



## Koneru Lakshmaiah Education Foundation


(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Department of Computer Science and Applications  
Program: BCA  
Academic Year :2023-2024


S. No	COURSE CODE	COURSE TITLE	CO. No.	Course Outcome
1	22UC0009	Ecology And Environment	CO1	Understanding the importance of Environmental education and conservation of natural resources
			CO2	Understanding the Ecosystems ,biodiversity and their
			CO3	Understand global Environmental issues, pollution
			CO4	Understand the knowledge on solid waste management, disaster management and EIA process
2	22UC0011	Gender & Social Equality	CO1	Students will have developed a better understanding of important issues related to gender in contemporary India
			CO2	Students will be sensitized to basic dimensions of the biological, sociological, psychological, and legal aspects of gender. This will be achieved through group discussions.
			CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
			CO4	Students will acquire nsight into the gendered division of labour and its relation to politics and economics.
3	23UC1101	Integrated professional English	CO1	Understanding the language Mechanics in Basic Grammar & Interactive Listening & Speaking
			CO2	Applying Integrated Reading skills & Techniques of Writing
4	23UC1202	English Proficiency	CO1	Understanding Language Mechanics in advanced Grammar and advanced Communicative Listening & Speaking
			CO2	Applying the advanced Reading techniques and Advanced Techniques of Writing
5	22UC1203	Design Thinking & Innovation	CO1	Understand the importance of Design thinking process for contextualized problems

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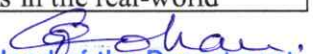
			CO2	Analyze, define, and ideate for solutions
			CO3	Develop and test the prototype made
			CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity
6	22UC2103	Essential Skills for Employability	CO1	Developing basic grammar Identify and organize sentence structures based on grammar and apply in writing skills
			CO2	Develop effective interpersonal skills, cultivate a positive attitude, apply positive self-talk techniques, and use SWOC analysis to enhance employability.
			CO3	Develop drafting skills through Cloze Test, Passage completion, E-mail writing, Paragraph writing, Essay writing
			CO4	Develop effective communication skills through JAM and extempore, describing products and processes through JAM and extempore, demonstrating proper email and phone etiquette, and improving listening skills to enhance personal and professional relationships.
7	22UC0010	Universal Human Values & Professional Ethics	CO1	Understand and analyse the essentials of human values and skills, self-exploration, happiness, and prosperity.
			CO2	Evaluate coexistence of the "I" with the body.
			CO3	Identify and associate the holistic perception of harmony at all levels of existence.
			CO4	Develop appropriate technologies and management patterns to create harmony in professional and personal lives.
8	22FL3055	Foreign Language (GERMAN LANGUAGE)	CO1	Understand the German language Basic Proficiency: Students will develop and apply a solid foundation in German, allowing them to introduce themselves, engage in basic conversations, and understand everyday expressions.
			CO2	Determine the German Vocabulary and Grammar: Students will learn essential vocabulary and grasp German grammar rules, enabling them to construct simple sentences accurately.
			CO3	Comprehensive Reading and Listening practices: Students will comprehend basic written and spoken German, understanding short texts, signs, and following straightforward conversations.
			CO4	Examining and interpreting the German Cultural Awareness: Students will gain insights into German-speaking countries' culture, enhancing their ability to communicate respectfully and appreciate the customs and traditions.
9	22UC2204	Corporate Readiness Skills	CO1	Extend word power for developing effective speaking and writing skills
			CO2	Apply Interpersonal Skills in day-to-day life

