



**TECNIA INSTITUTE OF ADVANCED STUDIES**  
**GRADE "A" INSTITUTE**

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**INSTITUTIONAL AREA MADHUBAN CHOWK, ROHINI, DELHI 110085**

Tel:91-11-27555121-24, E-Mail : directortias@tecnia.in, Website: www.tiaspg.tecnia.in



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 QMS & EMS Certification  
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 CAB #118005



21001:2018  
 Management Systems for  
 Education Organizations



51001:2018  
 Energy Management Systems

**Department of Information, Communication & Technology**

Ref.No.: TIAS/DICT/MCA/2023-24/011

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Programme: Master of Computer Applications

**Functional Elective Theory Courses**

MCA 108	Advanced Database Management Systems	To Expertise related to EER concepts, normalization, query processing & optimization and transaction processing.	Apply EER concepts and normalization for specific cases.
		Fair knowledge about implementation of NoSQL databases and its applications, structure and storage of XML data.	Make use of query processing, query optimization and advanced transaction processing for specific problem scenarios.
		Fundamental knowledge of Big data and its applications, client server architecture and emerging database models and applications and other advanced data models like multimedia and web databases.	Analyze object-oriented paradigm in database design along with OODBMS and ORDBMS
		Knowledge of Object-Oriented databases and concurrency control techniques, database recovery techniques in distributed databases.	Evaluate various concurrency control and recovery techniques for Distributed Databases. Appraise advanced database models and their applications Design and create appropriate NoSQL Databases for specific applications
MCA 110	Data Warehousing and Data Mining	Principles of Data Warehousing and Data Mining.	Relate to Data warehouse principles, components and architectures
		Architecture of Data Warehouse.	Demonstrate the necessity of data pre-processing for mining applications

		Various Data pre-processing Methods.	Apply suitable data mining techniques to solve specific real world problems
		Data Mining techniques.	Compare and evaluate different data warehousing models
MCA-112	Mobile Applications Design and Development	Design scripts to meet given interface requirements.	Relate to Android OS architecture and application components
		Use variables, properties and other code elements appropriately to implement the code design.	Make use of appropriate activities and intents in Android app development
		Devise, carry out and evaluate functional test strategies of mobile design	Model GUI application design in Android using action controls, fragments and views
		Implement and evaluate techniques for the installation of mobile applications and delivery via various channels.	Analyze Android data storage mechanism and APIs
		Implement and evaluate techniques for the installation of mobile applications and delivery via various channels.	Appraise iOS technology stack for mobile app development Design iOS applications using Swift language constructs

MCA-114	Full Stack Development	The core concepts of both the frontend and backend programming.	Relate the basics of Javascript (JS) and ReactJS
		The latest web development technologies.	Apply the concepts of props and State Management in React JS
		Maintaining data using NoSQL data bases	Examine Redux and Router with React JS
		Complete web application development process	Appraise Node JS environment and modular development
MCA-116	Web Technologies	Concept of HTML, CSS and JavaScript	Relate the fundamentals of Internet, Protocols, WWW, Webservers with HTML tags, commands of CSS and Java Script
		NET Architecture and C#.NET Basics	Build Dynamic Web Applications applying the concept of HTML, CSS and JavaScript.
		Creating Web Application using ASP.NET Web Forms, jQuery and AJAX	Examine the working of Basic ASP.NET Web Forms (Server Controls, Validation Controls, User controls, DO.NET, Caching, state management), AJAX and jQuery.
		Creating Web Application using ASP.NET MVC, jQuery and AJAX.	Appraise ASP.Net Web Forms and ASP.NET MVC Create an Interactive Web Application using ASP.NET Forms, ASP.NET MVC

