



### PROGRAMME OUTCOMES

Engineering Graduates will be able to:

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

- ❖ To obtain sound knowledge in computing fundamentals, principles and applications to solve complex engineering problems.

**2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- ❖ Apply knowledge of mathematics, science, and engineering to analyze design for the development of software domain systems.

**3. Design/Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

- ❖ Configure recent software tools, apply test conditions, to evaluate computer based systems to deploy and manage them in computer related environments.

**4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- ❖ Perform research based experiments on different software solutions either obtain from external domains or developed by themselves to analyze the experimental results.



**5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- ❖ Design and develop software projects based on their specifications to meet the future requirements.

**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- ❖ Identify, formulate and solve software engineering problems to assess societal, health, safety legal and cultural issues relevant to the professional engineering practices in computational field.

**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- ❖ Ability to understand the computing needs of inter-disciplinary scientific and engineering disciplines and design and develop algorithms and techniques for achieving sustainable development.

**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- ❖ Acquire and understand new knowledge, with professional ethics while developing software products.

**9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- ❖ Ability to work as an individual member and as a leader effectively to create computational development solutions.



**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- ❖ Communicate efficiently to address the complex engineering activities, with effective reports and documentation to make a good presentation.

**11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- ❖ Demonstrate and acquire knowledge in engineering and management principles to apply and manage these in all working environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

- ❖ Understand professional and ethical responsibilities and analyze the impact of computational skills on individuals, organizations, and the society.



### **Program Specific Outcomes (PSO's):**

#### **PSO1.**

The ability to analyse and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

#### **PSO2.**

The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

#### **PSO3.**

The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

#### **PSO4.**

The Computer Science and Engineering graduates are able to analyze, design, develop, test and apply management principles, mathematical foundations in the development of computational solutions, make them to expert in designing the computer software and hardware.

#### **PSO5.**

Develop their skills to solve problems in the broad area of programming concepts and appraise environmental and social issues with ethics and manage different projects in inter-disciplinary field.



### **Computer Science and Engineering (UG) - Programme Educational Objectives:**

**Gokula Krishna College of Engineering, Computer Science and Engineering program will prepare its graduates to**

#### **PEO1**

**Make Software professionals and scientists with an ability to solve all sorts of computational problems in all working environments.**

#### **PEO2**

**Develop graduates who can gain leadership qualities, to work as a team members and team leaders to facilitate technical solutions and problem analysis for computational domains in all environments as a responsible professional.**

#### **PEO3**

**Work productively as successful Computer professionals in diverse career paths including supportive and leadership roles on multidisciplinary teams or be active in higher studies.**

#### **PEO4**

**Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavours, and practice their profession with high regard to ethical responsibilities.**

#### **PEO5**

**Engage in life-long learning and to remain current in their profession to foster personal and organizational growth.**



### Course Objectives and Course Outcomes (COs)

**Course Name: Discrete Mathematics & Graph theory (20A54304)**

#### COURSE OBJECTIVES:

Introduce the concepts of mathematical logic and gain knowledge in sets, relations and functions and Solve problems using counting techniques and combinatorics and to introduce generating functions and recurrence relations. Use Graph Theory for solving real world problems

#### COURSE OUTCOME (CO):

After completion of the course, students will be able to

- Apply mathematical logic to solve problems.
- Understand the concepts and perform the operations related to sets, relations and functions.
- Gain the conceptual background needed and identify structures of algebraic nature.
- Apply basic counting techniques to solve combinatorial problems.
- Formulate problems and solve recurrence relations.
- Apply Graph Theory in solving computer science problems

**Course Name: DIGITAL ELECTRONICS & MICROPROCESSORS (20A04304T)**

#### COURSE OBJECTIVES:

To understand all the concepts of Logic Gates and Boolean Functions.

- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051.

#### COURSE OUTCOME (CO):

After Completion of this course, the student will be able to:

- Design any Logic circuit using basic concepts of Boolean Algebra.
- Design any Logic circuit using basic concepts of PLDs.
- Design and develop any application using 8086 Microprocessor.
- Design and develop any application using 8051 Microcontroller.

**Course Name: Advanced Data Structures & Algorithms (20A05301T)**

#### COURSE OBJECTIVES:

Learn asymptotic notations, and analyze the performance of different algorithms.

- Understand and implement various data structures.
- Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.
- Understand non-deterministic algorithms, polynomial and non-polynomial problems.



### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Analyze the complexity of algorithms and apply asymptotic notations.
- Apply non-linear data structures and their operations.
- Understand and apply greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate Backtracking algorithms for various applications.