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			CO3	Differentiate and enhance critical and general reading skills
			CO4	Demonstrate necessary skills to be employable
10	23MT1112	Mathematics for Computer Science	CO1	Ability to understand the conceptualize the basic concepts of Matrices and its Applications
			CO2	Ability to understand the applications of truth tables to logic gates usage in digital circuit design and identify the logical expressions and their minimization techniques for logical circuit Optimization
			CO3	Ability to understand identify the operations on sets and properties. Relations and functions
			CO4	Ability to understand Graph and Graph theory applications in Circuits and Networking Theory
11	23MT1213	Probability and Statistics	CO1	Apply central tendency and dispersion measures to statistical inference.
			CO2	Apply correlation and regression in real-world scenarios, such as business forecasting or scientific research.
			CO3	Apply probability rules to solve problems involving simple and compound events. Calculate probabilities for different types of probability distributions (e.g., binomial, normal).
			CO4	Apply the steps of hypothesis testing to different scenarios. Describe the difference between Type I and Type II errors.
12	23SDCA01	Web and Social Media Technologies	CO1	Understand semantics of web page and concepts of HTML and CSS, its elements, and attributes.
			CO2	Demonstrating creation and usage of LinkedIn, Facebook & Twitter accounts and explaining various outcasts of social media platforms.
13	23SDCA02	Web Development using Python	CO1	Understand the basic programming skills in core Python
			CO2	Build python application to connect with the database and perform CRUD operations
			CO3	Develop Web forms and Application in Django
14	23SDCA03	Java Full Stack Development	CO1	Apply JDBC API, JUnit Testing Framework and XML Concepts to build Console and Web Applications, Solve Servlets, JSP, Hibernate, Spring and Spring Boot to build web applications and Enterprise Level applications.
			CO2	Analyze the design of linear data structures for real world problems, Apply the java full stack concepts and implemte the practicles on Spring Boot MVC, google maps, 2 step verification, sending mail and sms, captcha generation, bar code and qr code scanning, Spring Cloud and Spring Microservices.
			CO3	Analyze alternate algorithm techniques to solve optimization related problems in the real-world

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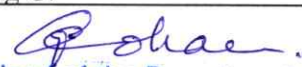
				scenario.,Apply the Java Concepts like Hibernate, Spring, Spring Boot, Spring Cloud and Microservices to Develop the Feature Rich Java Full Stack Application.
15	23SDCA04	Aspects of Mobile Application	CO1	Understand the basics of object-oriented programming language & Activity life Cycle Methods in Android.
			CO2	Apply the concepts of Android development and Designing of different widgets for android, Views, Layouts, and Navigation on Android
			CO3	Apply the concepts of the database and Memory storage concept to build the dynamic Android applications, Design and develop the Mobile application real-time case studies
16	23CA2121	Continuous Delivery and Deployment with DevOps	CO1	Identify the Need of DevOps in SDLC and Cloud Infrastructure in DevOps, Apply Version Control System to track the latest version of Software
			CO2	Analyse Continuous Integration and Continuous Deployment using Infrastructure as Code, Build in Cloud native Applications using Pipeline and Examine the Software and Automation Testing Frameworks
			CO3	Analyze need of Containerization in SDLC and Examine the Kubernetes Pod Configuration.
			CO4	Inspect Configuration Management using Infrastructure as Code, Analyze Continuous Monitoring and Container Orchestration process.
			CO5	Build and Inspect the Tools associated to DevOps Life Cycle.
17	23CA3122	Visual Programming and HCI	CO1	Illustrate the basic physiological, perceptual, and cognitive components of human learning and memory will learn by the students.
			CO2	Design the fundamental aspects and implementing user interfaces, the students will gain theoretical knowledge and practical experience.
			CO3	Implement about multimodal displays for conveying and presenting information, students will gain.
			CO4	Analyze the interaction problems from a technical, cognitive, and functional perspective, will learn by the student.
			CO5	Choose to develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems.
			CO6	Choose Practiced, a variety of simple methods for designing and evaluating the quality of user interfaces and spatial display

