	**Indian Tradition, Culture and Society**	**CO1**	To get basic principles of thought process, reasoning and inference to identify the roots and details of contemporary issues faced by our nation and try to locate possible solutions
		CO2	To understand the importance of our surroundings and encourage the students to contribute towards sustainable development
		CO3	To sensitize towards issues related to ‘Indian’ culture, tradition and its composite character

		CO4	To aware of holistic life styles of Yogic-science and wisdom capsules in Sanskrit literature that are important in modern society with rapid technological advancements and societal disruptions
		CO5	To acquaint with Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system

3rdYear (6th Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KCS601	**Software Engineering**	**CO1**	Explain various software characteristics and analyze different software Development Models
		CO2	Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards
		CO3	Compare and contrast various methods for software design
		CO4	Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing
		CO5	Manage software development process independently as well as in teams and make use of Various software management tools for development, maintenance and analysis
KCS602	**Web Technology**	**CO1**	Explain web development Strategies and Protocols governing Web
		CO2	Develop Java programs for window/web-based applications
		CO3	Design web pages using HTML, XML, CSS and JavaScript
		CO4	Creation of client-server environment using socket programming
		CO5	Building enterprise level applications and manipulate web databases using JDBC
		CO6	Design interactive web applications using Servlets and JSP
KCS603	**Computer Networks**	**CO1**	Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission
		CO2	Apply channel allocation, framing, error and flow control

			techniques
		CO3	Describe the functions of Network Layer i.e Logical addressing, subnetting & Routing Mechanism
		CO4	Explain the different Transport Layer function i.e Port addressing, Connection Management, Error control and Flow control mechanism
		CO5	Explain the functions offered by session and presentation layer and their Implementation
		CO6	Explain the different protocols used at application layer i.e HTTP, SNMP, SMTP, FTP, TELNET and VPN
KCS061	**Big Data**	**CO1**	Demonstrate knowledge of Big Data Analytics concepts and its applications in business
		CO2	Demonstrate functions and components of Map Reduce Framework and HDFS
		CO3	Discuss Data Management concepts in NoSQL environment
		CO4	Explain process of developing Map Reduce based distributed processing applications
		CO5	Explain process of developing applications using HBASE, Hive, Pig etc
KCS062	**Image Processing**	**CO1**	Explain the basic concepts of two-dimensional signal acquisition, sampling, quantization and color model
		CO2	Apply image processing techniques for image enhancement in both the spatial and frequency domains
		CO3	Apply and compare image restoration techniques in both spatial and frequency domain
		CO4	Compare edge based and region-based segmentation algorithms for ROI extraction
		CO5	Explain compression techniques and descriptors for image processing
KCS063	**Real Time System**	**CO1**	Illustrate the need and the challenges in the design of hard and soft real time systems
		CO2	Compare different scheduling algorithms and the schedulable criteria
		CO3	Discuss resource sharing methods in real time environment
		CO4	Compare and contrast different real time communication and medium access control techniques
		CO5	Analyze real time Operating system and Commercial databases
KCS064	**Data Compression**	**CO1**	Describe the evolution and fundamental concepts of Data Compression and Coding Techniques
		CO2	Apply and compare different static coding techniques (Huffman & Arithmetic coding) for text compression

