NARAYANA ENGINEERING COLLEGE
An Autonomous College under JNTUA, Approved by AICTE, New Delhi
Dhurjati Nagar, Gudur, Tirupati Dist., AP - 524101
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Estd : 2001

R 21 COURSE OUTCOMES

COURSE DETAILS		
Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Data Structures and Algorithms	**Course Code:** 21ES1009	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, student will be able to:	
CO 1	Analyze the data structure algorithms to evaluate the time & space complexities. (BL-4)
CO 2	Apply the knowledge of stack and queues for various applications. (BL - 3)
CO 3	Construct the linked lists for various applications. (BL - 3)
CO 4	Apply the knowledge of tree data structures for various applications. (BL - 3)
CO 5	Develop the graph models of the given problem through graph concepts(BL -3)

COURSE DETAILS		
Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Computer Organization and Architecture		**Course Code:** 21CS2001
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Describe the concepts of Functional Architecture and Basic Operations of Computing System. (BL-2)
CO2	Interpret there presentation of Fixed and Floating point numbers stored in digital computer. (BL-3)
CO3	Illustrate the basics of Instruction set and design of control units to execute Computer instruction. (BL - 3)
CO4	Analyze the Memory System and their impact on Computer cost & performance. (BL - 4)
CO5	Demonstrate the basic knowledge of I/O devices and Interfacing of I/O devices with computer.(BL - 3)

COURSE DETAILS		
Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Database Management Systems	**Course Code:** 21CS2002	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: On successful completion of the course, the student will be able to:	
CO 1	Describe database technologies and database design. (BL-2)
CO 2	Understand Relational Database Management Systems. (BL-2)
CO 3	Construct queries, procedures for database creation in RDBMS.(BL-3)
CO 4	Apply normalization on database design. (BL-3)
CO 5	Demonstrate concurrency control techniques and techniques for database recovery. (BL-2)

COURSE DETAILS		
Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Mathematical Foundation for Computer Science	**Course Code:** 21CS2003	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the concepts associated with Mathematical Logic and Predicatecalculus
CO 2	Learn The Basic Concepts About Relations, Functions, Algebraic StructuresAnd To Draw Different Diagrams Like Lattice, Hasse Diagrams
CO 3	Understand The Elementary Combinatory And Pigeon-Hole Principle.
CO 4	Describe Functions, Various Types Of Recurrence Relations And The MethodsTo Find Out Their Solutions.
CO 5	Understand The Basic Concepts Associated With Graphs And Trees

COURSE DETAILS

Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Object Oriented Programming through Java		**Course Code:** 21CS2004
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, Student will be able to:	
CO1	Describe the basic Elements of Java for problem solving.(BL-2)
CO2	Demonstrate the concepts of arrays and strings for organizing data. (BL-3)
CO3	Describe the concepts of object oriented programming. (BL-2)
CO4	Design the web applications through java applets. .(BL-3)
CO5	Develop Multi-threaded programs to improve the system performance. (BL-6)

COURSE DETAILS

Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Data Structures and Algorithms Lab		**Course Code:** 21ES1513
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, Student will be ableto:	
CO 1	Apply the Arrays and linked lists for solving the problems. (BL -3)
CO 2	Apply the stacks and queues for solving the given applications. (BL -3)
CO 3	Implement operations on binary trees and binary search trees for givenapplications. (BL -3)
CO 4	Implement searching and sorting algorithms for given applications.(BL-3)

COURSE DETAILS

Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Database Management Systems Lab		**Course Code:** 21CS2501
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Use SQL for creating database and performing data manipulation operations. (BL-3)
CO 2	Examine integrity constraints to build efficient databases. (BL-3)
CO 3	Sketch PL/SQL programs including procedures, functions, cursors and triggers.(BL-3)
CO 4	Apply queries using advanced database design and Normalization. (BL-3)

COURSE DETAILS

Class: II B. Tech	**Semester:** I	**AcademicYear:** 2022-23
Course Title: Object Oriented Programming through Java Lab		**Course Code:** 21CS2502
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Apply the fundamental elements of java programming to solve given problems.(BL-3)
CO 2	Implement the concepts of object oriented programming to solve the applications. (BL-3)
CO 3	Apply the Method overloading and exception handling mechanisms to solve given problems. (BL-3)
CO 4	Apply the Multithreading and packages to improve the system performance. (BL-3)