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18	23CA3223	Network and Infrastructure Security	CO1	Acquire the concept of physical layer and various transmission media
			CO2	Understand the architecture of router, mechanism of packet forwarding and policy for internet routing
			CO3	Understand the importance of distributed algorithms, multicast routing and various threats in network
			CO4	Understand types of vulnerabilities and attacks in web applications and algorithm designed against them
			CO5	Apply Security concepts and analyse their performance using networking tools.
19	23CA1101	Computer Organization	CO1	Understanding the fundamental concepts and techniques used in digital electronics and using K-Maps for Boolean Expression simplification
			CO2	Model the building blocks of Combinational and Sequential circuits and explaining registers and its usage.
			CO3	Analyze the basic concepts of computer organization: structure and operation of computers and their peripherals the design of the functional units of a digital computer system.
			CO4	Classify the working of the Central Processing Unit. Design and evaluate the performance of memory systems
20	23CA1102	Essentials of Information Technology	CO1	Summarize the architectural design of a computer, hardware peripherals and various concepts of Operating systems
			CO2	Implementing Programming fundamentals and User interface designs
			CO3	Understand the fundamentals of Computer networks.
			CO4	Construct Software attributes, Specifications and Software Requirement Specification Document
			CO5	Analyze and Explore data through Word Processing, Spreadsheet applications and Presentations
21	23CA1103	Computational Thinking for Structured Design	CO1	Understanding different concepts of C programming constructs for creating programs.
			CO2	Illustrate about different control structures and Arrays.
			CO3	Experiment with functions and pointers for solving real world problems.
			CO4	Analysing the working of structures and different file handling methods
			CO5	Evaluate solutions for programs using basic and advanced concepts of C language, can solve the programming challenges using C.

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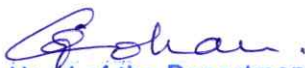
			CO6	Develop Applications using C Programming.
22	23CA1204	Software Engineering	CO1	Demonstrate the requirement of software development for various applications.
			CO2	Utilize some of the Process Models in software engineering for software development.
			CO3	Identify stakeholders requirements, multiple viewpoints, eliciting requirements pts, Extreme Programming, SAFE Methodology
			CO4	Analyze various testing techniques
23	23CA1205	Essentials of Operating System	CO1	Explain the fundamental operating system abstractions such as processes, memory management, functionalities of operating system
			CO2	Illustrate algorithms of scheduling and process virtualization, theory and implementation of synchronization.
			CO3	Apply the operating system's resource management techniques, dead lock management techniques, paging, segmentation
			CO4	Demonstrate page replacement algorithms and handling file systems.
24	23CA1206	Data Structures	CO1	Understand basic concepts of Arrays,LinkedList,Stack,Trees and Graphs
			CO2	Apply the Basic operations sorting, searching, insertion and deletion of data for arrays and linked list
			CO3	Analyse real time problems and design solutions using Trees and Graphs.
			CO4	Test for searching and sorting techniques and their performance in solving real world problems.
			CO5	Evaluate programs to demonstrate the functionality of different data structures, sorting algorithms, searching algorithms, etc.
25	23CA1207	Object Oriented Programming	CO1	Understand the basic concepts of Object-Oriented Programming, Datatypes, Operators and Type Conversion.
			CO2	Design and implement programs using standard design patterns to solve general problems.
			CO3	Choose the best type of Inheritance, creation of packages and interfaces to implement multiple inheritance.
			CO4	Build and Analyze Java applications using exceptions, formatted and unformatted I/O Streams
			CO5	Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs that solve real-world problems.
			CO6	Develop Small programs for the problems using the principles of abstraction, encapsulation, inheritance, and polymorphism