		CO3	Apply and compare different dynamic coding techniques (Dictionary Technique) for text compression
		CO4	Evaluate the performance of predictive coding technique for Image Compression
		CO5	Apply and compare different Quantization Techniques for Image Compression
KCS651	**Software Engineering Lab**	**CO1**	Identify ambiguities, inconsistencies and incompleteness from a requirements specification and state functional and non-functional requirement
		CO2	Identify different actors and use cases from a given problem statement and draw use case diagram to associate use cases with different types of relationship
		CO3	Draw a class diagram after identifying classes and association among them
		CO4	Graphically represent various UML diagrams, and associations among them and identify the logical sequence of activities undergoing in a system, and represent them pictorially
		CO5	Able to use modern engineering tools for specification, design, implementation and testing
KCS652	**Web Technology Lab**	**CO1**	Develop static web pages using HTML
		CO2	Develop Java programs for window/web-based applications
		CO3	Design dynamic web pages using Javascript and XML
		CO4	Design dynamic web page using server site programming Ex. ASP/JSP/PHP
		CO5	Design server site applications using JDDC,ODBC and section tracking API
KCS653	**Computer Networks Lab**	**CO1**	Simulate different network topologies
		CO2	Implement various framing methods of Data Link Layer
		CO3	Implement various Error and flow control techniques
		CO4	Implement network routing and addressing techniques
		CO5	Implement transport and security mechanisms
KOE060	**Idea to Business Model**	**CO1**	Enhance creative knowledge of students regarding selection of a business idea and it's implementation process
		CO2	Acquire knowledge on entrepreneurship development, its Pro's and con's
		CO3	Acquire basic knowledge on how to become an entrepreneur
		CO4	Develop knowledge on Production systems and it's sustainability through production, planning and control (PPC)
		CO5	Develop appropriate business model and apply in a better way

KOE061	**Real Time Systems**	**CO1**	Describe concepts of Real-Time systems and modeling
		CO2	Recognize the characteristics of a real-time system in context with real time scheduling
		CO3	Classify various resource sharing mechanisms and their related protocols
		CO4	Interpret the basics of real time communication by the knowledge of real time models and protocols
		CO5	Apply the basics of RTOS in interpretation of real time systems
KOE062	**Embedded System**	**CO1**	Understand the basics of embedded system and its structural units
		CO2	Analyze the embedded system specification and develop software programs
		CO3	Evaluate the requirements of the programming embedded systems, related software architecture
		CO4	Understand the RTOS based embedded system design
		CO5	Understand all the applications of the embedded system and designing issues
KOE063	**Introduction to MEMS**	**CO1**	Understand the Basic concept of MEMS Fabrication Technologies, Piezoresistance Effect, Piezoelectricity, Piezoresistive Sensor
		CO2	Explain Mechanics of Beam and Diaphragm Structures.
		CO3	Understand the Basic concept of Air Damping and Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model
		CO4	Know the concept of Electrostatic Actuation
		CO5	Understand the applications of MEMS in RF
KOE064	**Object Oriented Programming**	**CO1**	Understand the Basic concept of Object Orientation, object identity and Encapsulation
		CO2	Understand the Basic concept of Basic Structural Modeling
		CO3	Know the knowledge of Object oriented design, Object design
		CO4	Know the knowledge of C++ Basics
		CO5	Understand the Basics of object and class in C++
KOE065	**Computer based Numerical Techniques**	**CO1**	Understand the concept of errors to evaluate approximate roots of several types of equations
		CO2	Analyze the problem and evaluate data by different interpolation methods and creating interpolating graphs
		CO3	Understand the concept of interpolation to analyze and evaluate the numerical differentiation and integration
		CO4	Remember the concept of formula based the solution of ordinary differential equations to evaluate differential

			equations withy initial conditions
		CO5	Apply the concept of partial differential equation to evaluate the partial differential equations
KOE066	**GIS & Remote Sensing**	**CO1**	Understand about the principles of Remote Sensing and its advantages and limitations
		CO2	Retrieve the information content of remotely sensed data
		CO3	Apply problem specific remote sensing data for engineering applications
		CO4	Analyze spatial and attribute data for solving spatial problems
		CO5	Create GIS and cartographic outputs for presentation
KOE067	**Basics of Data Base Management System**	**CO1**	Describe the features of a database system and its application and compare various types of data models
		CO2	Construct an ER Model for a given problem and transform it into a relation database schema
		CO3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus
		CO4	Explain the need of normalization and normalize a given relation to the desired normal form
		CO5	Explain different approaches of transaction processing and concurrency control
KOE068	**Software Project Management**	**CO1**	Identify project planning objectives, along with various cost/effort estimation models
		CO2	Organize & schedule project activities to compute critical path for risk analysis
		CO3	Monitor and control project activities
		CO4	Formulate testing objectives and test plan to ensure good software quality under SEI-CMM
		CO5	Configure changes and manage risks using project management tools
KOE069	**Understanding the Human Being Comprehensively – Human Aspirations and Its Fulfillment**	**CO1**	To have clarity about human aspirations, goal, activities and purpose of life
		CO2	To understand the harmony in nature/existence and participation of human being in the nature/existence.
		CO3	To understand the human tradition and its various components
		CO4	To understand co-existence with other orders
		CO5	To live with harmony from self to entire existence
KNC601	**Constitution of India, Law and Engineering**	**CO1**	Identify and explore the basic features and modalities about Indian constitution
		CO2	Differentiate and relate the functioning of Indian

