



Koneru Lakshmaiah Education Foundation

(Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

Accredited by NAAC as 'A++' Grade University ♦ Approved by AICTE ♦ ISO 9001-2015 Certified

Campus: Green Fields, Vaddeswaram - 522 502, Guntur District, Andhra Pradesh, INDIA.

Phone No. 0863 - 2399999; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in

Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 -2577715, Fax: +91-866-2577717.

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

Y20 Batch - COURSE OUTCOMES

COURSE CODE	COURSE NAME	CO	OUTCOME DESCRIPTION
20MT1101	Mathematics for Computing	CO1	Model a system of equations for real world applications in engineering, physical and biological sciences, computer science, finance, economics and solve them through matrix algebra
		CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional & predicate logic
		CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees
		CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management
		CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)
20SC1101	Computational Thinking for Design	CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm.
		CO2	Translate computational thinking into Logic Design for Solving real world problems
		CO3	Apply and Analyze CRUD operations on Basic Data Structures using Asymptotic Notations
		CO4	Apply and Analyze CRUD operations on Linear Data Structures using Asymptotic Notations
		CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems
20UC1101	Integrated Professional English	CO1	Understand the concepts of grammar to improve communication, reading, and writing skills

		CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions
		CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices
		CO4	Apply the concepts of writing to draft corporate letters, emails, and memos
20ME1103	Design Tools Workshop-1	CO1	Understand the concept of Engineering Design Process, Visualize, and complete his/her innovative design by final drafting using 3D modeling in Auto Desk Fusion 360
		CO2	Understand the concept of web pages, web browser, web server, and able to create Static webpages. Apply the HTML5 and CSS knowledge in building static web pages. Introduction to building social profiles through web blogging and video blogging.
		CO3	Understand the concept of report writing using the markup language Latex. Build reports using Latex and apply templates and Bibliography in latex for various documentation purposes.
		CO4	Understand the concept of data visualization and apply visualization techniques in creating data visualization dashboards with tools like Power BI.
20EC1101	Digital Logics & Processors	CO1	Ability to understand the logic and design concepts of processor, CPU, and digital combinational blocks
		CO2	Ability to design memory and timing & control modules for digital processor operations.
		CO3	Ability to design programmable and reprogrammable (CPLD/FPGA) digital logic modules using Verilog HDL
		CO4	Ability to design the digital logic and circuits using optimization methods.
		CO5	Design of Digital Logic modules using Verilog HDL and optimized methods
20UC1203	Design Thinking & Innovation-I	CO1	Understand the basics of design thinking and its implications in product or service development
		CO2	Understand and Analyze the requirements of a typical problem
		CO3	Plan the necessary activities towards solving the problem through ideation and prototyping
		CO4	evaluate the solution and refine them based on the customer feedback
20UC1202	English Proficiency	CO1	Demonstrating different interpersonal skills for employability.
		CO2	Distinguishing Business essential skills
		CO3	Classifying social media and corporate communication skills.

19SC1203	Object Oriented Design	CO4	Applying analytical thinking skills
		CO1	Understand basic Concepts of OOP, fundamentals of Java and apply the concepts of classes and objects through Java language
		CO2	Apply constructors, Overloading, parameter passing in Java Programming
		CO3	Apply access control, Inheritance, Packages
		CO4	Apply Interfaces, Exception Handling
19MT2102	Mathematics for Engineers	CO5	Analyze object-oriented programming concepts to write programs
		CO1	Apply differential and integral calculus to find maxima & minima of functions, evaluate the integrals and solve the ordinary differential equations.
		CO2	Demonstrate the Fourier series and Laplace transforms and solve the Partial differential equations.
		CO3	Describe probability, Random Variables and Distributions
		CO4	Explain complex variables, analytic functions and introduction to stochastic process and Algebraic structures.
19EC1202	Computer Organization & Architecture	CO1	Understand the functionality of the computer, CPU functional units - control unit, memory unit, arithmetic and logic unit instruction execution unit and the interconnections among these components.
		CO2	Understand the CPU operations, instruction interpretation and execution. Outline the concepts of micro-operations, RTL operations, main memory, cache memory and virtual memory organizations.
		CO3	Understand the different types of I/O subsystems and I/O transfer techniques.
		CO4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.
		CO1	Apply measures of efficiency on algorithms and Analyze different Sorting Algorithms.
19SC1202	Data Structures	CO2	Analyze and compare stack ADT and queue ADT implementations using linked list and applications.
		CO3	Analyze the linked implementation of Binary, Balanced Trees and different hashing techniques.
		CO4	Analyze different representations, traversals, applications of Graphs and Heap organization.
		CO5	Develop and evaluate common practical applications for linear and nonlinear data structures.
		20CI2102S	Operating Systems
CO2	Apply memory and process virtualization		
CO3	Illustrate synchronization problems and multi-threading libraries		
CO4	Understand persistence concepts		
CO5	Develop application programs		