### **Course Name: Object Oriented Programming Through Java (20A05302T)**

### **COURSE OBJECTIVES:**

To understand object oriented concepts and problem solving techniques

- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Solve real-world problems using OOP techniques.
- Apply code reusability through inheritance, packages and interfaces
- Solve problems using java collection framework and I/O classes.
- Develop applications by using parallel streams for better performance.
- Develop applets for web applications.
- Build GUIs and handle events generated by user interactions.
- Use the JDBC API to access the database

### **Course Name: Computer Organization (20A05303)**

### **COURSE OBJECTIVES:**

To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design

- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors

### **COURSE OUTCOME (CO):**



After completion of the course, students will be able to

- Understand computer architecture concepts related to the design of modern processors, memories and I/Os
- Identify the hardware requirements for cache memory and virtual memory
- Design algorithms to exploit pipelining and multiprocessors
- Understand the importance and trade-offs of different types of memories.
- Identify pipeline hazards and possible solutions to those hazards

**Course Name: DIGITAL ELECTRONICS & MICROPROCESSORS LAB(20a04304P)**

### **COURSE OBJECTIVES:**

To understand all the concepts of Logic Gates and Boolean Functions.

- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051

### **COURSE OUTCOME (CO):**

After Completion of this course, the student will be able to:

- Design any Logic circuit using basic concepts of Boolean Algebra.
- Design any Logic circuit using basic concepts of PLDs.
- Design and develop any application using 8086 Microprocessor.
- Design and develop any application using 8051 Microcontroller

**Course Name: Advanced Data Structures and Algorithms Lab (20A05301P)**

### **COURSE OBJECTIVES:**

Learn data structures for various applications.

- Implement different operations of data structures by optimizing the performance.
- Develop applications using Greedy, Divide and Conquer, dynamic programming.





- Implement applications for backtracking algorithms using relevant data structures.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand and apply data structure operations.
- Understand and apply non-linear data structure operations.
- Apply Greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms.

**Course Name: Object Oriented Programming Through Java Lab (20A05302P)**

### **COURSE OBJECTIVES:**

To introduce the concepts of Java.

- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Recognize the Java programming environment.
- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming constructs to solve a problem

**Course Name: Web Application Development (20A05304)**

### **COURSE OBJECTIVES:**

Learn website development using HTML, CSS, JavaScript.

- Understand the concepts of responsive web development using the bootstrap framework
- Make use of the JQueryjavascript library to provide interactiveness to the websites.
- Discover how to use Google Charts to provide a better way to visualize data on a website
- 5. Learn Content Management Systems to speed the development process

### **COURSE OUTCOME (CO):**



After completion of the course, students will be able to

- Construct web sites with valid HTML, CSS, JavaScript
- Create responsive Web designs that work on phones, tablets, or traditional laptops and widescreen monitors.
- Develop websites using jQuery to provide interactivity and engaging user experiences
- Embed Google chart tools in a website for better visualization of data.
- Design and develop web applications using Content Management Systems like WordPress

**Course Name: ENVIRONMENTAL SCIENCE (20A99201)**

### **COURSE OBJECTIVES:**

To make the students to get awareness on environment

- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

### **COURSE OUTCOME (CO):**

At the end of the course, the student will be able to

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes.

**Course Name: Deterministic & Stochastic Statistical Methods (20A54404)**

### **COURSE OBJECTIVES:**

This course provides a study of various Mathematical Methods and Statistical Methods which is needed for Artificial Intelligence, Machine Learning, and Data Science and also for Computer Science and engineering problems.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Apply logical thinking to problem-solving in context.
- Employ methods related to these concepts in a variety of data science applications.
- Use appropriate technology to aid problem-solving and data analysis.
- The Bayesian process of inference in probabilistic reasoning system. • Demonstrate skills in unconstrained optimization.



### **Course Name: DATABASE MANAGEMENT SYSTEMS (20A05401T)**

#### **COURSE OBJECTIVES:**

This course is designed to:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagrams for any customized application
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on concurrency techniques • Demonstrate the organization of Databases

#### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Design a database for a real-world information system
- Define transactions that preserve the integrity of the database
- Generate tables for a database • Organize the data to prevent redundancy
- Pose queries to retrieve the information from the database.

