

PROGRAM OUTCOMES	<p>PO - 1 The MCA programme is designed to create an information technology base through collaboration, vision and foresight that encourages Diversity and Innovation.</p>
	<p>PO - 2 Being a Professional and Technical course, it offers to students a wide range of options for an ambitious career in Development and Maintenance fields.</p>
	<p>PO - 3 With proficient knowledge in various technologies, one becomes eligible for placements in both Government sectors namely ISRO/DRDO and multiple private sectors like Google, Amazon, Microsoft, IBM, TCS etc.,</p>
	<p>PO - 4 Following are the lucrative job positions on offer like, System Analysts, System Designers, Quality Analyst, Project Manager, Software Application Architect, Software Programmer and IT Managers in relevant fields of IT.</p>
	<p>PO - 5 The course curriculum will have enough flexibility to enable a student to undertake advanced studies in computer science later on.</p>

COURSE OUTCOMES:

The MCA course structure gives an awareness to the students to choose the appropriate data structure and algorithm design method for a specified application, solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions. The course also helps the students to solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound and writing programs for these solutions, describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms, Demonstrate different methods for traversing trees, compare alternative implementations of data structures with respect to performance and to discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

COURSE OUTCOMES AT THE END OF I SEMESTER

P -1	DATA STRUCTURES
	<ol style="list-style-type: none">1.To assess how the choice of data structures and algorithm design methods impacts the performance of programs.2.To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions. ...3.To provide the knowledge of basic data structures and their implementations.4.To understand the importance of data structures in the context of writing efficient programs.

P -2	COMPUTER ORGANIZATION
	After completion of the course the student should be able to: <ul style="list-style-type: none">• Describe the internal organization of a computer, CPU, memory unit, input/outputs and the functional units of a processor• Manipulate representations of numbers stored in digital computers• Explain addressing modes, instruction formats and program control statements• Understand the theory and architecture of central processing unit and micro-sequencer

P -3	OPERATING SYSTEMS
	After completion of the course the student should be able to: <ol style="list-style-type: none">1. describe the basic concepts of operating systems, including structure and components2. explain how memory, I/O devices, files, processes and threads are managed, and evaluate the performance of various scheduling algorithms3. explain the concepts covered in concurrency control, including mutual exclusion and synchronization, deadlock and starvation4. understand key concepts on physical and virtual memory, scheduling, I/O and file systems and mass storage structures.

P -4	OBJECT ORIENTED PROGRAMMING SYSTEMS
	After completion of the course the student should be able to: <ul style="list-style-type: none">• To understand Object Oriented Programming concepts, class hierarchy, characteristics of Java, inheritance and polymorphism and become familiar with the relationship between classes and objects in a Java program.

	<ul style="list-style-type: none"> • Learn programming based on JAVA 7 and above. • To write efficient and effective applications in Java, Java's event handling model, graphical user interface (GUI), swing component set, understand the relationship between the AWT and Swing. • Have a better understanding of Java's event model and design, build simple Graphical User Interfaces (GUI)s, Networking, Java Database Connectivity with JDBC™, Servlets, JavaServer Pages (JSP). • The course aims to make the students learn programming in Java. Java language elements and characteristics, including data types, operators, and control structures are discussed in order to make the students develop Java applications.
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P -5	PROBABILITY STATISTICS AND QUEUEING THEORY
	<p>After completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Define and explain basic concepts in probability theory and how to translate real-world problems into probability models • Solve standard problems that include random variables, discrete and continuous probability distributions • Perform Test of Hypothesis and construct a confidence interval to estimate population parameters • Compute and interpret the results of Correlation Analysis, Multivariate Regression, Chi-Square test for Independence and Goodness of Fit • Explain basic concepts in Markov processes, M/M/1 and M/M/C queueing systems.

COURSE OUTCOMES AT THE END OF II SEMESTER

P -1	DATABASE MANAGEMENT SYSTEMS
	<ul style="list-style-type: none">• To introduce Database concepts of Relational model, Relational algebra, SQL and various Database design architectures.• To understand Conceptual Database designs, ER diagrams.• To understand Functional Dependencies and Standard Database design practices such as Normalization.• To familiarize students with Database Application Design Tools including Embedded SQL, JDBC, Cursors and Stored Procedures.• To understand Transaction Management, Concurrency Control and Recovery Systems.
P -2	ARTIFICIAL INTELLIGENCE
	<ul style="list-style-type: none">• To introduce the key concepts in AI, Standard AI problems and techniques.• To formulate AI problems and understand the standard search techniques including BFS, DFS, Heuristic search, Hill Climbing, A*, AO*.• To understand how knowledge is represented in computers, various structured representations and symbolic logic.• Explore the key ideas in Expert Systems and Natural Language Processing.
P -3	EMBEDDED SYSTEMS
	<ul style="list-style-type: none">• To make students familiar with Embedded system Architecture, Microprocessor Architecture.• To understand the concepts of shared data problem and semaphores.• To understand how to get embedded s/w on to target machine.• To understand how to test s/w on host machine.
P -4	BUSINESS ANALYTICS
	<p>After completion of the course the student should be able to:</p> <ul style="list-style-type: none">• Describe data and models used for Business Analytics and apply various descriptive analytic techniques to analyze data• Estimating population parameters, interval estimates, construct confidence intervals and perform hypothesis testing• Estimate and interpret the parameters of simple linear regression and multiple