20CI2103R	Mathematical Programming (MP)	CO1	Solve linear programming problems in engineering and business decision making problems
		CO2	Make use of Duality and Sensitivity Analysis in Linear Programming models. .
		CO3	Solve network models and LINEAR PROGRAMMING PROBLEMS using interior point methods
		CO4	Apply Cutting plane and Branch and Bound methods to solve Discrete optimization problems.
20CS2104S	Database Management Systems	CO1	Illustrate the functional components of DBMS and Construct an ER Model for a database.
		CO2	Apply a relational model for a database & Implement SQL concepts and relational algebra.
		CO3	Analyze PL/SQL programs, normalization techniques, indexing to construct and access database
		CO4	Analyze the importance of transaction processing, concurrency control, and recovery techniques.
		CO5	Design a database and implement SQL queries and PL/SQL programs to do various operations on data.
20TS2101S	Technical Skills (SDP-1)	CO1	Build full stack web applications using the MongoDB, Express JS, React & Node JS Full Stack framework
		CO2	Build React Native Apps and use Redux for state management
		CO3	Apply the object-oriented programming concepts for building design patterns, data structures and collections framework
		CO4	Apply JUNIT framework for Test Driven Development and apply the JDBC concepts for CRUD operations
18PH4101	Quantum Physics for Engineers	CO1	Able to understand the structure of crystalline solids, semiconductors physics and properties of light in Engineering application of Lasers.
		CO2	Able to understand the behavior of electrons on the microscopic level by using different quantum models
		CO3	Able to solve the time-independent Schrodinger wave equation as an intermediate step to solve the time-dependent Schrodinger wave equation
		CO4	Able to explain the meaning and significance of the postulates of the special theory of relativity
20UC2103	Professional Communication Skills	CO1	To develop receptive skills
		CO2	To identify and update oneself with different types of personal skills
		CO3	To enhance the problem-solving skills through analyzing the given data in finding the solutions
		CO4	To apply deductive reasoning in solving problems
20UC1203	Design Thinking & Innovation-2	CO1	compare and select problems suitable for DT projects and use techniques for empathetic research

		CO2	identify and document insights, user habits and identify user needs.
		CO3	Visualize solutions, evaluate solution concepts and able to create rough prototypes, gather feedback.
		CO4	Able to create high-fidelity prototypes. Able to test user experience, Able to identify a business model for a solution concept. Able to estimate financial results
20IE2050	Social Internship	CO1	Remember the fundamentals of the science of water cycle along with powerful tools that students can use to diagnose the health of the local water cycle as well as develop targeted action plans to restore the local natural water cycle and bring water prosperity
		CO2	Remember the water sustainability and water resilience of village, city, residential facilities and households using multi-level water scorecards
		CO3	Apply the design thinking positive action plan for a village, campus, residential facility and community neighborhood.
		CO4	Applying the water positive solutions within an urban watershed, a rural watershed, residential institutional and corporate community
20SP2117	Yoga	CO1	Understand Yoga History
		CO2	Understand STANDING ASANAS
		CO3	Understand SITTING ASANAS
		CO4	Understand BACKLAYING ASANAS, FRONT LAYING ASANAS and Pranayamas
20CI2204R	Computer Networks & Security	CO1	Compare various network topologies, reference models and switching mechanisms along with error correction and detection.
		CO2	Application of several MAC Protocols, network issues and Routing Algorithms.
		CO3	Identify suitable protocols in managing network related issues.
		CO4	Analyze existing network security services.
20CI2205R	Artificial Intelligence for Data Science	CO1	Understand Artificial Intelligence as Representation and Search. Apply Logic Programming.
		CO2	Understand Data Exploration, Data analysis and manipulation. Apply Importing, Summarizing, and Visualizing Data
		CO3	Understand handling uncertainty, Probability and Independence, Data pre - processing and Introduction to Machine Learning
		CO4	Predict outcomes using regression and learn how to classify data, Clustering of data, Introduction to Time Series Forecasting

