Course Outcomes (COs)

Department of

Artificial Intelligence and Data Science

Programme Name: B.E.-Artificial Intelligence (AI) and Data Science

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2022 Scheme(UG)

Course Outcomes of Second -Year Courses

Course Name	**Mathematics for Computer Science**
Course Code	**BCS301**
Course outcomes (COs): At the end of the course the student will be able to:	
BCS301.1	Illustrate the basic concepts of– Probability distribution, Markov chain, Statistical inference and Design of experiments.
BCS301.2	Apply suitable probability distribution models and design of experiments for the given scenario in Computer science & engineering.
BCS301.3	Analyze & solve engineering problems using Statistical methodology and tools.
BCS301.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	**Digital Design & Computer Organization**
Course Code	**BAD302**
Course outcomes (COs): At the end of the course the student will be able to:	
BAD302.1	Understand Digital Logic, Processor memory and inter device communication
BAD302.2	Analyze Digital circuits, internal Organization of Memory and understand Processor performance
BAD302.3	Design combinational circuits and sequential circuits using Verilog code and implement interconnection of processor and peripheral devices.
BAD302.4	Optimize digital circuits using Mathematical and Verilog tools and evaluate Processor performance including Impact of cache/Pipelining.

Course Name	**Operating Systems**
Course Code	**BAD303**
Course outcomes (COs): At the end of the course the student will be able to:	
BAD303.1	Demonstrate the structure and functions of the operating system and its needs
BAD303.2	Apply suitable techniques for management of different resources
BAD303.3	Analyze processes, threads, memory, storage and scheduling algorithms
BAD303.4	Analyze I/O management and file system, concepts of protection and security.

Course Name	**Data Structures and Application**
Course Code	**BAD304**
Course outcomes (COs): At the end of the course the student will be able to:	
BAD304.1	Explain different data structures and their applications.
BAD304.2	Apply suitable operations on data structures.
BAD304.3	Develop algorithms that make use of data structures.
BAD304.4	Develop solutions using suitable data structure algorithm to model the real-world problem

Course Name	**Data Structures Lab**
Course Code	**BADL305**
Course outcomes (COs): At the end of the course the student will be able to:	
BADL305.1	Identify various linear and non-linear data structures.
BADL305.2	Analyze various linear and non-linear data structures
BADL305.3	Demonstrate the working nature of different types of data structures and their applications
BADL305.4	Apply the appropriate data structure for solving real world problems

2021 Scheme (UG)

Course Outcomes of Second-Year Courses

Course Name	Transform Calculus, Fourier Series and Numerical Techniques
Course Code	**21MAT31**
Course outcomes (COs): At the end of the course the student will be able to:	
21MAT31.1	Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series Numerical solutions of PDE & ODE and Calculus of variation .
21MAT31.2	Apply the above acquired knowledge to solve the problems in engineering.
21MAT31.3	Analyze the solutions of the real world problems using above techniques.
21MAT31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Data Structures and Applications
Course Code	**21CS32**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS32.1	Explore the fundamental concepts of data structures
21CS32.2	Apply suitable operations on data structures
21CS32.3	Design and Develop algorithms that make use of data structures
21CS32.4	Implement solution for solving problems using high level languages with suitable data structure algorithms

Course Name	Analog and Digital Electronics
Course Code	**21CS33**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS33.1	Explain the characteristics and applications of BJT,OP-Amp,555 timer and digital circuits
21CS33.2	Illustrate analog and digital circuits
21CS33.3	Design analog and digital circuits using simplifying techniques.
21CS33.4	Demonstrate and test analog and digital circuits

Course Name	Computer Organization and Architecture
Course Code	21CS34
Course outcomes (COs): At the end of the course the student will be able to:	
21CS34.1	Explain the basic organization of a computer system
21CS34.2	Experimenting the functioning of different sub systems, such as processor, input/output, and memory
21CS34.3	Analyse the different arithmetic and logical units.
21CS34.4	Illustrate hardwired control and micro programme