### **Course Name: OPERATING SYSTEMS (20A05402T)**

#### **COURSE OBJECTIVES:**

The course is designed to

- Understand basic concepts and functions of operating systems
  - Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
  - Familiarize with the basics of the Linux operating system
- Implement various schemes for achieving system protection and security



### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Realize how applications interact with the operating system
- Analyze the functioning of a kernel in an Operating system.
- Summarize resource management in operating systems
- Analyze various scheduling algorithms
- Examine concurrency mechanism in Operating Systems
- Apply memory management techniques in the design of operating systems
- Understand the functionality of the file system
- Compare and contrast memory management techniques.
- Understand deadlock prevention and avoidance.
- Perform administrative tasks on Linux based systems.

**Course Name: Software Engineering (20A05403T)**

### **COURSE OBJECTIVES:**

To learn the basic concepts of software engineering and life cycle models

- To explore the issues in software requirements specification and enable to write SRS documents for software development problems
- To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
- To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
- To reveal the basic concepts in software project management

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Obtain basic software life cycle activity skills.



- Design software requirements specifications for given problems.
- Implement structure, object oriented analysis and design for given problems.
- Design test cases for given problems.
- Apply quality management concepts at the application level.

**Course Name: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (20A52301)**

### **COURSE OBJECTIVES:**

To inculcate the basic knowledge of micro economics and financial accounting

- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

### **COURSE OUTCOME (CO):**

Define the concepts related to Managerial Economics, financial accounting and management.

- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Develop the accounting statements and evaluate the financial performance of business entity

**Course Name: Database Management Systems Laboratory (20A05401P)**

### **COURSE OBJECTIVES:**

To implement the basic knowledge of SQL queries and relational algebra.

- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors using PL/SQL.
- To design and implementation of a database for an organization

### **COURSE OUTCOME (CO):**



After completion of the course, students will be able to

- Design database for any real world problem
- Implement PL/SQL programs
- Define SQL queries

Decide the constraints

- Investigate for data inconsistency

**Course Name: OPERATING SYSTEMS LAB (20A05402P)**

### **COURSE OBJECTIVES:**

To familiarize students with the architecture of OS.

- To provide necessary skills for developing and debugging CPU Scheduling algorithms.
- To elucidate the process management and scheduling and memory management.
- To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
- To provide insights into system calls, file systems and deadlock handling.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Trace different CPU Scheduling algorithms (L2).
- Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
- Evaluate Page replacement algorithms (L5).
- Illustrate the file organization techniques (L4).
- Illustrate shared memory process (L4).
- Design new scheduling algorithms (L6)

**Course Name: SOFTWARE ENGINEERING LAB (20A05403P)**



### **COURSE OBJECTIVES:**

- To learn and implement the fundamental concepts of Software Engineering.
- To explore functional and non-functional requirements through SRS.
- To practice the various design diagrams through the appropriate tool.
- To learn to implement various software testing strategies.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Acquaint with historical and modern software methodologies
- Understand the phases of software projects and practice the activities of each phase
- Practice clean coding
- Take part in project management
- Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

**Course Name: Exploratory Data Analytics with R (20A05404)**

### **COURSE OBJECTIVES:**

The students will be able to learn:

- How to manipulate data within R and to create simple graphs and charts used in introductory statistics.
- The given data using different distribution functions in R.
- The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.
- The relevance and importance of the theory in solving practical problems in the real world

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to



- Install and use R for simple programming tasks.
- Extend the functionality of R by using add-on packages
- Extract data from files and other sources and perform various data manipulation tasks on them.
- Explore statistical functions in R.
- Use R Graphics and Tables to visualize results of various statistical operations on data.
- Apply the knowledge of R gained to data Analytics for real-life applications.

**Course Name: Design Thinking for Innovation (20A99401)**

### **COURSE OBJECTIVES:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

### **COURSE OUTCOME (CO):**

Define the concepts related to design thinking.

- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

**Course Name: Computer Networks (20A05501T)**

### **COURSE OBJECTIVES:**

The course is designed to





- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Expose the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Familiarize with the applications of Internet
- Elucidate the design issues for a computer network

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Identify the software and hardware components of a Computer network
- Design software for a Computer network
- Develop new routing, and congestion control algorithms
- Assess critically the existing routing protocols
- Explain the functionality of each layer of a computer network
- Choose the appropriate transport protocol based on the application requirements

**Course Name: ARTIFICIAL INTELLIGENCE (20A05502T)**

### **COURSE OBJECTIVES:**

This course is designed to:

- Introduce Artificial Intelligence
- Teach about the machine learning environment
- Present the searching Technique for Problem Solving
- Introduce Natural Language Processing and Robotics



### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Apply searching techniques for solving a problem
- Design Intelligent Agents
- Develop Natural Language Interface for Machines
- Design mini robots
- Summarize past, present and future of Artificial Intelligence

**Course Name: FORMAL LANGUAGES AND AUTOMATA THEORY ((20A05503))**

### **COURSE OBJECTIVES:**

This course is designed to:

- Introduce languages, grammar, and computational models
- Explain the Context Free Grammars
- Enable the students to use Turing machines
- Demonstrate decidability and un-decidability for NP-Hard problems

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- List types of Turing Machines
- Design Turing Machine
- Formulate decidability and undesirability problems.

