MCA

Sl.No	Branch	Sem	Subject	COs
1	MCA	1st	18MCA11 Data Structure	1) Demonstrate different data structures, its operations using C programming.
				2) Analyse the performance of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques.
				3) Implement some applications of data structures in a high-level language such as C/C++
				4) Design and apply appropriate data structures for solving computing problems.
				5) Compute the efficiency of algorithms in terms of asymptotic notations for the given problem.
2	MCA	1st	18MCA12 Os With Unix	1) Analyse the basic Operating System Structure and concept of Process Management
				2) Analyse the given Synchronization/ Deadlock problem to solve and arrive at valid conclusions.
				3) Analyse OS management techniques and identify the possible modifications for the given problem context.
				4) Demonstrate the working of basic commands of Unix environment including file processing

				5) Demonstrate the usage of different shell commands, variable and AWK filtering to the given problem
3	MCA	1st	18MCA13 Computer Network	1) Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.
				2) Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
				3) Analyse the networking concepts of TCP/IP for wired and wireless components
				4) Identify the issues of Transport layer to analyse the congestion control mechanism
				5) Design network topology with different protocols and analyse the performance using NS2
4	MCA	1st	18MCA14 Mathematical Foundation	1) Apply the fundamentals of set theory and matrices for the given problem.
				2) Apply the types of distribution, evaluate the mean and variance for the given casestudy/ problem.
				3) solve the given problem by applying the Mathematical logic concepts
				4) Model the given problem by applying the concepts of graph theory.
				5) Design strategy using gaming theory concepts for the given problem..
				6) Identify and list the different applications of discrete mathematical concepts in computer science.
5	MCA	1st	18MCA15 Research Methodology And Ipr	1) Identify the suitable research methods and articulate the research steps in a proper sequence for the given problem.

				2) Carry out literature survey, define the problem statement and suggest suitable solution for the given problem.
				3) Analyse the problem and conduct experimental design with the samplings.
				4) Perform the data collection from various sources segregate the primary and secondary data
				5) Apply some concepts/section of Copy Right Act /Patent Act /Cyber Law/ Trademark to the given case and develop conclusions
6	MCA	1st	18MCA16 DS LAB	1) Demonstrate different data structures, its operations using C programming.
				2) Analyse the performance of Stack, Queue, Lists, Trees, and Hashing, Searching and Sorting&; techniques.
				3) Implement some applications of data structures in a high-level language such as ;C/C++
				4) Design and apply appropriate data structures for solving computing problems.
				5) Compute the efficiency of algorithms in terms of asymptotic notations for the given problem.
7	MCA	1st	18MCA17 Unix Programming Lab	1) Demonstrate the working of basic commands of Unix environment including file processing
				2) Apply Regular expression to perform pattern matching using utilities like grep, sed
				3) Implement unix commands/ system calls to demonstrate process management
				4) Demonstrate the usage of different shell commands, variable and AWK filtering to the given problem

				5) Develop shell scripts for developing the simple applications to the given problem.
8	MCA	1st	18MCA18 Computer Network Lab	1) Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.
				2) Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
				3) Analyse the networking concepts of TCP/IP for wired and wireless components
				4) Identify the issues of Transport layer to analyse the congestion control mechanism
				5) Design network topology with different protocols and analyse the performance using NS2
9	MCA	1st	18MCA19BC Bridge Course - basic Programing	1) Demonstrate the key concepts introduced in C programming by writing and executing the Programs.
				2) Demonstrate the concepts of structures and pointers for the given application/problem
				3)Implement the single/multi-dimensional array for the given problem
				4) Demonstrate the application of logic gates in solving some societal/industrial problems.
				5) Analyze how memory organization, operations, instruction sequencing and interrupts are Useful in executing the given program
10	MCA	2nd	18MCA21 Database Management System	1) Apply the basic concepts of database management in designing the database for the given problem
				2) Design entity-relationship diagrams to the given problem to develop database