Course Name	Object Oriented Programming with JAVA Laboratory
Course Code	21CSL35
Course outcomes (COs): At the end of the course the student will be able to:	
21CS35.1	Analyse the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP.
21CS35.2	Demonstrate the ability to design and develop java programs, analyse, and interpret object-oriented data and document results
21CS35.3	Apply object-oriented concepts using Java to develop programs
21CS35.4	Develop user friendly applications using Console based I/O GUI/ File concepts

Course Name	Programming in C++
Course Code	21CS382
Course outcomes (COs): At the end of the course the student will be able to:	
21CS382.1	Understand the basics of object-oriented programming concepts and design a solution to a problem using class types, function operations.
21CS382.2	Apply the code reusability and extensibility functionalities using object oriented features.
21CS382.3	Analyze the file handling mechanisms and explore the Performance analysis of I/O Streams.
21CS382.4	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems.

Course Name	Mathematical Foundation for Computing, Probability and Statistics
Course Code	21MAT41
Course outcomes (COs): At the end of the course the student will be able to:	
21MAT41.1	Illustrate the concepts of– Logic, Relations & Functions, Graph theory, Probability distributions and Statistical methods.
21MAT41.2	Apply the above acquired knowledge to solve problems in Computer science & engineering.
21MAT41.3	Analyze the solutions of the real world problems using above techniques.
21MAT41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Design and Analysis of Algorithms
Course Code	**21CS42**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS42.1	Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm
21CS42.2	Apply Master Theorem to compute time efficiency of recursive algorithms and compare efficiency of algorithms
21CS42.3	Solve various problems using appropriate design techniques and compare efficiency of algorithms
21CS42.4	Experiment with various design techniques to solve problems

Course Name	**Microcontroller and Embedded Systems**
Course Code	**21CS43**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS43.1	Describe the architectural features and instructions of ARM microcontroller.
21CS43.2	Apply the knowledge gained for Programming ARM for different applications
21CS43.3	Interface external devices with ARM microcontroller and interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
21CS43.4	Develop the hardware /software co-design, firmware design approaches and demonstrate the need of real time operating system for embedded system application

Course Name	**Operating System**
Course Code	**21CS44**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS44.1	Demonstrate the structure and functions of the operating system and its needs
21CS44.2	Apply suitable techniques for management of different resources
21CS44.3	Analyze processes, threads, memory, storage and scheduling algorithms
21CS44.4	Analyze I/O management and file system, concepts of protection and security.

Course Name	**Python Programming Laboratory**
Course Code	**21CSL46**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS46.1	Explain programming features of python and other data structures lists, tuples and dictionaries.
21CS46.2	Apply various features of python to solve problems
21CS46.3	Interpret the concepts of Object-Oriented Programming as used in Python.
21CS46.4	Explore the need for scraping websites and working with PDF, JSON and other file formats

Course Name	R Programming
Course Code	21CS483
Course outcomes (COs): At the end of the course the student will be able to:	
21CS48.1	Understand the fundamentals of R programming
21CS48.2	Utilize R Data types, classes and functions for developing programs.
21CS48.3	Make use of different R Data Structures
21CS48.4	Apply critical programming concepts to process real world problem

Course Outcomes of Third-Year Courses

Course Name	**Automata Theory And Compiler Design**
Course Code	**21CS51**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS51.1	Explain the core concepts of automata theory and theory of computation and the structure of compiler.
21CS51.2	Apply the concepts of automata theory and theory of computation to design the different phases of compiler.
21CS51.3	Design regular and context free grammars for different classes of language and make use of these concepts in compiler design.
21CS51.4	Design computation models for problems in Automata theory and adaptation of such model in the field of compilers.