MCA 118	Theory of Computation	Expressing problems as testing membership in a language	Relate to the basics of Finite State Machines.
		Designing a capable mathematical model of computation to decide/recognize a language	Explain grammar and establish equivalence between grammar, languages and pushdown automata
		Distinguishing the relative capabilities of different models of computation	Solve the computational model for a given language
		Understanding what is decidable and what is not	Analyze Finite Automata for different regular expressions and languages
		Classifying the languages based on space-complexity and time-complexity of the model	Estimate the optimal computing time of the given problem. Analyse and evaluate the decidability of the various computational problems using programming skills
MCA 120	Software Testing	Core Software Testing Concepts	Identify the fundamentals of software testing and differentiate it from debugging.
		Testing at the unit, module, subsystem and system levels	Apply knowledge of prioritization, and technical and logical dependencies, to schedule test execution for a given set of test cases during development and regression testing.
		The testing process	Appraise test tools, object-oriented software testing according to their purpose and the test activities they support.
		Manual and automated techniques for generating and validating test data	Develop test cases for given problem with respect to structural and functional testing techniques.
		Test-Driven Development	Adapt in a cross-functional Agile team to discuss principles and basic practices of Agile software development.
		Testing Best Practices	
MCA 122	Microprocessors	Features of microprocessor systems and specifically with the basic 16-bit (8086) processor, its architecture, internal organization and their functions.	Recall various features of microprocessor, memory and I/O devices.
		Processor instruction set	Illustrate 8086 microprocessor architecture and define its bus organization including control signals.
		Low-level Assembly language programming.	Apply the concepts of memory and I/O interfacing to 8086 processor.
		Interfacing external peripheral devices with the processors.	Explain and outline the features of advance microprocessors.
		Advance processors including RISC based processors.	Understand 8086 processor addressing modes, outline classification of different instructions and functions of each

			instruction and write programs in assembly language using 8086 instructions.
MCA-124	Embedded Systems	Acquire knowledge of basic structure and function of embedded systems.	Recall Embedded system, architecture and the design process of an Embedded Systems.
		Learn process to design embedded Systems.	Explain working of different memory devices and memory management techniques.
		Understand operating system concepts, its types and choosing RTOS.	Identify Interrupt and interfacing of firmware with I/O and memory.
		Learn interfacing of embedded system with peripherals and memory devices.	Discover basics of operating system and its types alongwith different task synchronization techniques. Appraise RTOS, memory interface, and communication interfaces.
MCA-126	Information Security	Various technical and management aspects of information security	Recall varied risks related to information security
		Security requirements within an organization	Identify threats, vulnerabilities and counter measures to prevent attacks on information
		Threats, malware through the analysis of worms, viruses, Trojans	Apply risk and IT security guidelines on software security, database security, network security and computer security audit on various types of industries
		Make students aware of the various technologies to implement appropriate security measures within an organization	Apply risk and IT security guidelines on software security, database security, network security and computer security audit on various types of industries Create user identification and authentication methods
MCA-128	Digital Marketing	Overall understanding of Digital Marketing.	Interpret Digital Marketing preliminaries.
		Various strategies involved in Marketing products and Services Digitally	Build effective Digital Marketing strategies for different products and services.
		Understanding of Digital Marketing Platforms.	Make appropriate use of varied Digital Marketing Platforms like Email, Facebook, Twitter, YouTube, Pinterest, etc as per given scenario.
		Techniques for Search Engine Optimization (SEO) and Mobile Marketing.	Apply and analyze the concept of Search Engine Optimization (SEO), SEM and Mobile Marketing to given scenarios
		Develop insight on Current Trends – Digital and Social Statistics (Infographics).	Analyze specific trends using Google Analytics Create effective Display Ads and Search Engine Advertising

MCA-130	Management Information System	Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making.	Explain the usage of Information systems in Business and their importance.
		Analyze and synthesize business information systems to facilitate evaluation of strategic alternatives.	Identify the techniques of strategic design for Emerging IT Infrastructure.
		Effectively communicate strategic alternatives to facilitate decision making.	Construct the required Information Systems in an ethical way
		Understand entire spectrum of issues related to managing information systems in an ethical manner.	Appraise the Business Applications of Information Systems
MCA-132	Management Principles and Organizational Behaviour	Understanding of management and behavioral processes in the business environment	Recall the significance of individual differences and people skills for becoming effective, responsible and ethical managers
		Identify the Human interactions in an organization at various levels.	Explain the power of groups in influencing organizational efficacy, and develop the ability to work in teams
		Factors driving human interactions.	Understand interpersonal processes and apply strategies to enhance one's effectiveness
		Interpersonal interactions through applications of concepts learned to get better results in attaining specific business organizational goals.	Discover effective communication channels and leadership structures that can help reinforce desired organizational culture
MCA-134	Finance and Accounting	Preparation of primary books of account.	Recall the purpose and principles of accounting.
		Preparation of final statements.	Explain the mechanics of accounting equation to understand the inter-linkages among various financial statements.
		Inventory cost flow methods and valuation of closing inventory.	Build journal, ledger and trial balance and understand their importance.
		Analysis of financial statements and its reporting.	Analyze financial statements and generate the reports for purpose of decision making.
		Understanding the scope of computer applications in Indian financial sector.	Create inventory accounts and financial statements. Elaborate the financial system, functions of various participants and types of operations to apply knowledge in that area.
MCA-205	Statistics and Data Analytics	Descriptive and inferential statistics and its application to real world problems.	Explain fundamental concepts and terminologies of statistics and data analytics
			Experiment with various measures of central tendency, dispersion, shape and their implication.