COURSE DETAILS

Class: II B. Tech	Semester: II	Academic Year: 2022-23
Course Title: EXPLORATORY DATA ANALYTICS WITH R		**Course Code:** 21MA1007
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: On successful completion of the course, the student will be able to:	
CO 1	Demonstrate the fundamental knowledge of R-Programming concepts for solving the engineering applications (BL-2)
CO 2	Apply dataobjects& probability commands for data manipulations (BL-3)
CO 3	Apply descriptivestatistics and data distribution commands for statisticalanalysis (BL-3)
CO 4	Analyze hypothesis testing & graphical analysis on different data-sets for testable hypothesis and virtualization (BL-4)
CO 5	Analyze complex analytical models using formula syntax and regression for data analysis (BL-4)

COURSE DETAILS

Class: II B. Tech	Semester: II	AcademicYear: 2022-23
Course Title: Computer Networks	**Course Code:** 21CS2005	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: On successful completion of the course, student will be able to:	
CO 1	Describe the concepts of Internet in terms of its building blocks, organized layered architecture. (BL-2)
CO 2	Identify the errors in data transfer between source and destination. (BL-2)
CO 3	Demonstrate the skills of sub netting and routing protocols. (BL-3)
CO 4	Illustrate the reliable, unreliable communication on public networks forvarious applications. (BL-3)
CO 5	Explain the principles of Application Layer and its protocols(BL-4).

COURSE DETAILS

Class: II B. Tech	**Semester:** II	**Academic Year:** 2022-23
Course Title: Operating Systems	**Course Code:** 21CS2006	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Illustrate the concepts and design of operating system of a computer. (BL-2)
CO 2	Analyze CPU process scheduling and deadlock handling techniques provided with concurrencies. (BL-4)
CO 3	Analyze the memory management and virtual memory concepts of an application. (BL-4)
CO 4	Demonstrate the structure and implementation of file system for effective storage in a system. (BL-2)
CO 5	Illustrate Mass Storage Structure and Protection Mechanism of a system. (BL-2)

COURSE DETAILS

Class: II B. Tech	**Semester:** II	**Academic Year:** 2022-23
Course Title: Software Engineering	**Course Code:** 21CS2007	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Understand Fundamental concepts of software engineering and analyze process models required to develop a software system.(BL-2)
CO 2	Analyze software requirements and model requirements for developing the application.(BL-4)
CO 3	Apply software design and development technique uses by understanding software architecture.(BL-3)
CO 4	Analyze the User interface design techniques to design GUI.(BL-4)
CO 5	Analyze the testing strategies and techniques for quality software.(BL-4)

COURSE DETAILS

Class: II B. Tech	**Semester:** II	**Academic Year:** 2022-23
Course Title: Exploratory Data Analysis with R Lab **Course Code:** 21MA1501		
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Apply R elements for solving basic engineering applications (BL-3)
CO 2	Apply dataobjects commands for data manipulations (BL-3)
CO 3	Implement hypothesis testing &graphical Analysison different data-sets for testable hypothesis and virtualization (BL-3)
CO 4	Design and Implement engineering application usingANOVA for data analysis(BL-3)

COURSE DETAILS

Class: II B. Tech	**Semester:** II	**Academic Year:** 2022-23
Course Title: Operating Systems and Computer Networks Lab	**Course Code:** 21CS2503	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, Priority and Dead lock detection, avoidance (BL-3)
CO 2	Implement memory management schemes, page replacement schemes and File Organization techniques (BL-3)
CO 3	Analyze the concept of data link layer to differentiate Error detection and Correction codes for a computer network. (BL - 4)
CO 4	Analyze the concept of Network layer to differentiate various routing protocols for a network. (BL - 4)

COURSE DETAILS

Class: II B. Tech	**Semester:** II	**Academic Year:** 2022-23
Course Title: Software Engineering Lab	**Course Code:** 21CS2504	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, Student will be able to:	
CO 1	Select suitable software development process model for the given scenario(BL-3)
CO 2	Classify the requirements and prepare software requirements specification for projects and perform modeling (BL-2)
CO 3	Understand the various design techniques and implement (BL-2)
CO 4	Apply testing principles for validating software project.(BL-3)

COURSE DETAILS

Class: III B. Tech	**Semester:** I	**Academic Year:** 2023-24
Course Title: Artificial Intelligence	**Course Code:** 21CS2008	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Understand the role of agents, environments and relationship amongthem.(BL-2)
CO2	Examine various problem-solving approaches in searching and learning. (BL-2)
CO3	Demonstrate the use of Reinforcement learning and natural language Processing.(BL-3)
CO4	Understand the natural language for communication and object perception (BL-2)
CO5	Demonstrate the role of Robot in various applications and list out Philosophical issues in AI. (BL-2)