**Course Name: SOFTWARE PROJECT MANAGEMENT (20A05504a)**

### **COURSE OBJECTIVES:**



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

This course is designed to enable the students to understand the fundamental principles of Software Project management & will also have a good knowledge of the responsibilities of a project manager and how to handle them.

## **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Describe the fundamentals of Project Management
- Recognize and use Project Scheduling Techniques
- Familiarize with Project Control Mechanisms
- Understand Team Management
- Recognize the importance of Project Documentation and Evaluation.

**Course Name: BIG DATA TECHNOLOGIES (20A05504c)**

## **COURSE OBJECTIVES:**

To learn the big data characteristics, study challenges and Hadoop framework to handle big data.

## **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand the elements of Big data
- Use different technologies to tame Big Data
- Process Given data using Map Reduce
- Develop applications using Hive, NoSQL.

**Course Name: COMPUTER NETWORKS LAB (20A05501P)**

## **COURSE OBJECTIVES:**

To understand the different types of networks



- To discuss the software and hardware components of a network
- To enlighten the working of networking commands supported by operating system
- To impart knowledge of Network simulator 2/3
- To familiarize the use of networking functionality supported by JAVA
- To familiarize with computer networking tools.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Apply the existing algorithms for error and flow control
- Experiment with the Network simulation environment
- Experiment with socket programming
- Develop various applications using socket programming
- Design the necessary Security and Authentication algorithms.

**Course Name: ARTIFICIAL INTELLIGENCE LAB (20A05502P)**

### **COURSE OBJECTIVES:**

To teach the methods of implementing algorithms using artificial intelligence techniques

- To illustrate search algorithms To demonstrate the building of intelligent agents

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Implement search algorithms
- Solve Artificial intelligence problems
- Design chatbot and virtual assistant.

**Course Name: COMPILER DESIGN (20A05601T)**



### **COURSE OBJECTIVES:**

- Teach the concepts related to assemblers, loaders, linkers and editors
- Introduce the basic principles of the compiler construction
- Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
- Expose the process of intermediate code generation.
- Instruct the process of Code Generation and various Code optimization techniques

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Differentiate the various phases of a compiler
- Design code generator
- Apply code optimization techniques
- Identify the tokens and verify the code.

**Course Name: MACHINE LEARNING (20A05602T)**

### **COURSE OBJECTIVES:**

The course is introduced for students to

- Gain knowledge about basic concepts of Machine Learning
- Study different learning algorithms
- Learn about of evaluation of learning algorithms
- Learn about Dimensionality reduction

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Identify machine learning techniques suitable for a given problem



- Solve the problems using various machine learning techniques
- Apply Dimensionality reduction techniques
- Design application using machine learning techniques.

**Course Name: INTERNET OF THINGS (20A05603T)**

### **COURSE OBJECTIVES:**

Understand the basics of Internet of Things and protocols.

- Discuss the requirement of IoT technology
- Introduce some of the application areas where IoT can be applied.
- Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand general concepts of Internet of Things.
- Apply design concept to IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications
- Create IoT solutions using sensors, actuators and Devices.

**Course Name: SOFTWARE TESTING (20A05604a)**

### **COURSE OBJECTIVES:**

- Introduce the fundamentals of various testing methodologies.
- Describe the principles and procedures for designing test cases.



- Teach debugging methods.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand the basic testing procedures.
- Develop reliable software
- Design test cases for testing different programming constructs
- Test the applications by applying different testing methods and automation tools.

**Course Name: ADVANCED COMPUTER ARCHITECTURE (20A05604b)**

### **COURSE OBJECTIVES:**

- Understand the Concept of Parallel Processing and its applications
- Implement the Hardware for Arithmetic Operations
- Analyse the performance of different scalar Computers
- Develop the Pipelining Concept for a given set of Instructions
- Distinguish the performance of pipelining and non-pipelining environment in a processor

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Illustrate the types of computers, and new trends and developments in computer architecture
- Outline pipelining, instruction set architectures, memory addressing
- Apply ILP using dynamic scheduling, multiple issue, and speculation
- Illustrate the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges
- Apply multithreading by using ILP and supporting thread-level parallelism (TLP).