		Data analysis using different statistical tools and techniques.	Apply probability and probability distribution primitives.
			Examine hypothesis testing and use inferential statistics- T, F, Z and Chi Square Test
			Assess analysis of variance for specific cases.
MCA-207	Enterprise Computing with JAVA	Dynamic web pages using Servlets	Model Java EE architectural components,Servlet creation and session management for web applications.
		Session management	Inspect the fundamentals of Java Server Pages (JSP) and Struts for web-based applications.
		Designing custom tags using JSP	Appraise Hibernate Framework of JEE and apply constructs of Object Relational Mapping.
		Data access, searches and queries using HQL	Elaborate principles of Dependency Injection and its application in JEE.
		Web Application development using Spring framework	Design applications based on Spring Boot and Spring AOP.
		Handling crosscutting concerns using Spring AOP	
MCA-209	Natural Language Processing	Able to develop expertise related to Natural Language Processing and their applications.	Relate to the existing NLP systems and determine the advantages and disadvantages of these systems.
			Demonstrate the skills of solving specific NLP tasks, as well as running experiments on textual data.
			Apply Natural Language Processing (NLP) knowledge to some of its application.
			Assess and apply the available tools of NLP on various case studies.
MCA-211	Computer Graphics	Basic building blocks and core concepts of computer graphics.	Demonstrate graphics drawings with respect to graphics primitives.
		Typical graphics pipeline.	Explain the mathematical concepts of different graphics algorithms.
		Theoretical, mathematical foundation and practical aspects of different graphics algorithms.	Apply 2D & 3D transformation concepts to represent images with different dimensions and shapes.
		Fundamental concepts of animation and its related technologies to	Analyze and evaluate the concepts of projections and shading methods to obtain realistic images.

		design interactive graphics applications.	Develop scenes with different clipping methods and transform it to graphics display device.
			Develop interactive applications using different computer graphics algorithms and animation effects.
MCA-213	Wireless Sensor Networks	Understand about the basics of wireless communication and wireless sensor network.	Explain the underlying technology and architecture of a Wireless sensor network
		Study about various types of protocols in different layers of wireless sensor network.	Analyse the different variants of Operating systems in wireless sensor networks.
		Understand the different applications of wireless sensor network.	Examine the various types of protocols in MAC layer, network layer and transport layer
			Evaluate real world problems using appropriate sensor devices
			Design different applications for network management.
MCA-215	Software Project Management	Effective management of software projects.	Illustrate project scheduling within time and budget
		Tools and techniques used for project management. The model-based software architectures.	Identify ethical issues related to software project management.
		Workflows of the process of Software project Management.	Apply the model-based software architectures.
			Analyse how a project can be monitored, controlled and assessed.
			Evaluate risk associated with project development, and design policies to reduce risk.
			Develop an efficient project to reduce rework and labour-intensiveness.
MCA-217	Advanced Computer Architecture	Fundamental techniques of high-performance computing.	Explain micro-architectural design of processors
		Study and evaluate the benefits of design options in computer architecture.	Identify the meaning of Parallel Processing, its applications and technologies
			Distinguish between the different parallel architectures and compare their performance relative to various parameters
			Explain and evaluate the performance of different ILP methods, pipelining design/approach for a given set of Instructions
		Gain experience and understanding of the application of these techniques	Evaluate the performance of pipelining and non-pipelining environment in a processor

			Assess cache and memory related issues in multi-processors, and parallel programming models
MCA-219	Distributed Systems	Fundamentals of Distributed Systems.	Explain the real life applications, architecture and model of Distributed Systems
		Types of Distributed Systems.	Analyze fundamentals of Distributed Operating Systems and its concepts like synchronization, mutual exclusion, deadlocks and shared memory
		Concepts of Communication, Synchronization and Resource Allocation	Determine Cloud, Fog and Edge Computing, and apply adequate patterns for user-interaction with connected-objects.
		Basics of Cloud, Fog and Edge Computing and Internet of Things.	Analyze, design and implement Distributed Databases.
		Understanding of Parallel and Distributed Databases.	
MCA-221	Applied Cryptography	Fundamental knowledge of cryptographic technologies.	Explain the basic primitives underlying the classical and modern cryptographic techniques.
		Security properties of the cryptographic techniques.	Demonstrate how security properties are defined and proven at cryptographic level.
		Classical and modern cryptographic techniques.	Identify common attacks and cryptographic techniques to prevent them.
		how secure systems are engineered.	Analyze and apply appropriate cryptographic techniques to security engineer the problem at hand.
MCA-223	Cloud Computing	Cloud Computing Basic concepts and its applications.	Identify the importance of Cloud Computing Paradigm, Cloud Security primitives & Load Configurations.
		Virtualization and its role in the implementation of cloud computing.	Model and apply the concepts of Virtualization and Security in the cloud computing environment.
		Data centre overview and its architecture.	Analyze the concept of Data Centres with Cloud Computing and examine the Use cases of various Cloud Computing Titans.
		Popular public clouds and their features.	Design & Appraise Cloud Computing based VMS and weigh the advantages & disadvantages of various proprietary platforms along with available best practices
		Security issues in cloud and available countermeasures.	
MCA 225	E-Business Systems	E-business and its applications to Information Technology.	Define the concepts of e-business and e-commerce and the related