COURSE DETAILS

Class: III B. Tech		**Semester:** I	**Academic Year:** 2023-24
Course Title: Design and Analysis of Algorithms		**Course Code:** 21CS2009	
Regulation: NECR BTECH 21		**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, student will be able to:	
CO 1	Understand the general principle of Divide and Conquer and identify suitable problems to apply Divide and Conquer paradigm.(BL-2)
CO 2	Understand optimization problems and the general principles of Greedy and Dynamic Programming paradigms to solve them.(BL-2)
CO 3	Apply backtracking to solve optimization problem.(BL-3)
CO 4	Analyze the advantage of bounding functions in Branch and Bound technique to solve the problems. (BL-3)
CO 5	Classify deterministic and Non-deterministic algorithms for P, NP, NP –hard and NP-complete classes of problems.(BL-2)

COURSE DETAILS

Class: III B. Tech		**Semester:** I	**Academic Year:** 2023-24
Course Title: Theory of Computation		**Course Code:** 21CS2010	
Regulation: NECR BTECH 21		**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	**Explain** formal machines, languages and computations for designing of Finite Automata.**[BL:3]**
CO 2	**Design** finite state machines **for acceptance of strings.[BL:3]**
CO 3	**Develop** context free grammars **for formal languages**. .**[BL:3]**
CO 4	**Build** Pushdown automata **for context free grammars.** *[BL:6]*
CO 5	**Apply** Turing machine for solving problems and **Validate decidability and undecidability.[BL:6]**

COURSE DETAILS

COURSE DETAILS		
Class: III B. Tech	**Semester:** I	**Academic Year:** 2023-24
Course Title: SOFTWARE PROJECT MANAGEMENT	**Course Code:** 21CS2007	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Identify the concepts of conventional software project management and Software Economics for developing a software project.
CO 2	Apply Conventional and modern principles of software project management to develop the software products.
CO 3	Explain the software architecture, life cycle phases and process for a building a software product.
CO 4	Interpret the techniques to evaluate progress of software project workflows in terms of milestones and check points, project organization responsibilities and process automation
CO 5	Choose the software metrics to implement a software product through process instrumentation ethical principles to be followed in management of software economics

COURSE DETAILS

COURSE DETAILS		
Class: III B. Tech	**Semester:** I	**Academic Year:** 2023-24
Course Title: Artificial intelligence lab	**Course Code:** 21CS2505	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Apply the good programming skills to formulate the solutions for computational problems.[BL-3]
CO2	Design and develop solutions for informed and uninformed search problems in AI.[BL-3]
CO3	Apply AI Techniques in Gaming [BL-3]
CO4	Demonstrate and enrich fundamentals in knowledge and its schemes [BL-2]

COURSE DETAILS		
Class: III B. Tech	**Semester:** I	**Academic Year:** 2023-24
Course Title: Design and Analysis of Algorithms Lab		**Course Code:** 21CS2507
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, student will be able to:	
CO 1	Demonstrate searching and sorting technique and calculate the time required to search and sort the elements by using Divide and Conquer method (BL-2)
CO 2	Apply Greedy method to solve knapsack problem and minimum cost spanning tree problem. (BL-3)
CO 3	Apply dynamic programming strategy to solve multistage problem and knapsack problem. (BL-3)
CO 4	Apply backtracking method to calculate 8-queen's problem and sub set problem. (BL-3)

COURSE DETAILS		
Class: III B. Tech	**Semester:** II	**Academic Year:** 2023-24
Course Title: Machine Learning	**Course Code:** 21CS2011	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the concepts of computational intelligence like machine learning
CO 2	Understand and apply the various Machine learning strategies
CO 3	Familiar with basic concepts in artificial neural network and its learning methods
CO 4	Explore regression methods in Machine learning
CO 5	Design and analyze the instance based and reinforcement learning

COURSE DETAILS

Class: III B. Tech	**Semester:** II	**Academic Year:** 2023-24
Course Title: Web Technologies	**Course Code:** 21CS2012	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Construct static web pages using HTML and CSS.**(BL-3)**
CO 2	Implement various concepts related to dynamic web pages and validate them using JavaScript**. (BL-3)**
CO 3	Create secure, usable database driven web applications**.(BL-3)**
CO 4	Develop web Applications using Scripting Languages.**(BL-3)**
CO 5	Implement SQL queries connecting through PHP **(BL-3)**