	<p>linear regression</p> <ul style="list-style-type: none"> • Apply forecasting models for various time series data including stationary time series, time series with linear trend and time series with seasonality • Implement models on spreadsheets, develop user-friendly applications and build linear optimization models on spreadsheets.
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P -5	WEB TECHNOLOGIES
	<p>After completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Understand and be able to analyse any real time web application • Acquire working knowledge to develop web applications using both client side and server side scripting and retrieving data from databases • Appreciate the importance of MVC architecture pattern in development of web applications.

COURSE OUTCOMES AT THE END OF III SEMESTER

P - 1	NETWORK SECURITY AND CRYPTOGRAPHY
	<ul style="list-style-type: none"> • To introduce the key concepts in Confidentiality and Data Integrity and issues involved in Network Security. • To familiarize students with various Cryptographic techniques. • To understand Number theory and Algorithms in Public Key Cryptography. • Explore different types of security threats in IP, Web, Systems, Electronic Mail and their remedies.

P - 2	DATA MINING
	<p>After completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Understand the functionality of the various data mining and data warehousing component • Appreciate the strengths and limitations of various data mining and data warehousing models • Explain the analyzing techniques of various data • Describe different methodologies used in data mining and data ware housing. Compare different approaches of data ware housing and data mining with various technologies.

P - 3	OBJECT ORIENTED SOFTWARE ENGINEERING
	<ul style="list-style-type: none"> • To explain importance of OOSE in Software Development. • To explain importance of requirements engineering. • To explain role of UML and Testing in Software Development. • To explain entire Software Development Process with aid of case studies.

P - 4	COMPUTER NETWORKS
	<p>After completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • Study the basic terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model • Acquire knowledge of Application layer and Presentation layer paradigms and protocols. • Study Session layer design issues, Transport layer services, and protocols. • Gain core knowledge of Network layer routing protocols and IP addressing. • Study data link layer concepts, design issues, and protocols. • Read the fundamentals and basics of Physical layer, and will apply them in real time applications.

P - 5	PYTHON PROGRAMMING
	<p>At the end of the course, a student should be able to:</p> <ul style="list-style-type: none"> • Acquire programming knowledge on Basics of Python • Acquire programming knowledge on Text and File Handling • Develop Python programs to Mean, Median, Mode, Correlation • Acquire programming knowledge on NumPy, Pandas Library • Acquire programming knowledge on Graph Visualizations in Python and Data Analysis using Python

COURSE OUTCOMES AT THE END OF IV SEMESTER

P -1	DATA SCIENCE
	<ul style="list-style-type: none"> • To introduce the process involved in Data Science Projects. • To familiarize students with basics of preparation, exploration and visualization of data. • To introduce modelling methods such as clustering, classification, regression and model evaluation. • To familiarize students with various methods in time series forecasting. • To understand basics of Anomaly detection and Feature selection.

P - 2	INTERNET OF THINGS
	<ul style="list-style-type: none"> • To provide students Conceptual Framework and ARchitectural view of IOT. • To introduce design principles for connected devices and for Web connection. • To familiarize students with acquiring, organizing and processing of data and analytics using Cloud platform and IOT cloud services. • To introduce sensors, RFIDs and WSN. • To introduce prototyping embedded devices for IOT and various IOT supported platforms.

P - 3	PROJECT WORK
	<ul style="list-style-type: none"> • Three Stages In Project adjudication: <ul style="list-style-type: none"> ○ Stage I: Presentation of Concept Note & Problem Approval by Guide ○ Stage II; Progress Approval by System Demonstration with results Internal -50 Marks ○ Stage III: Final Presentation with Documentation & External Viva-Voce - 50 Marks • Candidates can do their thesis work within the department or in association with any industry/research organization. In case of thesis done in association with an industry/research organization, one advisor (Guide) should be from the department and one advisor(CO-Guide) should be from the industry/research organization. • A publication of a paper on the thesis work in a National/International Conference proceedings with presentation certificate or a paper on the thesis work be communicated to a National/International Journal & accepted for publication for the submission of thesis at the end of 4th semester is desirable. • The external examiner shall be nominated by the Chairman, Board of Examiners in ITCA as per the norms of the University