				application with appropriate fields and validations
				3) Implement a database schema for the given problem domain.
				4) Formulate and execute SQL queries to the given problem.
				5) Apply normalization techniques to improve the database design to the given problem.
11	MCA	2nd	18MCA22 Object Oriented Programming with Java	1) Demonstrate the basic programming constructs of Java and OOP concepts to develop Java programs for a given scenario.
				2) Illustrate the concepts of generalization and run time polymorphism applications to develop reusable components
				3) Demonstrate the usage of Packages, Interfaces, Exceptions and Multithreading in building given applications.
				4) Apply Enumerations, Wrappers, Auto boxing, Collection framework and I/Ooperations for effective coding to the given problem
				5) Implement the concepts of Applets, and networking using Java network classes for developing the distributed applications to the given problem
12	MCA	2nd	18MCA23 Web Technologies	1) Apply the features JQuery for the given web-based problem.
				2)Demonstrate the development of XHTML documents using JavaScript and CSS
				3) Illustrate the use of CGI and Perl programs for different types of server- side; applications
				4) Design and implement user interactive dynamic web-based applications.

				5) Demonstrate applications of Angular JS and JQuery for the given problem
13	MCA	2nd	18MCA24 Software Engineering	1) Identify and define different requirements for the given problem and present in the IEEE format.
				2) Use modern tool to create dynamic diagrams to represent the design for the given problem.
				3) Draw class diagram, analyse the different types of association that exists as per the given problem and represent them using UML notations.
				4) Analyse the given system to identify actors, use cases to design use case diagrams for the given problem using RSA/open source tool.
				5) Design the static/dynamic models to meet application requirements of the given system and generate code (skeleton) using the modern tool.
14	MCA	2nd	18MCA251 Cybersecurity	1) Apply IT ACT (Cyber law) to the given case/problem and infer from the given case and analyze the gap if exists
				2) Analyze the working of cyber security principles in designing the system.
				3) Analyze the given problem (cybercrime, vulnerability, threat), develop a strategy (physical, logical or administrative controls) to mitigate the problem and articulate consequences on Society and National Economy.
				4) Examine relevant network defense/web application tool to solve

				given cyber security problem and evaluate its suitability.
				5) Evaluate provisions available in Indian cyber law to handle infringement of intellectual property rights that happens on the cyber platform.
15	MCA	2nd	18MCA251 Cybersecurity	1)Apply IT ACT (Cyber law) to the given case/problem and infer from the given case and analyze the gap if exists
				2)Analyze the working of cyber security principles in designing the system
				3)Analyze the given problem (cybercrime, vulnerability, threat), develop a strategy (physical, logical or administrative controls) to mitigate the problem and articulate consequences on Society and National Economy
				4)Examine relevant network defense/web application tool to solve given cyber security problem and evaluate its suitability
				5) Evaluate provisions available in Indian cyber law to handle infringement of intellectual property rights that happens on the cyber platform.
16	MCA	2nd	18 MCA254 User Interface Design	1) Analyse the new technologies that provide interactive devices and interfaces.
				2) Apply the guidelines to develop the UID and evaluate for the given problem.
				3) Apply the development methodologies with an analysis of the social impact and legal

				issues, Understand Direct Manipulation and Virtual Environment.
				4) Discuss the command, natural languages and issues in design for maintaining QoS.
				5) Demonstrate techniques for information search and visualization for the given problem.
17	MCA	2nd	18MCA263 Mobile Application Development	1) Develop effective user interfaces that leverage evolving mobile devices
				2) Develop applications using software development kits (SDKs), frameworks and toolkits.
				3) Implement suitable methods to integrate database and server-side technologies
				4) Design and develop open source software based mobile application to the given problem.
				5) Build and deploy competent mobile application to solve the societal/industrial problems.
18	MCA	2nd	18MCA27 DBMS Lab	1) Design entity-relationship diagrams to solve given database applications
				2) Implement a database schema for a given problem.
				3) Formulate SQL queries in Oracle for the given problem
				4) Apply normalization techniques to improve the database design for the given problem
				5) Build database and verify for its appropriate normalization for any given problem
19	MCA	2nd	18MCA28 Java Programming Lab	1) Demonstrate the fundamental data types and constructs of Java Programming by writing executable/interpretable programs.