		CO5	Develop AI for Data science lab and skilling programs in the python environment. Includes Implementation related to various searching algorithms and first order logic of AI, Data Processing, Data Visualization, Regression Techniques, Classification and Clustering Techniques, Time Series Forecasting
20CI2206R	Design & Analysis of Algorithms	CO1	Apply concepts of mathematics to find space and time complexities of various algorithms
		CO2	Analyze the problems that can be solved by using Divide and Conquer and Greedy Method
		CO3	Analyze the problems that can be solved by using Dynamic Programming and Backtracking
		CO4	Analyze the problems that can be solved by using Dynamic Programming and Backtracking
		CO5	Analyze the various design techniques to solve any real-world problems.
20TS2208R	Technical Skilling (SDP-2)	CO1	To analyze and apply suitable design techniques to implement given real-world problems by problem-solving, logic building, and building web applications.
		CO2	To build enterprise-level full-stack web applications using features of the Django framework
		CO3	Analyze suitable design techniques to solve given real-world problems
		CO4	Analyze important algorithmic design paradigms and methods.
20CI2207R	Management Information Systems	CO1	Relate the basic concepts and technologies used in the field of management information systems from technical, socio-ethical and business perspective and as well for assessing the relationship between the digital firm, electronic commerce, electronic business and internet technology.
		CO2	To understand and apply various knowledge representation methods with different technology infrastructure and business intelligence as strategic weapons to counter the risks associated with business and for making business more competitive.
		CO3	Analyse and interpret information systems role played by the major types of information systems in organizations and their relationship in supporting the major functional areas of the business between organizations, information systems and business processes, including the processes for customer relationship management and supply chain management in creating efficiencies for businesses.
		CO4	Ascertain and distinguish the relationships between concepts of information systems, organization, management and strategy for better decision making in supporting various levels of business strategy with information systems.
20UC2204	Corporate Communication Skills	CO1	Understand how to Speak from the script, Product & Process Description, Presenting Arguments, Paragraph writing
		CO2	Understand how to set a Goal and how to build a Team and manage Time and Leadership

		CO3	Understand the properties of numbers, solving the problems on divisibility rules, unit's digit, remainders, Percentages and its applications like Profit and Loss and Simple and Compound Interest. Understand the concept of Permutations combinations and Probability.
		CO4	Understand Inductive Reasoning to find the answers in Series, Analogy odd man out and coding and Decoding. understand the concepts of clocks and Calendars.
20CI3109R	Enterprise Programming	CO1	Understand the basic concepts of XML, XSLT and JDBC
		CO2	Develop Enterprise Application using Servlet and JSP
		CO3	Create an enterprise application using JSF and build business logic using EJB, JNDI and Session beans
		CO4	Apply JAX-RS, JMS and JAAS specifications to build web services
20TS3110R	Technical Skills (SDP-3)	CO5	Build Web and Enterprise applications using Maven, Hibernate, Spring Boot Framework with Spring Cloud and Microservices
20CI3154R	Application Development on Cloud	CO1	Analyze, predict, and apply the server-based computing for hosting the web application with appropriate database and storage.
		CO2	Implement the cloud services to monitor and secure the cloud infrastructure.
		CO3	Analyze, predict, and apply the CI/CD services for hosting the web application.
		CO4	Analyze, predict and apply appropriate serverless, container based, workflow and messaging based services.
		CO5	Apply the knowledge and implement the cloud concepts in real time.
20CI3155R	Solutions Architect on Cloud	CO1	Analyze, predict, and apply the server-based computing for hosting the web application with appropriate database and storage.
		CO2	Implement the cloud services to monitor and secure the cloud infrastructure.
		CO3	Analyze, predict, and apply the CI/CD services for hosting the web application.
		CO4	Analyze, predict, and apply appropriate serverless, container based, workflow and messaging based services.
		CO5	Apply the knowledge and implement the cloud concepts in real time
20CI3112R	Machine Learning	CO1	Understand the basic terminology and measurements of Machine Learning and Apply Machine Learning techniques using Tree and Bayesian models.
		CO2	Build Neural Network and SVM Algorithm for solving Classification and Prediction problems
		CO3	Apply Dimensionality reduction methods, Evolutionary learning and Ensembled methods to solve classification problems
		CO4	Illustrate different unsupervised models, Analytical, Explanation-Based and reinforcement learning methods

