Subject Code	Name of Subject	Course Outcome(CO)
MCA101	Object Oriented Programming	CO1:Explain and identify procedural and object-oriented paradigm.
		CO2:Develop real life application using object-oriented concepts.
		CO3:Design and develop applications to provide a Strong foundation for advanced C++ concepts.
MCA102	Software Engineering & Project Management	CO1- Define the key concepts of Software Project Management and identify software life cycles for different types of software
		CO2-Demonstrate understanding of the requirements analysis, application of UML Models and estimation of software size, cost along with project planning and change management concepts.
		CO3-Apply various factors influencing project management, quality assurance and risk assessment to develop process for successful quality project delivery with HR Practices, Software risk and reliability issues.
MCA103	Computer Organization and Architecture	CO1: Explain the fundamentals of digital logic circuit design; structure & function of a modern digital computer and concepts of Computer Organization and Architecture.
		CO2: Identify performance issues in processor and memory design of a modern digital computer.
		CO3: Illustrate design issues involved in the development of Multiprocessor Computer Organization & Architecture.
		CO4: Analyse the strengths, limitations, applications and design trade-offs amongst different Computer Architectures and Organization.
MCA104	IT in Management	CO1:Explain Business values, role of IT and its applications in digital world.
		CO2:Analyze the strategic impact of Information Technology acquisition in managing modern business organization
		CO3:Demonstrate strategies for managing International governance and articulate the ethical and societal concerns pertaining to present and future dimensions of IT usage in modern organization.
MCA105	Statistics and Probability	CO1 – Apply measures of central tendency and dispersion on data.

		CO2- Devise null and alternative hypotheses. Apply non-parametric tests on small, large sample data of real life problems.
		CO3- Identify and distinguish common probability distributions for discrete and continuous variables.
MCAL101	Lab I – SEPM and OOP Lab	CO1: Design and Develop the solution to a problem using Object Oriented Programming Concepts
		CO2: Demonstrate software cost estimation models and project scheduling tools along with examples of software quality assurance from various sectors.
		CO3: Develop real time applications using SEPM and C++ concepts.
MCAL102	Lab II – Web Technologies and Mini Project-Lab	CO1:Explain the functionality of world wide web
		CO2: Develop static web pages using HTML & CSS
		CO3: Design and develop dynamic web applications using PHP
MCA201	Data Structures	CO1- Define and compute efficiency of various algorithms and apply sorting, searching and hashing techniques on basic data structures
		CO2- Understand linear data structures and algorithmic implementation of their applications
		CO3-Compose non-linear data structures and apply stack, queue and linked list to implement non-linear data structures.
MCA202	Operating System	CO1:Explain the general architecture and services of Operating System.
		CO2:Interpret and analyze process management, I/O management, memory management functions of Operating System
		CO3:Classify file systems, Protection and security mechanisms of different Operating Systems.
MCA203	Computer Networks	CO 1: Explain the basic concepts of computer networks and data communication systems.
		CO 2: Analyse basic networking protocols and their use in network design.
		CO 3: Design and implement basic networking model.
MCA204	Financial Accounting and Management	CO1: Define basic terms in Accountancy and Explain accounting practices, policies, processes and techniques that supports financial decision making in an organization.
		CO2: Prepare financial statements and Apply financial analysis techniques in making both business and financial decisions.

		CO3: Prepare budgets and Analyze financial statements.
MCA 205	Decision making and Mathematical Modelling	CO1 – Illustrate fundamental concepts of Logic, Sets, Relations and Graphs.
		CO2- Explain linear recurrence, relations by recognizing homogeneity, linearity, constant coefficients, degree, and characteristic equation.
		CO3- Apply MADM & MCDM Techniques to real-world business problems.
MCAL201	Lab I –OS and CN Lab	CO1: Apply various operating system commands.
		CO2: To write a shell script and awk programming.
		CO3: Create real life application with end-to-end understanding of User experience practices.
MCAL202	Lab II –DS and Web Application Development using Open source tools Lab	CO1: To produce different sorting and searching working models based on algorithms
		CO2:To Implement various linear and non-linear data structures along with their applications
		CO3: To develop web applications using AJAX framework and open source tools.
MCA301	Database Management systems	CO1:Explain fundamental database concepts and relational data model.
		CO2:Apply logical database design principles, E-R diagrams and database normalization techniques on application-based case studies.
		CO3:Demonstrate the working mechanism and function of indexing, query optimization, transaction management for traditional RDBMS and advanced databases.
MCA302	Java programming	CO1: Demonstrate the core Object Oriented concepts of the Java Language.
		CO2: Design and develop effective standalone applications, for business problems using advance java concepts.
		CO3: Design and develop web applications using server side programming & modern frameworks.
MCA303	Information Security	CO1: Explain the importance of Information Security, its applications, and fundamental cryptography algorithms underpinning security solutions.
		CO2: Illustrate Authentication and Message Digest Algorithms, their Types, Security Attacks and Solutions on Authentication Protocols.
		CO3: Explain the working, function and types of Firewalls, Intrusion Detection and Intrusion Prevention Systems.