			parliamentary system at the center and state level
		CO3	Differentiate different aspects of Indian Legal System and its related bodies
		CO4	Discover and apply different laws and regulations related to engineering practices
		CO5	Correlate role of engineers with different organizations and governance models
KNC602	**Indian Tradition, Cultural and Society**	**CO1**	To get basic principles of thought process, reasoning and inference to identify the roots and details of contemporary issues faced by our nation and try to locate possible solutions
		CO2	To understand the importance of our surroundings and encourage the students to contribute towards sustainable development
		CO3	To sensitize towards issues related to 'Indian' culture, tradition and its composite character
		CO4	To aware of holistic life styles of Yogic-science and wisdom capsules in Sanskrit literature that are important in modern society with rapid technological advancements and societal disruptions
		CO5	To acquaint with Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system

4thYear (7th Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KHU701	**Rural Development: Administration and Planning**	**CO1**	Students can understand the definitions, concepts and components of Rural Development
		CO2	Students will know the importance, structure, significance, resources of Indian rural economy
		CO3	Students will have a clear idea about the area development programmes and its impact
		CO4	Students will be able to acquire knowledge about rural entrepreneurship
		CO5	Students will be able to understand about the using of different methods for human resource planning
KHU702	**Project Management & Entrepreneurship**	**CO1**	Understand need, scope, entrepreneurial competencies & traits
		CO2	Entrepreneurial idea and innovation
		CO3	Understand project appraisal: Preparation of a real time project

			feasibility report containing technical appraisal
		CO4	Understand project financing
		CO5	Understand social entrepreneurship
KCS071	**Artificial Intelligence**	**CO1**	Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents
		CO2	Understand search techniques and gaming theory
		CO3	The student will learn to apply knowledge representation techniques and problem-solving strategies to common AI applications
		CO4	Student should be aware of techniques used for classification and clustering
		CO5	Student should aware of basics of pattern recognition and steps required for it
KCS072	**Natural Language Processing**	**CO1**	To learn the fundamentals of natural language processing
		CO2	To understand the use of CFG and PCFG in NLP
		CO3	To understand the role of semantics of sentences and pragmatic
		CO4	To introduce speech production and related parameters of speech
		CO5	To show the computation and use of techniques such as short time fourier transform, linear predictive coefficients and other coefficients in the analysis of speech
KCS073	**High Performance Computing**	**CO1**	Able to understand the basic concept of Computer architecture and Modern Processor
		CO2	Able to understand the basic concepts of access optimization and parallel computers
		CO3	Able to describe different parallel processing platforms involved in achieving high performance computing
		CO4	Develop efficient and high performance parallel programming
		CO5	Able to learn parallel programming using message passing paradigm
KCS074	**Cryptography & Network Security**	**CO1**	Classify the symmetric encryption techniques and Illustrate various Public key cryptographic techniques
		CO2	Understand security protocols for protecting data on networks and be able to digitally sign emails and files
		CO3	Understand vulnerability assessments and the weakness of using passwords for authentication
		CO4	Be able to perform simple vulnerability assessments and password audits
		CO5	Summarize the intrusion detection and its solutions to overcome the attacks
KCS075	**Design &**	**CO1**	Be exposed to technology and business trends impacting