20CI3113R	Data Visualization Techniques	CO5	Implement Machine Learning Techniques using Python Language
		CO1	Understand the modeling of various types of data
		CO2	Understand the Visualization fundamentals
		CO3	Apply methods and tools for Non-Spatial Data Visualization
		CO4	Apply methods for Scientific / Spatial Data Visualization and Web data visualization.
20CI3136R	Software Verification & Validation	CO5	Evaluate data visualization through Python & Tableau.
		CO1	To Understand test cases suitable for a software development for different domains.
		CO2	To Identify and apply suitable tests to be carried out. Conduct an inspection or review of software source code for a small or medium sized software project.
		CO3	To Prepare and apply test planning based on the document using automatic testing tools
		CO4	To Document test plans and apply test cases designed.
20CI3137R	UX Design	CO5	To Test the software application completely and make it sure that it's performing well and as per the specifications
		CO1	Understand and discuss about User Experience design process.
		CO2	Recognize User Interface and differentiate from User Experience and principles of User Interface.
		CO3	Focusing and distinguishing about Components of UI design process with Interactive Devices.
		CO4	Determine graphic design techniques and psychology principles of User Experience
20UC3005	Aptitude Builder	CO5	Designing wire frames using Adobe XD, UX Pressia and Whimsical.
		CO1	Interpret English Language Skills necessary for placements
		CO2	Apply the techniques of writing and use standardized business vocabulary in formal communication
		CO3	Enhance students to build aptitude to meet the requirements of their day-to-day workplace challenges. Prepare them for campus placements and for various other competitive examinations.
		CO4	Enhance students to build logical thinking skills to meet the requirements of their day-to-day workplace challenges. Prepare them for. Campus placements and also for various other competitive examinations.
20IE3041	Technical Internship	CO5	Analyze the Research work
19FL3054	French Language	CO1	Acquire a working knowledge of the basic elements of the French language viz. letters, vowels, accents, articles, useful expressions, etc.
		CO2	Frame questions and respond in the affirmative or negative with être and avoid and form plurals
		CO3	Understand and apply the adjectives and essential verbs.
		CO4	Comprehend and use in speech, vocabulary, reading, questions, and answers on passages pertaining to Monuments of

			France.
20CI3156R	Automata Theory & Compiler Design	CO1	Design finite machines, regular expressions, and regular grammar for regular languages and to prove existence of non-regular languages.
		CO2	Design Context Free Grammars for Context Free Languages and simplify them for optimization.
		CO3	Design Push Down Automata for CFL and to prove existence of non-Context Free languages.
		CO4	Design Turing machines, proving the existence of non-Turing acceptable languages
20CI3154R	Application Development on Cloud	CO1	Analyze, predict, and apply the server-based computing for hosting the web application with appropriate database and storage.
		CO2	Implement the cloud services to monitor and secure the cloud infrastructure.
		CO3	Analyze, predict, and apply the CI/CD services for hosting the web application
		CO4	Analyze, predict, and apply appropriate serverless, container based, workflow and messaging based services.
		CO5	Apply the knowledge and implement the cloud concepts in real time.
20CI3155R	Solutions Architect on Cloud	CO1	Analyze, predict, and apply the server-based computing for hosting the web application with appropriate database and storage.
		CO2	Implement the cloud services to monitor and secure the cloud infrastructure.
		CO3	Analyze, predict, and apply the CI/CD services for hosting the web application.
		CO4	Analyze, predict, and apply appropriate serverless, container based, workflow and messaging based services.
		CO5	Apply the knowledge and implement the cloud concepts in real time.
20CI3156R	Automata Theory & Compiler Design	CO1	Design finite machines, regular expressions, and regular grammar for regular languages and to prove existence of non-regular languages.
		CO2	Design Context Free Grammars for Context Free Languages and simplify them for optimization.
		CO3	Design Push Down Automata for CFL and to prove existence of non-Context Free languages
		CO4	Design Turing machines, proving the existence of non-Turing acceptable languages
20CI3258R	Deep Learning	CO1	Able to understand Perception, Back Propagation, and dimensionality reduction algorithms to solve neural networks
		CO2	Able to apply Regularization techniques -dropout, normalizations, and generate CNN LeNet, AlexNet, ZF-Net, VGGNet models
		CO3	Apply RNN, Long Short-Term Memory (LSTM), Deep art and autoencoders
		CO4	Build Markov models, Markov networks, Markov chains and Autoregressive Models like NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), and DCGAN.

		CO5	Implement basic Neural Networks, optimization algorithms, various types of auto encoders, batch normalization, convolutional neural networks, RNN and LSTM
20CI3259R	Big Data Engineering	CO1	Understand the concepts of big data and its processing.
		CO2	Applying the knowledge of Initial exploration of data base using NoSQL and PIG
		CO3	Apply advanced algorithms & Statistical modeling for big data using HDFS, HIVE, and MapReduce.
		CO4	Big Data Application using Hbase and Cassandra model
		CO5	Build and Evaluate Big Data Engineering using PIG, Hadoop, and HIVE Programming concepts.
20CI3261R	Computer Vision	CO1	Understand image representation and modeling.
		CO2	Apply image transformation methods
		CO3	Interpret image processing algorithms
		CO4	Apply and analyze transformation, pose consistency and segmentation algorithms
		CO5	Analyze and implement computer vision techniques by means of Python using the OPENCV library.