			information technology and web-based tools.
		Security over internet and data privacy issues.	Demonstrate instructional content designing and standardized course designing with e-content designing.
		Varied Payment systems and e-business models.	Examine various e-business models, revenue models, electronic payment systems and electronic fund transfers.
		Various online strategies for e-business.	Create effective strategies for e-business, and mobile commerce while adapting to the emerging trends in e-business.
MCA-227	Web Intelligence and Big Data	Concepts of web intelligence and big data technologies.	Explain the fundamentals of web intelligence and big data
			Understand issues and apply text and Image pre-processing techniques to specific cases.
		Applications of web intelligence capabilities and big data analytics tools.	Analyse the key issues in big data management and its associated applications.
			Adapt Hadoop and related big data technologies such as Map Reduce, Pig and Hive in the context of big data management.
MCA-229	Flutter and Dart	Understand the lifecycle of mobile app development.	Demonstrate the basic primitives in Flutter and Dart framework
			Model native platform code using Flutter and Dart
		Create cross-platform mobile app rapidly	Examine the use of widgets and user interactions in application development.
		Build full-fledged mobile app.	Evaluate application development using the concepts of animation and interactive widgets
Construct flutter and dart applications using customized layouts and service interactions			
MCA-231	Service Oriented Architecture	Understand goals of Service-Oriented (SO), its benefits and effects on an Enterprise.	Explain Service Oriented Architecture, Service Oriented Application, Big Data, Cloud and Containers
		Introduction to XML and its Advantages.	Apply XML in Service Oriented based Solution for a given problem
		Analysis and Design of Service-Oriented Solutions.	Analyze the architecture of Service Oriented solution for any given specific problem.
		Understand Web Services, REST API Services, Microservices and Contract Design.	Assess Microservices based solution with other approaches.
MCA-233	Multimedia Technologies	Identify a range of concepts, techniques and tools for creating	Explain the technical aspects of multimedia systems.

		and editing the interactive multimedia applications.	
		Identify the current and future issues related to multimedia technology.	Apply various file formats of audio, video and text media in different applications.
		Identify both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary hardware and software technologies.	Analyze the QoS parameters of various multimedia applications through internet.
			Evaluate different types of multimedia compression methods.
			Design interactive multimedia software applications using animations.
			Develop real-time multimedia applications using different multimedia components.
MCA-235	Internet of Things	Understand the IoT Terminology, Technology, architecture and its implementation procedure.	Explain the architecture of Internet of Things
		Learn the Network and Communication protocols for IoT.	Demonstrate the different enabling technologies for IoTs
		Identify the role of controllers and sensors in IoT.	Apply Python Programming skills to develop IoT application
		Apply the Programming Concepts for IoT.	Analyze the architecture of Arduino and Raspberry Pi
			Create Small IoT Applications using Sensors
MCA-237	Soft Computing	Fuzzy logic and its applications.	Demonstrate the techniques of soft computing and their role in problem solving
		Artificial neural networks and its applications.	Apply various soft computing techniques in order to solve problems effectively and efficiently.
		Applications of Soft computing to solve problems in varieties of application domains.	Construct neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
			Analyze Fuzzy logic and neural networks primitives like fuzzy sets, fuzzy logic and heuristics based on human experience.
			Assess the current research problems and research methods in Soft Computing Techniques.
MCA-239	Software Quality Management	Fundamentals of Software Quality	Identify software quality and the varied models and approaches aimed at realizing software quality in varied software development environments.
		Software Quality Factors	
		Components of Software Quality Management	

