



Koneru Lakshmaiah Education Foundation

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

Accredited by NAAC as 'A++' ♦ Approved by AICTE ♦ ISO 21001:2018 Certified

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Department of Computer Science & Engineering

Program: B.Tech – AI & DS

Academic Year :2022-2023

| Course Code | Course Title | CO NO | Description of the Course Outcome |
|-------------|---------------------------|-------|--|
| 23AD3211 | Cloud Computing | CO1 | Employing and relate the features of Scalable Computing and System models for Distributed and Cloud Environment |
| | | CO2 | Operating and Applying Implementation levels of Virtualization mechanisms in Distributed and Cloud Environment |
| | | CO3 | "Choosing and Sketch out Estimate Service models and Architectural Design for Resource management in Distributed and Cloud Environment " |
| | | CO4 | "Interpreting and demonstrating Ubiquitous feature in Cloud environment and Cloud Software Programming Environments " |
| 23AD2211 | Cryptography and Security | CO1 | Understand the principles of cryptography by analyzing various attacks and apply different classic encryption techniques. |
| | | CO2 | Understand the principles of block cipher and apply algorithms like DES, AES. |
| | | CO3 | Understand and apply different algorithms of public key crypto system for ensuring secured communication and authentication. |
| | | CO4 | Understand the concept of elliptic curve and its applications to cryptography. Apply hash algorithms for security. |
| | | CO5 | Implement various cryptographic algorithms so as to analyze the achievability of security goals like Confidentiality, integrity, authentication. |

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| 22AD2226 | Image and video processing | CO1 | Interpret Fundamentals of Image processing and Image Transforms |
| | | CO2 | Analyze various Image Processing Techniques |
| | | CO3 | Analyze various basic Steps of Video Processing |
| | | CO4 | illustrate different 2-D Motion Estimation techniques |
| | | CO5 | Demonstrate various image and video processing tools |
| 23CS3273RA | Natural Language Processing | CO1 | Understand and apply approaches to syntax and semantics in NLP |
| | | CO2 | Apply the statistical estimation and statistical alignment models |
| | | CO3 | Analyze grammar formalism and context free grammars |
| | | CO4 | Analyze Rule based Techniques, Statistical Machine translation (SMT), word alignment |
| | | CO5 | Inspect and Evaluate Language Processing Methods using python |
| 23AD3113 | Real Time Operating System | CO1 | Describe the Basics Of Real-Time Concepts-Architecture, RTOS building blocks |
| | | CO2 | Illustrate various CPU scheduling algorithms and Thread concepts apply synchronization algorithms for solving the complex Engineering problems. Illustrate the Inter Process |
| | | CO3 | Illustrate the Inter Process Communication and Pipes Memory Management |
| | | CO4 | Demonstrate the case studies and Kernel Design Issues |
| | | CO5 | "Develop knowledge and practical skills through case studies of various RTOS. " |
| 23AD2223 | Soft Computing | CO1 | Interpret fuzzy logic system |
| | | CO2 | Analyze Artificial Neural Network Models |
| | | CO3 | Demonstrate Swarm and Evolutionary Algorithms |
| | | CO4 | Illustrate Hybrid Fuzzy- Neural- Evolutionary-Swarm Models |
| | | CO5 | Demonstration of neuro, fuzzy, evolutionary, and swarm algorithms using open source tools |

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| 23AD3207 R/A/P | Data Science Visualization | CO1 | Understand Data science, data collection, and data preprocessing |
| | | CO2 | Applying descriptive statistical sampling techniques to explore the various real world data sets |
| | | CO3 | Build data wrangling models with data science libraries like NumPy and Pandas with data science libraries like NumPy and Pandas |
| | | CO4 | Applying various data visualization tools to explore the data |
| | | CO5 | Implement various data science and visualization techniques to real world problems using python |
| 22UC0009 | Ecology & Environment (EE) | CO1 | Define to articulate basic understanding of the importance of Environmental education and conservation of natural resources. conservation of natural resources and Energy resources. |
| | | CO2 | Understand concepts of ecosystems and learn methods for conservation of habitats and biodiversity. |
| | | CO3 | Identify critically about individual roles in prevention of pollution. An Environmental Studies will be enabled to do independent research on human interactions with the environment |
| | | CO4 | Recognize the knowledge on environmental legislation, disaster management and EIA process |
| OEAD0003 | MEDICAL DATA ANALYTICS | CO1 | To Understand principles and concepts of medical data analytics, including the types of data used, data pre-processing techniques, and statistical and machine learning algorithms |
| | | CO2 | To formulate statistical and machine learning techniques to analyze medical data, including exploratory data analysis, hypothesis testing, regression and classification, clustering, and deep learning |