		CO4: Explain the function, working mechanisms of and Identify the trade-offs involved, in standard security protocols related to Web & Internet Security, Database Security, Authentication Systems, Email & Wireless Mobile Security.
MCA304	Operation Research	CO1 – Describe Basic operation research concept and terminology involved in optimization techniques.
		CO2- Device an Operation Research (OR) model for solving business problems and identify appropriate OR Techniques to optimize their solutions.
		CO3- To Identify and evaluate trade - offs in existing and recent techniques for solving optimization problems.
MCA305	Software Testing and Quality Assurance	CO1:Explain objectives, principles, strategies and methods of software testing.
		CO2:Apply various Software testing Techniques to find bugs in software applications.
		CO3:Assess software test automation problem and apply various software quality assurance techniques to ensure the quality in software.
MCAL301	Database Management systems and Software Testing Lab	CO1: Demonstrate DBMS fundamental and advanced concepts.
		CO2: Apply core and advanced concepts of DBMS to a given problem statement.
		CO3: Demonstrate manual testing techniques and automated testing tools.
		CO4: Create test design documents and test reports
MCAL302	Java Programming and Unified Modeling Language Lab	CO1: Develop a simple software application using the object oriented approach.
		CO2: Design and develop a Java Web Applications.
		CO3: Apply UML tools for object oriented software modeling.
MCAPR 301	Mini Project	CO1:Choose appropriate Open Source Tool to develop a business solution with the experience of self-learning.
		CO2:Apply project management concepts and implement solution as effective team member.
		CO3:Compile and present the project report for technical solution.
MCA401	Data Mining and Business Intelligence	CO1:Interpret Business Intelligence concepts and compare prediction methods to analyse real life problem
		CO2:Utilize data warehouse concepts for data analysis and Business intelligence visualisations.

		CO3:Illustrate the process of data pre-processing and apply association rule mining algorithm on a given problem statement.
		CO4:Apply data mining algorithms to solve business problems and explain the working of web mining and text mining.
MCA402	Advanced Web Technology	CO1:Explain .net framework architecture components
		CO2:Apply object oriented programming and ADO.net concepts in C# to develop desktop and web applications
		CO3:Design and develop secure web applications using asp.net according to industry standards
		CO4:Analyze and develop custom XML and WCF web services.
MCA403	Computer Graphics	CO1: Recognize the difference between Computer Graphics and Image Processing; Describe Raster and Random Graphics Systems, its Components and Various application areas for Computer Graphics and Image Processing.
		CO2: Illustrate the algorithms and corresponding implementations for generating various Output Primitives of Computer Graphics; Explain and Apply different 2-D and 3-D Geometric Transformation Techniques.
		CO3: Explain and Apply different Image Processing Techniques.
MCA 4043	Enterprise Resource Planning	CO1: Conceptualize and identify the strategy used for ERP Implementation.
		CO2: Examine design principles for various business module in ERP.
		CO3: Evaluate emerging technologies for implementation of ERP.
MCA4044	Ethics & CSR	CO1:Understand ethical theories and ethics in profession.
		CO2:Analyze global issues and apply ethical Code, Audit and living in real world.
		CO3:Analyze Corporate Social Responsibility and its framework.
MCA4054	AI and Soft Computing	CO1-Explain various AI concepts, identify and describe problems that are amenable to solution by AI and soft computing techniques.
		CO2-Infer neural network concepts and explain various algorithms with their applications
		CO3-Apply fuzzy logic techniques and genetic algorithm to find solution of uncertain and complex problems
MCAL401	Advanced Web Technology	CO1:Develop Windows forms applications and Web Applications using Dot NET Technologies.