Course Name	**Computer Networks**
Course Code	21CS52
Course outcomes (COs): At the end of the course the student will be able to:	
21CS52.1	Understand the basic needs of communication system
21CS52.2	Interpret the communication challenges and its solution
21CS52.3	Identify and organize the communication system network components
21CS52.4	Design communication networks for user requirements

Course Name	Database Management Systems
Course Code	21CS53
Course outcomes (COs): At the end of the course the student will be able to:	
21CS53.1	Identify, define and analyze database objects, enforce integrity constraints on a database using RDBMS
21CS53.2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation
21CS53.3	Design and build simple database systems and relate the concept of transaction, concurrency control and recovery in database

21CS53.4	Develop application to interact with databases, using relational algebra expression from queries.

Course Name	**Principles Of Artificial Intelligence**
Course Code	**21CS54**
Course outcomes (COs): At the end of the course the student will be able to:	
21CS54.1	Apply knowledge of agent architecture, searching and reasoning techniques for different applications.
21CS54.2	Analyse Searching, Inferencing Techniques and Demonstrating agents.
21CS54.3	Develop knowledge base sentences using propositional logic and first order logic
21CS54.4	Illustrate the application of probability in uncertain reasoning.

Course Name	**Database Management System Laboratory With Mini Project**
Course Code	**21CSL55**
Course outcomes (COs): At the end of the course the student will be able to:	
21CSL55.1	Create, Update and query on the database.
21CSL55.2	Demonstrate the working of different concepts of DBMS
21CSL55.3	Design a database application with help ER diagram, schema diagram
21CSL55.4	Implement, analyze and evaluate the project developed for an application.

Course Name	Software Engineering & Project Management
Course Code	21CS61
Course outcomes (COs): At the end of the course the student will be able to:	
21CS61.1	Understand the activities involved in software engineering
21CS61.2	Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques
21CS61.3	Describe various software testing methods and to understand the importance of agile methodology and DevOps
21CS61.4	Illustrate the role of project planning and quality management in software development

Course Name	Data Science And Its Applications
Course Code	21AD62
Course outcomes (COs): At the end of the course the student will be able to:	
21CS62.1	Identify and demonstrate data using visualization tools
21CS62.2	Make use of Statistical hypothesis tests to choose the properties of data, curate and manipulate data.
21CS62.3	Utilize the skills of machine learning algorithms and techniques and develop models
21CS62.4	Experiment with social network analysis and make use of natural language processing skills to develop data driven applications

Course Name	Machine Learning
Course Code	21AI63
Course outcomes (COs): At the end of the course the student will be able to:	
21AI63.1	Understand the concept of Machine Learning and Concept Learning.
21AI63.2	Apply the concept of ML and various classification methods in a project and concept of ML in a decision tree structure and implementation of Ensemble learning and Random Forest.
21AI63.3	Analyse various training models in ML and the SVM algorithm to be implemented.
21AI63.4	Apply Bayes techniques and explore more about the classification in ML.

Course Name	**Machine Learning Lab**
Course Code	**21AIL66**

Course outcomes (COs): At the end of the course the student will be able to:

21AIL66.1	Understand the Importance of different classification and clustering algorithms and demonstrate the working of various algorithms with respect to training and test data sets.
21AIL66.2	Illustrate and analyze the principles of Instance based and Reinforcement learning techniques
21AIL66.3	Elicit the importance and Applications of Supervised and unsupervised machine learning
21AIL66.4	Compare and contrast the Bayes theorem principles and Q learning approach

Course Outcomes of Fourth-Year Courses

Course Name	**Data Visualization**
Course Code	**21AD71**
Course outcomes (COs): At the end of the course the student will be able to:	
21AD71.1	Understand and use various plot types with Python
21AD71.2	Demonstrate the data visualization techniques.
21AD71.3	Analyze data represented in the form of graphs & charts
21AD71.4	Experiment with different visualization tools

Course Name	**Cloud Computing**
Course Code	**21AD72**
Course outcomes (COs): At the end of the course the student will be able to:	
21AD72.1	Understand and analyze various cloud computing platforms and service provider.
21AD72.2	Illustrate various virtualization concepts
21AD72.3	Identify the architecture, infrastructure and delivery models of cloud computing.
21AD72.4	Explain the Security aspects of CLOUD.