	Development of Applications		mobile applications
		CO2	Be competent with the characterization and architecture of mobile applications
		CO3	Be competent with understanding enterprise scale requirements of mobile applications
		CO4	Be competent with designing and developing mobile applications using one application development framework
		CO5	Be exposed to Android and iOS platforms to develop the mobile applications
KCS076	**Software Testing**	**CO1**	Have an ability to apply software testing knowledge and engineering methods
		CO2	Have an ability to design and conduct a software test process for a software testing project
		CO3	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation
		CO4	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods
		CO5	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems
KCS077	**Distributed System**	**CO1**	To provide hardware and software issues in modern distributed systems
		CO2	To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems
		CO3	To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed
		CO4	To know about Shared Memory Techniques and have Sufficient knowledge about file access
		CO5	Have knowledge of Synchronization and Deadlock
KCS078	**Deep Learning**	**CO1**	To present the mathematical, statistical and computational challenges of building neural networks
		CO2	To study the concepts of deep learning
		CO3	To introduce dimensionality reduction techniques
		CO4	To enable the students to know deep learning techniques to support real-time applications
		CO5	To examine the case studies of deep learning techniques
KCS079	**Service Oriented Architecture**	**CO1**	Comprehend the need for SOA and its systematic evolution
		CO2	Apply SOA technologies to enterprise domain
		CO3	Design and analyze various SOA patterns and techniques

		CO4	Compare and evaluate best strategies and practices of SOA
		CO5	Understand the business case for SOA
KCS710	**Quantum Computing**	**CO1**	Distinguish problems of different computational complexity and explain why certain problems are rendered tractable by quantum computation with reference to the relevant concepts in quantum theory
		CO2	Demonstrate an understanding of a quantum computing algorithm by simulating it on a classical computer, and state some of the practical challenges in building a quantum computer
		CO3	Contribute to a medium-scale application program as part of a co-operative team, making use of appropriate collaborative development tools (such as version control systems)
		CO4	Produce code and documentation that is comprehensible to a group of different programmers and present the theoretical background and results of a project in written and verbal form
		CO5	Apply knowledge, skills, and understanding in executing a defined project of research, development, or investigation and in identifying and implementing relevant outcomes
KCS711	**Mobile Computing**	**CO1**	Explain and discuss issues in mobile computing and illustrate overview of wireless telephony and channel allocation in cellular systems
		CO2	Explore the concept of Wireless Networking and Wireless LAN
		CO3	Analyse and comprehend Data management issues like data replication for mobile computers, adaptive clustering for mobile wireless networks and Disconnected operations
		CO4	Identify Mobile computing Agents and state the issues pertaining to security and fault tolerance in mobile computing environment
		CO5	Compare and contrast various routing protocols and will identify and interpret the performance of network systems using Adhoc networks
KCS712	**Internet of Things**	**CO1**	Demonstrate basic concepts, principles and challenges in IoT
		CO2	Illustrate functioning of hardware devices and sensors used for IoT
		CO3	Analyze network communication aspects and protocols used in IoT
		CO4	Apply IoT for developing real life applications using Ardunio programming
		CO5	To develop IoT infrastructure for popular applications
KCS713	**Cloud**	**CO1**	Describe architecture and underlying principles of cloud