	and Data Mining and Business Intelligence Lab	CO2: Analyze business problem through Business Intelligence Visualisations using Tableau
		CO3: Demonstrate parallel and distributed database concepts and apply Data warehousing and mining techniques to a given problem statement
MCAL402	Computer Graphics and Image Processing Lab	CO1- Design scan conversion problems using C++ programming.
		CO2 - Understand the Practical Implementation of different type of geometric transformation of objects in 2D and 3D.
		CO3- : Analyze images in the frequency domain using various transformation techniques.
MCAL403 Activity Lab	Soft Skill Development	CO1 Identify and interpret interpersonal skills that help in communication, teamwork, leadership and decision making.
		CO2 Methodically implement and correlate the different facets of organizational behavior to facilitate better interpersonal relationships.
		CO3 Develop holistic leaders and technocrats helping in individual and organizational growth.
MCA501	Wireless and Mobile technology	CO1:Understand the concept of cellular communications, advantages and its limitations.
		CO2: Compare the various wireless technologies and its applications
		CO3: Apply the appropriate technology in the applications with Implemention the concepts of networking using CISCO Software.
		CO4:- Comparison on different cellular network with their generation growth with parallel Comparison between WAP Model and Mobile IP
MCA502	Advanced Distributed Computing	CO1: Define the concepts of distributed and parallel computing.
		CO2: Illustrate the concepts of SOA, distributed system management and object based system.
		CO3: Analyse security and storage in cloud technologies.
MCA503	User Experience Design	CO1: Explain user experience concepts and the methodological approach for user experience design
		CO2: Apply prototyping and problem solving techniques of user experience design for real life applications
		CO3:Assess User experience evaluation techniques to real-life applications and explain the Ux methods for agile development.

MCADLE5041	Big Data Analytics	CO1:-. Develop and maintain reliable, scalable systems using Apache HADOOP
		CO2:-Write Map Reduce based application
		CO3:- Differentiate between conventional SQL and NoSQL
		CO4:- Analyze and develop Big Data solutions using HIVE and PIG and tools for analysing NOSQL Concepts and HBase Commands
MCADLE5043	Internet of Things	CO1-Explain the concept of IOT and its application in value chain.
		CO2-Infer IoT architectures and analyze the IoT enabling Technologies including Open – Source Prototyping Platforms.
		CO3-Discover the real-world problems and relate solutions for them in context of IoT
MCAILE5053	Management Information System	CO1: Explain the MIS concepts in strategic business environment of today's digital firm.
		CO2: Analyze decision making concepts and its applications in Decision Support System through data information and knowledge
		CO3:Categorize Ecommerce applications & analyze the security threats to the application.
MCA L501	Mobile Application and User experience Design Lab	CO1: Demonstrate Android activities life cycle
		CO2: Design and develop innovative android applications
		CO3: Create real life application with end-to-end understanding of User experience practices.
MCA L502	Open Source System For ADC Lab	CO1:Demonstrate the use of java Concepts for Socket Programming
		CO2:Design and Develop the solution to a problem using java concepts
		CO3:Explore various advanced distributed concepts
MCAPR 501	Mini Project	CO1: Identify and infer the domain specific problem statement using critical and logical thinking
		CO2:Analyze and Design business Solution to solve societal problem using modern open source tool with the experience of self-learning
		CO3:Compile and present the project report for technical solution.
MCAPR601	Internship – Project	CO1: Interpret and analyze real life organizational and environmental situations
		CO2: Apply project management concepts and implement solution as effective team member.

		CO3: Compile and present the project report for technical and business solution.
		CO1:Choose the research domain and outline the research objectives
		CO2:Select appropriate research technique, build LR and compose solution/conclusion
MCA602	Seminar – Research Paper	CO3:Compile and articulate experience in preparation of research materials for publication or presentation

PO	Graduate Attribute	Description
PO1	**Computational Knowledge**	Develop and apply fundamentals of mathematics and computing to demonstrate competencies in IT ecosystem.
PO2	**Problem Analysis:**	Identify, conduct survey use quantitative and qualitative techniques to develop critical thinking & problem solving skills.
PO3	**Design /Development of Solutions**	The ability to analyze problem domain & its variable factors to design a solution which is in sync with societal, cultural, public health, safety & environmental consideration
PO4	**Conduct investigations of complex Computing problems**	The ability to apply computing knowledge, research methodology to analyze & interpret complex computing problem
PO5	**Modern Tool Usage**	Adapt and apply appropriate modern tools & techniques to solve complex problems through practical lab sessions
PO6	**Professional Ethics**	Understand and develop awareness of ethical, social, cultural & cyber regulations for professional computing practices.
PO7	**Life-long Learning:**	Recognizing the need for self development through up gradation to keep pace with dynamic IT industry.
PO8	**Project management and**	Illustrate the understanding of basic

	finance	principles of management and apply the same to one's project and contribute effectively in various projects in a transnational, multicultural teams across the globe.
PO9	**Communication Efficacy**	Understand and efficiently communicate with IT professional and common audience about complex computing data through effective reports, documentation & presentation.
PO10	**Societal and Environmental Concern**	Acknowledge & Sensitize towards the social, legal, cultural issues & their influence on computing practices & their consequential responsibilityas an IT professional.
PO11	**Individual and Team Work**	Function as an effective collaborator, member, leader in a transnational workplace
PO12	**Innovation and Entrepreneurship**	Inculcate a spirit of innovation and enterprise through sustained training programs, mentoring, to create a budding entrepreneur & technocrat to contribute to a society at a large