### **Course Name: COMPILER DESIGN LAB (20A05601P)**

#### **COURSE OBJECTIVES:**

- To introduce LEX and YACC tools
- To learn to develop algorithms to generate code for a target machine
- To implement LL and LR parsers

#### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Design, develop, and implement a compiler for any language
- Use LEX and YACC tools for developing a scanner and a parser
- Design and implement LL and LR parsers
- Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity.

### **Course Name: MACHINE LEARNING LAB (20A05602P)**

#### **COURSE OBJECTIVES:**

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

#### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand the implementation procedures for the machine learning algorithms.
- Design Java/Python programs for various Learning algorithms.
- Apply appropriate data sets to the Machine Learning algorithms.





- Identify and apply Machine Learning algorithms to solve real world problems.

**Course Name: INTERNET OF THINGS LAB (20A05603P)**

### **COURSE OBJECTIVES:**

To introduce components such as WiFi, Bluetooth, Temperature, Moisture sensors

- To know the Micro controller such as Arduino
- To know the System on Chip (SOC) / Single Board Computer such as Raspberry Pi
- To understand HTTP IoT protocols and perform Experiments for data transmission
- To understand UAV/Drones and Internet of Drones Experiments

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Know the various IoT sensors and understand the functionality
- Design and analyze IoT experiments and transfer the data to IoT Clouds
- Design the IoT systems for real time applications
- Understand Drones and Perform Internet of Drones Experiments.

**Course Name: CLOUD COMPUTING (20A05701a)**

### **COURSE OBJECTIVES:**

- Examine the state-of-the art Distributed Computing systems



- Understand fundamentals and essentials of Cloud Computing
- Understand the importance of virtualization in Cloud Computing and now how this has enabled the development of Cloud Computing
- Explore Cloud computing simulation tools
- Understand Cloud computing programming models
- Explore import cloud computing driven systems such as openstack, Aneka, public clouds

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Explain the principles of Cloud computing systems
- Compare the strengths and limitations of Cloud Computing
- Understand the private, hybrid and public clouds, followed by right selection of Cloud for the specific application types
- Identify the appropriate Cloud service for a given application
- Evaluate the comparative advantages and disadvantages of virtualization, open source tools, Public Clouds
- Design and host the application in Private, Hybrid and Public Clouds using Thread, Task and MapReduce programming models.

**Course Name: VEHICULAR ADHOC NETWORKS (20A05701c)**

### **COURSE OBJECTIVES:**

- Introduce to the students with the emerging technologies, standards and applications in vehicular communication systems
- Study the design considerations and challenges of vehicle-to-infrastructure and vehicle-to-vehicle communications
- Theories such as vehicular mobility modeling, and vehicular technologies and standards from the physical to network layers will be introduced
- Examples of emerging applications of vehicular communication in Intelligent Transportation Systems will also be studied and discussed.



### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Understand and describe the basic theories and principles, technologies, standards, and system architecture of vehicular ad-hoc networks (VANET) or inter-vehicle communication networks.
- Analyze, design, and evaluate vehicular communication platforms for various kinds of safety and infotainment applications.

**Course Name: CRYPTOGRAPHY & NETWORK SECURITY (20A05702b)**

### **COURSE OBJECTIVES:**

This course aims at training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes, and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols, PKI standards
- Various secure communication standards including Kerberos, IPsec, TLS and email
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications

### **COURSE OUTCOME (CO):**

Course Outcomes:

- After completion of the course, students will be able to
- Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory
- Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication



- Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- Apply different digital signature algorithms to achieve authentication and create secure applications
- Apply network security basics, analyse different attacks on networks and evaluate the performance of firewalls and security protocols like TLS, IPSec, and PGP
- Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications.

**Course Name: FULL STACK DEVELOPMENT (20A05703a)**

### **COURSE OBJECTIVES:**

Learn the core concepts of both the frontend and backend programming course, to get familiar with the latest web development technologies.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Develop a fully functioning website and deploy on a web server.
- Gain Knowledge about the front end and back end tools
- Find and use of code packages based on their documentation to produce working results in a project.
- Create web pages that function using external data.

**Course Name: BLOCKCHAIN TECHNOLOGY AND APPLICATIONS (20A05703b)**

### **COURSE OBJECTIVES:**

- Understand how block chain systems (mainly Bitcoin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.



### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Block chain implementations and Understand Crypto currency markets.
- Examine how to profit from trading crypto currencies.

**Course Name: DEEP LEARNING (20A05703c)**

### **COURSE OBJECTIVES:**

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture.

### **COURSE OUTCOME (CO):**

After completion of the course, students will be able to

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs.



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