	Computing		computing
		CO2	Explain need, types and tools of Virtualization for cloud
		CO3	Describe Services Oriented Architecture and various types of cloud services
		CO4	Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing
		CO5	Analyze advanced cloud technologies
KCS714	**Block Chain Architecture Design**	**CO1**	Describe the basic understanding of Blockchain architecture along with its primitive
		CO2	Explain the requirements for basic protocol along with scalability aspects
		CO3	Design and deploy the consensus process using frontend and backend
		CO4	Apply Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities
KCS752	**Mini Project or Internship Assessment**	**CO1**	Developing a technical artifact requiring new technical skills and effectively utilizing a new software tool to complete a task
		CO2	Writing requirements documentation, selecting appropriate technologies, identifying and creating appropriate test cases for systems
		CO3	Demonstrating understanding of professional customs & practices and working with professional standards
		CO4	Improving problem-solving, critical thinking skills and report writing
		CO5	Learning professional skills like exercising leadership, behaving professionally, behaving ethically, listening effectively, participating as a member of a team, developing appropriate workplace attitudes
KCS753	**Project**	**CO1**	Analyze and understand the real-life problem and apply their knowledge to get programming solution
		CO2	Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues
		CO3	Use the various tools and techniques, coding practices for developing real life solution to the problem
		CO4	Find out the errors in software solutions and establishing the process to design maintainable software applications
		CO5	Write the report about what they are doing in project and learning the team working skills

Open Electives II Courses (offered in 7th Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KOE071	Filter Design	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.
		CO5	Understand the concept of Approximation Theory.
KOE072	Bioeconomics	CO1	Students will be able to understand basic concept of Bioeconomics, challenges, opportunities& regulations
		CO2	Students will be able to understand development and innovation in terms of bioeconomy towards sustainable development
		CO3	Students will be able to understand Inter- and transdisciplinarity in bioeconomy &research approaches
		CO4	Students will be able to explain biobased resources, value chain, innovative use of biomass and biological knowledge to provide food, feed, industrial products
		CO5	Know importance of bioeconomy related concepts in public, scientific, and political discourse
KOE073	Machine Learning	CO1	Understand the need for machine learning for various problem solving
		CO2	Understand a wide variety of learning algorithms and how to evaluate models generated from data
		CO3	Understand the latest trends in machine learning
		CO4	Design appropriate machine learning algorithms and apply the algorithms to a real-world problems
		CO5	Optimize the models learned and report on the expected accuracy that can be achieved by applying the models
KOE077	Design Thinking	CO1	Develop a strong understanding of the design process and apply it in a variety of business settings
		CO2	Analyze self, culture, teamwork to work in a multidisciplinary environment and exhibit empathetic behavior
		CO3	Formulate specific problem statements of real time issues and generate innovative ideas using design tools
		CO4	Apply critical thinking skills in order to arrive at the root cause from a set of likely causes
		CO5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments

4thYear (8th Semester)

Course Code	Course Name	Course Outcomes (COs) *At the completion of the course, students will be able to:*	
KHU801	Rural Development: Administration and Planning	CO1	Understand the definitions, concepts and components of rural development
		CO2	Will know the importance, structure, significance, resources of Indian rural economy
		CO3	Will have a clear idea about the area development programmes and its impact
		CO4	Will be able to acquire knowledge about rural entrepreneurship
		CO5	Will be able to understand about the using of different methods for human resource planning
KHU802	Project Management &Entrepre-neurship	CO1	Understand need, scope, entrepreneurial competencies & traits
		CO2	Entrepreneurial idea and innovation
		CO3	Understand project appraisal: Preparation of a real time project feasibility report containing technical appraisal
		CO4	Understand project financing
		CO5	Understand social entrepreneurship
KOE080	Fundamentals of Drone Technology	CO1	To design UAV drone system
		CO2	To understand working of different types of engines and its area of applications
		CO3	To understand static and dynamic stability dynamic instability and control concepts
		CO4	To know the loads taken by aircraft and type of construction and also construction materials in them
KCS851	Project I	CO1	Analyze and understand the reallife problem and apply their knowledge to get programming solution
		CO2	Engage in the creative design process through the integration and application of diverse technical knowledge and expertise to meet customer needs and address social issues
		CO3	Use the various tools and techniques, coding practices for developing real life solution to the problem
		CO4	Find out the errors in software solutions and establishing the process to design maintainable software applications
		CO5	Write the report about what they are doing in project and learning the team working skills

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