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26	23CA2108	Computer Networks	CO1	Understand the fundamentals of computer networks and data communication.
			CO2	Understand the fundamentals of computer networks and data communication.
			CO3	Understand and Analyze the fundamentals of Data Communication
			CO4	Analyze the IEEE Standards, Data Link Layer and Evaluate design issues in networks.
27	23CA2109	Database Management Systems	CO1	Remembering Database and File System and Applying different kinds of data models with functional components of DBMS
			CO2	Applying design, SQL, PL/SQL and correlating appropriate strategies for optimization of queries with Tuple Relational Calculus and Domain Relational Calculus
			CO3	Analysing normal forms based on functional dependency and Apply normalization techniques to eliminate redundancy with the ACID properties
			CO4	Applying concurrency techniques to demonstrate the organization of Databases with log mechanism and check pointing techniques for system recovery.
			CO5	Analysing and apply in Identifying variety of methods for effective processing of given queries
			CO6	Choose a MongoDB and implement SQL queries and PL/SQL programs to do various operations on data..
28	23CA2210	Object Oriented Analysis & Design & ADVANCED	CO1	Illustrate the fundamentals of object modelling.
			CO2	Build static and dynamic UML diagrams.
			CO3	Make use of design patterns for Software design
			CO4	Analyse various Object-Oriented Methodologies.
			CO5	Evaluate different types of UML Diagrams
29	23CA21C1	Cloud Architectures	CO1	Classify cloud computing importance and services.
			CO2	Relate cloud services & models.
			CO3	Explain Virtualization and its applications.
			CO4	Apply cloud services using web services Cloud to utilize cloud resources.
			CO5	Measure various cloud services using web services Cloud for building and deploying applications.
30	23CA22C2	Cloud Web Services	CO1	Understand the model of Cloud Computing as a Service.

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			CO2	Classify the Networking and storage Basics required for cloud services
			CO3	Demonstrate the Control of workflow in Global Infrastructure and Security of cloud services.
			CO4	Summarize the methods and approaches of Monitoring & Pricing in cloud web service.
			CO5	Experiment with the cloud web services.
31	23CA31C3	Cloud Serverless Computing	CO1	Describe Cloud computing and cloud service scheduling hierarchy.
			CO2	Describing the Functions-as-a-service and Event-driven programming. Develop Scalable Models Using Serverless Architectures.
			CO3	Demonstrating the application functionalities using Serverless runtimes and Serverless databases
			CO4	Apply Serverless Programming Practices and Patterns. Architect, Build, and Operate the serverless applications
			CO5	Analyse a real-world and scalable full-stack application using Serverless technologies
32	23CA31C4	Design and Development of Cloud Application	CO1	Understand the basic concept of hybrid cloud
			CO2	Understand the management of hybrid cloud in terms of development and deployment
			CO3	Plan the establishment of hybrid plan
			CO4	Apply the usage of Azure as a platform for hybrid cloud
			CO5	Evaluate Applications using AWS cloud
33	23CA32C5	Cloud Security	CO1	Explain Importance of Information Security in the Cloud Context
			CO2	Identify various concepts of cloud security
			CO3	Develop the cloud vulnerabilities and threats
			CO4	Construct how cloud and Security works in a seamless model
34	23CA21D1	Data Science Methodologies	CO1	Understand Data science, Exploratory Data Analysis, Data Extraction, Wrangling
			CO2	Understanding Probability and Probability distribution
			CO3	Analyse the linear and logistic regression solutions for real world problems
			CO4	Applying classification and clustering algorithms on select open source data sets

