Koneru Lakshmaiah Education Foundation
(Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
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DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

Y21 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)
21SC1101	**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.
21EC1101	**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
21UC1203	**Design Thinking & Innovation**	**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.

		CO4	Applying analytical thinking skills
21SC1203	**Computational Thinking for Object Oriented Design**	**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
		CO5	Analyze object-oriented programming concepts to write programs
21MT2102	**Mathematics for Engineers**	**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.
20EC1202	**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.
21SC1202	**Data Structures**	**CO1**	Apply measures of efficiency on algorithms and Analyze different Sorting Algorithms.
		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.
21CI2103R	**Operating Systems**	**CO1**	Understand basic algorithms for subsystem components
		CO2	Apply memory and process virtualization
		CO3	Illustrate synchronization problems and multi-threading libraries
		CO4	Understand persistence concepts
		CO5	Develop application programs

21CI2107R	**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.
21CI2104R	**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.
21IE2046	**Project Based Learning -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
21PH4101	**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 understands 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
21IE2040	**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
21SP2116	**Yoga**	**CO1**	Understand Yoga History
		CO2	Understand STANDING ASANAS
		CO3	Understand SITTING ASANAS
		CO4	Understand BACKLAYING ASANAS, FRONT LAYING ASANAS and Pranayamas
21CI2105R	**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.
21CI2216R	**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
21CI3113R	**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.
21IE2047	**Project Based Learning - 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.
21CI2217R	**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.
21UC2204	**Corporate Readiness 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.
21CI2107S	**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

21TS3113	**Project Based Learning - 3**	**CO5**	Build Web and Enterprise applications using Maven, Hibernate, Spring Boot Framework with Spring Cloud and Microservices
21CI3154R	**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.
21CI3155R	**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
21CS3021R	**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
		CO5	Implement Machine Learning Techniques using Python Language
21CS3051R	**Data Visualization Techniques**	**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.
		CO5	Evaluate data visualization through Python &Tableau.
21CS3062R	**Software Verification & Validation**	**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.
		CO5	To Test the software application completely and make it sure that it's performing well and as per the specifications
21CS3064R	**UX Design**	**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
		CO5	Designing wire frames using Adobe XD, UX Pressia and Whimsical.
21UC3005	**Aptitude Builder**	**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.
21IE3041	**Technical Internship**	**CO5**	Analyze the Research work
21FL3054	**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.
21CI2107	**Automata theory & formal languages**	**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
21CI3258	**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
21CI3259	**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.
21CI3261	**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.