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| | | CO3 | To Understand the Usage of electronic health records and clinical decision support systems to inform healthcare decisions and improve patient outcomes |
| | | CO4 | To Understand the ethical and legal issues related to medical data analytics, including data privacy and security, informed consent, and regulatory compliance |
| | | CO1 | Illustrate the concepts of big data, Initial exploration of analysis of data and Data visualization. |
| | | CO2 | Apply Initial exploration of data and advanced data analytics by using R |
| 23AD3206R/P/A | Big Data Analytics | CO3 | Apply advanced algorithms & Statistical modeling for big data using HDFS, HIVE, and PIG. |
| | | CO4 | Apply advanced SQL functions for in-database analytics by MADlib, Greenplum along with common deliverables of analytics life cycle project |
| | | CO5 | Build and Evaluate the Big Data Analytical problems using R, Hadoop, HIVE Programming concepts. |
| | | CO1 | Apply concepts of mathematics to find space and time complexities of various algorithms including string matching algorithms |
| | | CO2 | Analyze the problems that can be solved by using Divide and Conquer and Greedy Method |
| 22CS2205 A/R | DESIGN & ANALYSIS OF ALGORITHMS | CO3 | Analyze the problems that can be solved by using Dynamic Programming and backtracking |
| | | CO4 | Analyze the problems that can be solved by using Branch and Bound and NP-Hard Graph problems |
| | | CO5 | Analyze the various design techniques to solve any real- world problems. |
| | | CO1 | Illustrate the functional components of DBMS and Design an ER Model for a database |
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| 23AD2121 | | CO1 | Illustrate the functional components of DBMS and Design an ER Model for a database |

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| | DATABASE MANAGEMENT SYSTEMS | CO2 | Design a relational model for a database & Implement SQL concepts and relational algebra. |
| | | CO3 | Implement PL/SQL programs, normalization techniques, indexing to construct and access database |
| | | CO4 | Analyze the importance of transaction Processing, concurrency control and recovery techniques. |
| | | CO5 | Mongo DB: Introduction to NOSQL, CURD-INDEXING, AGGREGATE. |
| | | | Distributed database: Replication, Sharding, Performance analysis. |
| | | CO6 | Develop a database and implement SQL queries and PL/SQL programs to do various operations on data. |
| 23AD3105 R/A/P | DEEP LEARNING | CO1 | Apply optimization algorithms to solve neural networks |
| | | CO2 | Apply CNN model and its variants to real time data |
| | | CO3 | Able to apply Sequence models -RNN & LSTM |
| | | CO4 | construct the attention networks and Generative Neural models |
| | | CO5 | Implement basic Neural Networks, optimization algorithms, various types of auto encoders, batch normalization, convolutional neural networks , RNN and LSTM |
| | | CO6 | Implement Deep learning case studies using keras and pytorch |
| 22AD3206 R/A/P | Data Science & Visualization | CO1 | Understanding data science, data collection, and data pre-processing |
| | | CO2 | Applying descriptive statistical sampling techniques to explore the various real world data sets |
| | | CO3 | Build data wrangling models with data science libraries like numpy and pandas |
| | | CO4 | Applying various data visualization tools to explore the data |



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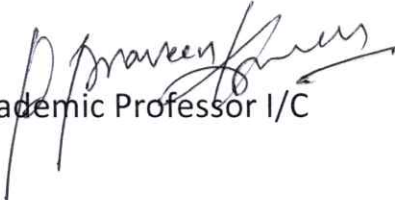
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| | | CO5 | Implement Various Data Science and Visualization Techniques to Real World Problems using Python |
| 22AD2203A/R/P | Datawarehousing and Data Mining | CO1 | Illustration of Warehouse & Mining, ETL, OLAP & OLTP, Data Cube Operations and Data Warehouse architecture control mechanism. |
| | | CO2 | Demonstration of Data Preprocessing through different methods |
| | | CO3 | Apply Different Classification Algorithms to Segregate Input data into different class levels and find out Hidden relationship between transactional dataset using Association Rule Mining |
| | | CO4 | Build different Clustering Models using the predefined dataset. |
| | | CO5 | "Implementation of warehousing and mining algorithms using suitable tools and programming languages " |
| 22AD2102 | INTRODUCTION TO AI AND DS | CO1 | Understand the concepts of intelligent agents and various |
| | | | search algorithms, to solve real- world problems. |
| | | CO2 | Analyse satisfaction problems, discover knowledge using logic, and analyse reasoning techniques to make informed decisions in uncertain environments. |
| | | CO3 | Classifiy various Machine Learning algorithms, Examine CNN and Deep Learning techniques |
| | | CO4 | Contrast various Data Visualization Techniques, Analyse Data analytics techniques, Discover the insights from complex datasets. |
| | | CO5 | Evaluate performance measures, different types of data analytics including descriptive, diagnostic, predictive and prescriptive analytics |
| | | CO6 | Examine AI for Data science lab in the python environment. |
| 23AD2209P | Machine Learning | CO1 | Understand the basic concepts of machine learning |