		Participants in Software Quality Management	Discover software quality aspects and participants by improving different phases of software development.
		Software Quality Metrics & Models	Analyze fundamental concepts of CASE Tools and quality metrics for specific software cases.
		Standards of Software Quality	
		Cost of Software Quality	Appraise varied SQA standards and costs and challenges associated with Software Quality.
		Future of Software Quality Management	
MCA-241	Digital Image Processing	Fundamental steps in Digital Image Processing and image formation.	Relate to the digital image processing primitives and the different types of images and their application areas.
		Various techniques to improve the visual appeal of an image.	Explain the image formation process, and the filtering techniques for image enhancement.
		Filtering of images in spatial and frequency domain for enhancement	Apply appropriate algorithms in both the spatial and frequency domain.
		Image restoration process.	Analyze types of noise and the techniques useful to remove the noise from the degraded images.
		Image compression and image segmentation useful in various applications.	Assess image segmentation and compression techniques for applications.
		Implementation of various algorithms for image analysis.	
MCA-243	Compiler Design	Concept of Lexical Analyzer and working of Lex tool.	Recall different language translation tools.
		Concept of Syntactical Analyzer and working of YACC tool.	Explain the importance of code optimization.
		Code generation and Code Optimization.	Identify compiler generation tools and techniques.
		Algorithms and data structures.	Construct compiler and its applications.
		Compiler and cross-compiler.	Design a compiler for a simple programming language.
MCA-245	Parallel Computing	Concepts of parallelism which enhances the speed of operations of an OS.	Define the terminology associated with parallel computing, such as efficiency and speedup
			Demonstrate different parallel architectures and inter-connect networks
		Various architectures of multiprocessor are taught.	Identify the challenges in efficient implementation of large-scale parallel applications
			Analyze the hardware and software challenges in parallelism
			Assess different parallel programming models, and algorithms
MCA-247	Numerical and Scientific Computing	Overview of some of the issues and problems that arise in scientific computation, such as (non-)linear systems, numerical and symbolic	Recall finite precision computation.

		integration, differential equation and simulation.	
		Suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.	Demonstrate understanding of common numerical methods used to obtain approximate solutions to otherwise intractable mathematical problems.
		Problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data	Apply Numerical analysis which has enormous applications in the field of Science and some fields of Engineering.
		To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.	Examine numerical methods for various mathematical operations and tasks.
		To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.	Analyze and evaluate the accuracy of common numerical methods.
			Assess calculation and interpretation of errors in numerical method.
MCA-249	Research Methodology	Fundamentals of Experiment Design and Statistics.	Identify how Research is done in Computer Science to improve Individual Research Productivity.
		Reading and Analyzing Research Papers.	Discover the types of Experiments and Measurements possible in Research.
		Data Processing.	Analyze the fundamental concepts of Sampling and Data Analysis.
		Paper Writing and Citation Management.	Develop appropriate Technical Writing Skills.
		Oral Presentations.	
BCA 251	Operational Research	Formulation of various real-life problems as Operations Research models and study of methodologies to solve these problems.	Demonstrate linear programming problems and appreciate their limitations.
		Introduce Linear Programming, Transportation and Assignment problems and discuss methods to find optimum solutions.	Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
		Study the theory of duality and sensitivity analysis in linear programming.	Solve different queuing situations and find the optimal solutions using models for different situations.

		Learn Project management techniques and their solution.	Apply these techniques constructively to make effective business decisions.
		Explore Queuing models and its applications.	Examine different models of queuing theory and game theory.
			Develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications.
MCA 253	Cyber Security and Cyber Laws	Fundamentals of cyber security and related safeguards.	Demonstrate computer technologies, digital evidence collection, and reporting in forensic acquisition.
		Cyber threats and vulnerabilities.	Apply strategies of using information as a weapon and a target.
		Securing web applications.	Identify the principles of offensive and defensive information warfare for a given context.
		Cyber Laws, Cyber Forensics and IPR.	Analyze the social, legal and ethical implications of information warfare.
			Appraise key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks, domain theft and Cyber Forensics.
MCA 255	E-Content Development	Developing e-content in a creative and standardized way.	Relate to the meaning and standards of e- learning and e-content.
		Designing e-content with multimedia features like audio, video & animation.	Demonstrate instructional content designing and standardized course designing with e-content designing.
		Deploying content on a Content Management system.	Apply digital media for e-content development.
		Using authoring and publishing tools for content design and presentation.	Examine Content Management systems (CMS) and Learning Management Systems (LMS).
		Become professional e-content designers.	Evaluate various authoring and publishing tools for e-content design and presentation.