				2) Illustrate the object oriented principles with the help of java programs.
				3) Develop reusable and efficient applications using inheritance and multi-threading concepts of java.
				4) Apply client-side programming and networking concepts to develop distributed applications.
				5) Write java programs to demonstrate the concepts of interfaces, inner classes and I/Ostreams.
20	MCA	3rd	18MCA31 Database Management System	1) Demonstrate the fundamentals of data models and conceptualize and depict a database system and Make use of ER diagram in developing ER Model
				2) To Summarize the SQL and relational database design
				3)Illustrate transaction processing, concurrency control techniques and recovery
				4) Inference the database design in the real world entities
21	MCA	3rd	18MCA32 Programming using Python	1) Understand and comprehend the basics of python programming
				2) Apply knowledge in real - time applications
				3) Understands about file and its applications
				4) Use standard programming constructs
22	MCA	3rd	18MCA33 Design and Analysis of Algorithms	1) Categorize Problems based on their Characteristics and Practical Importance
				2)Develop Algorithms using Iterative/Recursive Approach
				3) Compute the Efficiency of Algorithms in terms of Asymptotic Notations.
				4)Design the Algorithm using an appropriate design paradigm for solving a given problem

				5) Classify problems as P, NP or NP Complete
				6) Implement algorithms using various design strategies and determine their order of growth.
23	MCA	3rd	18MCA34 System Software	1) Understand the introductory concepts of system software, SIC and SIC/XE machine architecture.
				2) Understand the design and implementation of assemblers with implementation examples.
				3) Design and implement the linkers and loaders, macro processors and respective implementation examples.
				4)Learn the basic design and working of compilers.
24	MCA	3rd	18MCA351 Software Testing	1)Acquire knowledge of basic principles and knowledge of software testing and debugging and test cases
				2)Understand the perceptions on testing like levels of testing, generalized pseudocode and with related examples
				3)Study the various types of testing
				4)Analyse the difference between functional testing and structural testing
				5) Analyse the performance of fault based testing
25	MCA	3rd	18MCA36 DBMS Lab	1) Understand, appreciate the underlying concept of database technologies
				2) Able to create a database with different types of integrity constraints and use SQL, commands such as DDL, DML, DCL, TCL to access data from database objects.
				3) Design and implement a database schema for a given problem domain
				4)Perform embedded and nested queries

				5) Take up real-world problems independently.
26	MCA	3rd	18MCA37 Python Programming Lab	1) Apply object oriented programming concepts to develop dynamic interactive python applications.
				2) Use the procedural statements assignments conditional statements loops method calls and arrays
				3) Design code and test small python programs with a basic understanding of top down design.
				4) Learn how to create GUI and solve real world problem using language idioms data structures and standard library.
27	MCA	3rd	18MCA38 Algorithms Lab	1) Implement the Concept of Time and Space Complexity, Divide & Conquer strategy, Dynamic Programming, Greedy & approximate algorithms
				2) Describe the methodologies of how to analyze an algorithm
				3) Chose a better algorithms to solve the problems
28	MCA	4th	18MCA41 Advance Java Programing	1) Learn the concept of Servlet and its life cycle
				2) Understand JSP tags and its services
				3) Create packages and interfaces Build Database connection
				4) Develop Java Server Pages applications using JSP Tags.
				5) Develop Enterprise Java Bean Applications
29	MCA	4th	18MCA42 Advance Web Programming	1) Acquire Knowledge of Building the Web Applications using PHP, Ruby, Bootstrap, AJAX and XML

				2) Design the Asynchronous Web Applications using AJAX.
				3) Understand the terminology of building web applications using MVC architecture.
				4) Design responsive web applications using Bootstrap.
30	MCA	4th	18MCA43 Object Oriented Modelling And Design	1) Acquire knowledge of Basic UML Concepts and terminologies Life Cycle of Object oriented Development Modeling Concepts.
				2) Identify the basic principles of Software modelling and apply them in real world applications
				3) Produce conceptual models for solving operational problems in software and IT environment using UML
				4) Analyze the development of Object Oriented Software models in terms of Static behaviour Dynamic behaviour
				5) Evaluate and implement various Design patterns
31	MCA	4th	18MCA444 Cloud Computing	1) Understand the cloud computing delivery model and the enabling technologies
				2) Explain and cloud computing platforms, key technology drivers and cloud programming/software environments
				3) Identify the need for cloud computing model and compare various key enabling technologies
				4) Analyze and choose an appropriate programming environment for building cloud applications
32	MCA	4th	18MCA46	1) Understand the Professional communication at work place.