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			CO5	Execute data science algorithms using Python
35	23CA22D2	Data Warehousing & Mining	CO1	Demonstrate Data preprocessing in knowledge Discovery Process
			CO2	construct various multidimensional model with OLAP operations
			CO3	Infer knowledge pattern using Association and Classification methods
			CO4	Discover knowledge pattern from different clustering methods
			CO5	Examine data preprocessing task and discover Knowledge pattern using various Data mining methods.
36	23CA31D3	Applied Mahine Learning	CO1	Demonstrate the types of machine learning and model representation
			CO2	Implementing Linear Regression model for supervised learning
			CO3	Experimenting Multiple Linear Regression model
			CO4	Estimating various Regression coefficient
			CO5	Evaluate applications using linear regression techniques
37	23CA31D4	Introduction to Big Data Analytics	CO1	Understand how to store and maintain of Big Data
			CO2	Understand how to store and maintain of Big Data
			CO3	Understand architecture and ecosystem of Hadoop
			CO4	Outline Processing and Storage Layer of Hadoop, internal concept of Map Reduce
			CO5	Understand YARN Architecture and Execution of job in Hadoop cluster
38	23CA32D5	Data Visualization Techniques	CO1	Understand the brief history of data visualization, its importance, and the challenges involved in visualizing data
			CO2	Apply static graphical techniques such as bar graphs to represent data, including grouping bars, customizing colors, sizes, titles, and axis units
			CO3	Analyze multivariate statistical visual representations, such as dendrograms, scree plots, QQ plots, and PP plots.
			CO4	Examine the visualizations by adding annotations such as text, mathematical expressions, lines, arrows, shaded shapes, and error bars.
39	23CA21A1	Applied Artificial Intelligence	CO1	Understand about intelligence Ve, knowledge and artificial Intelligence, techniques of AI as a State space search, production systems.
			CO2	Implement problem solving by search, Heuristic search, Randomized search techniques and Finding optimal paths

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			CO3	Experiment with the appropriate methodologies for problem decompositions, planning and constraint data constraint satisfactions.
			CO4	Implement knowledge representation using Predicate Logic, representing knowledge using rules, Semantic Nets, Frames and conceptual dependencies
			CO5	Evaluate the theoretical concepts to conduct various experiments on Search Techniques and Language Representation and processing using AI .
40	23CA31A4	Applied Deep Learning	CO1	Illustrate Sigmoid Neurons, Feedforward Neural Networks, Gradient Descent (GD), Dimensional Reduction
			CO2	Experiment with the Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet Object Detection, RCNN, Fast RCNN, Faster RCNN, YOLO
			CO3	Build the concepts of , Deep Dream, LSTM, GRU and Neural style transfer
			CO4	Organize the concepts of Markov models, Markov networks, Markov chains, Variational autoencoders, Autoregressive Models: NADE, MADE, PixelRNN
			CO5	Evaluate Neural Networks, optimization algorithms, engine vector decomposition, various types of auto encoders, batch normalization, convolutional neural network
			CO6	Evaluate GANs.
41	23CA32A5	Perception and Computer Vision	CO1	Understand Image representation and modelling
			CO2	Apply Image transformation methods
			CO3	Implement image processing algorithms
			CO4	Design of face detection and recognition algorithms.
42	23CA21S1	Cyber Security and Ethical Hacking	CO1	Understand the need for cyber security
			CO2	Analyze various types of security threats and electronic payment systems
			CO3	Analyze the security issues involved in developing secure information systems
			CO4	Compare different ethical hacking methods
			CO5	Analyze various cyber security threats


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43	23CA22S2	Cyber Forensics	CO1	Understand Forensic Science and Recovery methods.
			CO2	Analyze Digital Evidence, Network Forensics and Mobile Device Forensics.
			CO3	Analyze Web Forensics and Email Forensics.
			CO4	Analyze the security policies, standards, and cyber laws.
			CO5	Design an application for cyber forensics using the concepts.
44	23CA31S3	Malware Analysis	CO1	Understand the basics of Malware analysis
			CO2	Organize the concept of dynamic analysis
			CO3	Build the concept of Virtual machines in Malware analysis
			CO4	Analyze the Exception handling in malware analysis
			CO5	Analyze the Exception handling in malware analysis
45	23CA31S4	Security Governance and Management	CO1	Introduction to E-Government and E-Governance; Models of E-Governance
			CO2	E-Government Infrastructure Development
			CO3	Security for e-Government; Applications of Data Warehousing and Data Mining in Government
			CO4	Case Studies
			CO5	Implementing e-governance models and systems using suitable platform.

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