COURSE DETAILS

Class: III B. Tech	**Semester:** II	**Academic Year:** 2023-24
Course Title: Software Architecture	**Course Code:** 21CS4007	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Demonstrate Software Architecture Reference Models and Architecture Business Cycle for making a good Software Architecture
CO 2	Choose different Software Architectural Life Cycles for designing a good Architecture
CO 3	Identify Quality Attributes, Functional attributes, and different types of tactics for creating architecture.
CO 4	Develop the document of software architecture and views for creating architecture.
CO 5	Develop real time projects by combining ATAM and CBAM frameworks with quality attributes.

COURSE DETAILS		
Class: III B. Tech	**Semester:** II	**Academic Year:** 2023-24
Course Title: Machine Learning Lab	**Course Code:** 21CS2508	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Demonstrate data sharing with different applications and sending and intercepting SMS.(BL-2)
CO2	Develop an application for creating basic GUI components, Layouts and basic widgets.(BL-3)
CO3	Analyze the capability to implement the application for location tracking, work with databases, and creating some basic widgets.(BL-4)

COURSE DETAILS		
Class: III B. Tech	**Semester:** II	**Academic Year:** 2023-24
Course Title: Web Technologies Lab	**Course Code:** 21CS2509	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Develop web pages using HTML, DHTML and Cascading Styles sheets (BL-6)
CO2	Develop a dynamic web pages using JavaScript (client side programming).(BL-6)
CO3	Develop an interactive web applications using PHP. (BL-6)
CO4	Build and consume web services. (BL-3)

COURSE DETAILS

COURSE DETAILS		
Class: IV B. Tech	**Semester:** I	**Academic Year:** 2024-25
Course Title: Cryptography and Network Security	**Course Code:** 21CS2013	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	**Apply** computer **security concepts and encryption techniques** to enhance the security in a communication model. *[BL-3]*
CO 2	**Implement** Synchronous and Asynchronous key cryptosystems. [BL -3]
CO 3	**Apply hash functions and authentication codes** to preserve integration and confidentiality of a message *[BL-3]*
CO 4	**Understand Email Security and IPSec** Practices**.** *[BL-2]*
CO 5	**Design secure applications** and **risk free** computer system. *[BL-3]*

COURSE DETAILS

COURSE DETAILS		
Class: IV B. Tech	**Semester:** I	**Academic Year:** 2024-25
Course Title: Mobile Application Development	**Course Code:** 21CS2014	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	To understand fundamentals of android operating systems.
CO 2	To understand the platform, tools, technology and process for developing mobile applications.
CO 3	To demonstrate the operation of the application, configuration files, intents and activities.
CO 4	To develop and deploy Android applications.
CO 5	To illustrate the various components, layouts and views in creating android applications

COURSE DETAILS		
Class: IV B. Tech	**Semester:** I	**Academic Year:** 2024-25
Course Title: Deep Learning	**Course Code:** 21CS2015	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 3

Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Demonstrate the mathematical foundation of neural network
CO 2	Describe the machine learning basics
CO 3	Differentiate architecture of deep neural network
CO 4	Build a convolution neural network
CO 5	Build and train RNN and LSTMs

COURSE DETAILS		
Class: IV B. Tech	**Semester:** I	**Academic Year:** 2024-25
Course Title: Mobile Application Development Lab		**Course Code:** 21CS2510
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:	
CO1	Demonstrate data sharing with different applications and sending and intercepting SMS.(BL-2)
CO2	Develop an application for creating basic GUI components, Layouts and basic widgets.(BL-3)
CO3	Analyze the capability to implement the application for location tracking, work with databases, and creating some basic widgets.(BL-4)

COURSE DETAILS

Class: IV B. Tech	**Semester:** I	**Academic Year:** 2024-25
Course Title: Deep Learning Lab	**Course Code:** 21CS2511	
Regulation: NECR BTECH 21	**Program/Dept.:** B.Tech/CSE	**Credits:** 1.5

Course Outcomes: After successful completion of the course, the student will be able to:

CO1	Identify the Deep learning algorithms which are more appropriate for various types of learning tasks in various domains Implementing Deep learning algorithms and solve real
CO2	Implementing Deep learning algorithms and solve real-world problems
CO3	Apply deep learning techniques for object identification and segmentation