			Professional Communication And Report Writing	2) Acquire the knowledge of technical writing and business reporting.
				3) Develop the leadership qualities.
				4) Understand and implement ethical behaviour at work place.
33	MCA	4th	18MCA47 Adv Java Programing Lab	1) Designing HTML pages to demonstrate Java Servlets, JSP, Bean, and EJB programs
				2) Implementing Dynamic HTML using Servlet and demonstration of service methods, auto web page refresh, Session tracking using cookie and HTTP Session in Servlet
				3) Learn the fundamental of connecting to the database.
				4) Demonstrate JSP (page attributes, action tags, and all basic tags) and types of EJB application
34	MCA	4th	18MCA48 Adv Web Programming Lab	1) Understand, analyze and apply the role of server side scripting languages.
				2) Build web application using PHP, Ruby, Bootstrap, XML and store values in MySQL.
				3) Build MVC based web applications using Ruby and Rails.
35	MCA	4th	18MCA49 Object Oriented Programming Lab	1) Understand the fundamental principles of Object-Oriented analysis, design, development and programming
				2) Demonstrate and represent the UML model elements to enable visual representation & of the system being developed
				3) Implement object oriented design model with the help of modern tool, Rational software Architect

				4) Analyze and differentiate the static and dynamic behaviour of the system for achieving & the intended & functionalities of the system
				5) Applicability, reasonableness and relation to other design criteria.
36	MCA	5th	18MCA51 Programming Using C#.net	1) Understand C# and client-server concepts using .NET Frame Work Components.
				2) Apply delegates, event and exception handling to incorporate wit ASP, Win Form, ADO.NET
				3) Analyze the use of .NET Components depending on the problem statement.
				4) Implement & Develop a web based and Console based application with Database Connectivity.
37	MCA	5th	18MCA53 Machine Learning	1) Choose the learning techniques and concept learning
				2)Identify the characteristics of decision tree and solve problem associated with
				3) Apply effectively for neural network for appropriate applications
				4) Apply Bayesian technique and derive learning rules
				5)Evaluate hypothesis and investigate instance based learning and reinforced learning
38	MCA	5th	18MCA542 Internet Of Things	1) Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
				2) Analyze the societal impact of IoT security events. & Develop critical thinking skills.
				3) Analyze, design or develop parts of an Internet of Things solution and map it toward selected business model(s)

				4) Evaluate ethical and potential security issues related to the Internet of Things.
39	MCA	5th	18MCA543 Image Processing	1)Explain how digital images are represented and manipulated in a computer, including reading and writing from storage, and displaying
				2) Be conversant with the mathematical description of image processing techniques and know how to go from the equations to code.
				3) Know the image enhancement, segmentation and compression techniques.
40	MCA	5th	18MCA552 Principles Of User Interface Design	1) Use the New technologies that provide interactive devices and interfaces.
				2) Apply the process and evaluate UID.
				3) Understand direct manipulation and virtual environment.
				4) Discuss the command, natural languages and issues in design for maintaining QoS.
				5) Persuade User documentations and information search.
41	MCA	5th	18MCA56 C Sharp .net Lab	1) Understand C# and client-server concepts using .NET Frame Work Components.
				2) Apply delegates, event and exception handling to incorporate with ASP, Win Form, and ADO.NET.
				3) Analyze the use of .NET Components depending on the problem statement.
				4) Implement & develop a web based and Console based application with Database Connectivity.
42	MCA	5th	18MCA57 Mobile Application LAB	1)Illustrate effective user interfaces that leverage evolving; mobile device capabilities
				2)Develop applications using software development (SD Ks), frameworks and toolkits

				3 Establish various methods integrate and server-side technologies
				4)Design and develop open source software based mobile applications
				5)Build and deploy competent mobile development solutions
43	MCA	6th	18MCA61 Internship	1) Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
				2) Ability to segregate work and execute/implement projects using appropriate tools.
				3) Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills.
44	MCA	6th	18MCA62 Seminar	1) Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.
				2) Ability to segregate work and execute/implement projects using appropriate tools.
				3) Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills.
45	MCA	6th	18MCA63 Major Project	1) Identify a suitable problem making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society and their ethical responsibilities.

				2) Ability to segregate work and execute/implement projects using appropriate tools.
				3) Develop skills to disseminate technical and general information by means of oral as well as written presentation and professional skills.