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| | | CO2 | "Build SVM Algorithm for solving Classification and Prediction problems |
| | | CO3 | Apply Ensemble methods to solve classification problem |
| | | CO4 | Analyze different categories of clustering algorithms |
| | | CO5 | Evaluation of EM based and Reinforcement learning models |
| | | CO6 | "Implement Machine Learning Techniques using python language |
| | | CO7 | Develop machine learning applications using using Python Language using Python Language |
| 23EC2210 R/A/P | Network Protocols and Security | CO1 | Apply the knowledge of Communitiation to analyze different network topologies |
| | | CO2 | Analysis of Network layer protocols and Routing algorithms |
| | | CO3 | Analysis of Trasport Layer protocols and Congestion control techniques |
| | | CO4 | Analysis of different cyber security attacks and |
| | | CO5 | Analyze different Enterprise Network protocols |
| | | CO6 | Analysis of different protocols with different topologies in networks |
| | | CO7 | Analysis of different enterprise network protocols using Cisco Packet Tracer |
| 22MT2103 R/A | PROBABILI TY, STATICTICS & QUEUEING THEORY | CO1 | To understand the importance of probabilistic concepts in a wide spectrum of problems arising in engineering applied science. |
| | | CO2 | To formulate the real world problems in terms of random processes using multivariate distribution functions |
| | | CO3 | To understand the role of Statistical tests of significance in stochastic process |
| | | CO4 | To formulate Stochastic process in terms of Markov chains and solve problems in queueing systems, and networks |
| 23CI2001 | | CO1 | Understand the fundamental concept of software and software engineering, as well as |

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| | ADAPTIVE SOFTWARE ENGINEER ING | | the nature of the process, including numerous software models with reverse engineering. |
| | | CO2 | Apply the demands of users and which methodology will be best suited to meet those needs. They can employ extreme software models to elicit and validate the user's needs. They can also use agile methodologies to design and develop project-based softwares |
| | | CO3 | Apply various software methodologies of Scrum, Kanban and SAFe Methodology for developing user-friendly software and also they can able to analyse various software projects by using project Monitoring Tools such as JIRA, Design Patterns - Architectural Patterns - Model Driven Architecture. |
| | | CO4 | Analyze numerous testing methodologies for testing diverse software, as well as risk management, project planning, and estimating in order to design and analyse any software project. |
| 22AD2107 R/A/P | Data Driven Artificial Intelligent Systems | CO1 | Understand and apply the concepts of intelligent agents and various search algorithms, to solve real-world problems. |
| | | CO2 | Analyse satisfaction problems, discover knowledge using logic, and analyse reasoning techniques to make informed decisions in uncertain environments |
| | | CO3 | Apply and analyse various Machine Learning algorithms, Examine CNN and Deep Learning techniques |
| | | CO4 | Apply various Data Visualization Techniques, Analyse Data analytics techniques, Discover the insights from complex datasets. |
| | | CO5 | Evaluate performance measures, different types of data analytics including descriptive, diagnostic, predictive and prescriptive analytics |
| | | CO6 | Examine AI for Data science lab in the python environment. |

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| 21CS2109 R/A/P | Operating systems (OS) | CO1 | Understand subsystem components of the Kernel and apply the CPU Scheduling algorithms. |
| | | CO2 | Understand memory and process virtualization and Paging, apply Page Replacement Algorithms. |
| | | CO3 | Apply the knowledge of persistence concepts, Redundant disk arrays, File System Implementation, Inter- process Communication and Distributed Systems. Apply Disk Scheduling Algorithms.. |
| | | CO4 | Apply different Lock Algorithms & Solve Synchronization Problems |
| | | CO5 | Understands Real-Time Systems and Security (A/P) |
| | | CO6 | Apply Unix System Calls. Use C Programming Language to implement Operating System Concepts (Practical) |
| 22SDAD01R/A/P | Application development using java | CO1 | Apply computational intelligence techniques using Python to solve complex problems. |
| | | CO2 | Implement and evaluate various computational intelligence algorithms, such as genetic algorithms, fuzzy logic, and neural networks, using Python. |
| 23TBAI01 | Computational Intelligence Using Python (CIP) | CO1 | Construct FA for different languages and regular expressions. |
| | | CO2 | Construct Context Free Grammars for different languages. And analyze the role of the Lexical Analyzer |
| | | CO3 | Construct different top-down and bottom- up parsers and define syntax directed definition and translation schemes |
| | | CO4 | Generate intermediate code, target code and apply different code optimization techniques |
| 23TBA102 | Cloud based AI Tools | CO1 | Apply various cloud-based AI tools and platforms, such as AWS SageMaker, Azure Machine Learning, and GCP AI Platform to develop, train, evaluate, and deploy AI models in the cloud |

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| | | CO2 | Design AI applications to handle large datasets, manage data pipelines, and efficiently store and access data |
| 23SDAD11 R/A/P | Autonomous Vehicle Systems | CO1 | Identify the need of Autonomous Driving |
| | | CO2 | Build a drone using autonomous system |
| | | CO3 | Apply Deep Learning in Autonomous Driving Perception |
| 22MT210 | Mathematical Programming | CO1 | Apply various methods for finding the optimal solution of Linear Programming Problem |
| | | CO2 | Apply Integer and Fractional programming approaches for solving optimization problems |
| | | CO3 | To express a practical problem, such as an engineering analysis or design problem and to optimize a multivariate quadratic function subject to linear constraints on the variables. |
| | | CO4 | To apply and understand the search and optimization methodologies applicable to the resolution of multi- disciplinary decision problems, under a decision support framework. |


 Academic Professor I/C


 Program Coordinator
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