



## **Annexure 4**

Program outcomes, program specific outcomes and  
course outcomes for all programs

**2018-19**

# Program Outcomes and Course Outcomes

## Programme Outcomes: MBA

<b>Department of Business Administration</b>	After successful completion of two year degree program in Business administration a student should be able to;
<b>Programme Outcomes</b>	<p>PO1. Apply the knowledge of management theories and practices to solve business problems.</p> <p>PO2. Foster Analytical and critical thinking abilities for data-based decision making.</p> <p>PO3. Develop value based leadership ability.</p> <p>PO4. Understand, analyze and communicate global, economic, legal and ethical aspects of business.</p> <p>PO5. Lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.</p> <p>PO6. Foster social and ethical values in their career and enterprises.</p>

## **Course Outcomes Master of Business Administration : Batch -16 Semester-I**

<b>Course</b>	<b>Outcomes</b>
ICC01 Principles of Management	<p>After completion of these courses students should be able to;</p> <p>CO-1. Define and explain the basic terminologies and functions of management.</p> <p>CO-2. Use the learnings to examine the given managerial situation and comment on it</p> <p>CO-3. Develop an alternative course of action, for a given situation, and support it with appropriate arguments.</p>

1 CC02 Business Communication	CO-1 Define and elaborate the basic processes and concepts of managerial communication CO-2 Describe the strategies for effective communication and the technique to use persuasive and professional language in speech and writing CO-3 Analyze personal communication, verbal and non verbal, formal and informal to identify specific areas for improvement. CO-4. Evaluate constructive negotiations and embed ethical considerations in all communication modes
1 CC 03 Managerial Economics	CO-1. Define the terms in Managerial Economics CO-2. Distinguish between different market structures and its relationship with business strategies CO-3. Explain the concepts, principles, theories in Microeconomics and Macroeconomics Apply the logic of choice for optimization and the thought process towards decision making CO-4. Analyze the new paper/business magazine articles in economy and business
1CCO4 Accounting for Managers	CO-1. Define, list the concepts of accounting including all the key terms and terminologies used in financial accounting and management accounting CO-2. Preparing financial statements using the national and international accounting standards, with clarity and accuracy. Appreciate the ethical dimensions in accounting, reporting and be able to adopt a socially responsible outlook while preparing accounting statements. CO-3. Analyze and interpret the financial position of an organization through its financial statements and accounting information using financial ratios. CO-4. Apply the knowledge, tools and techniques used in Financial and management accounting, to solve practical problems in this course including preparation of the final accounts, comparative statement, common size statements, and bank reconciliation statements.
1 CC05 Quantitative techniques for management	CO-1. Recall the underlying theory in quantitative methods for behavioural research CO-2. Apply the procedures for conducting quantitative studies and draw inferences CO-3. Formulate hypotheses, methods and evaluate results of a quantitative research paper
1 CC06 Business Law	CO-1. Describe the key terms and concepts used in the context of legal aspects of Business Law CO-2. Explain and discuss the different Acts CO-3. Articulate and apply their knowledge in business laws to various situations
1CC07 Environment management	CO-1. Define the fundamental concepts and terminologies in environmental management for a career in business. CO-2. Explain how environmental management principles are vital for sustainable development of the society. CO-3. Examine the common environmental problems and their impacts CO-4. Analyse the environmental legislations for management of the environment
1 CC08 Business Ethics and Corporate Governance	CO-1. Define the key concepts, theories, principles in business ethics, corporate governance, corporate social responsibility and PR. CO-2. Explain the concepts, business dilemma, corporate governance issues that occur in the work place and in corporate world and the role of these concepts in the business world today and in sustainable development

	<p>CO-3. Apply the theories, values, and principles in ethics and governance in business and personal settings</p> <p>CO-4. Justify a course of action by analysing a given phenomenon and recognising the underlying ethical and governance issues</p>
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**Course Outcomes MBA : Semester-II**

2 CC09 Financial Management	<p>CO-1. Explain the important terminologies of financial management</p> <p>CO-2. Calculate the present value and future value for financial planning of an organization</p> <p>CO-3. Analyze the profitable investment using CBD techniques and make decisions</p> <p>Evaluate the cost of capital and mobilize fund at affordable average cost</p> <p>CO-4. Evaluate the optimum capital structure which increases the shareholders wealth</p>
2 CC 10 Marketing Management	<p>CO-1. Define the basic concepts, principles and terminologies in marketing</p> <p>b. Explain the fundamental aspects in marketing</p> <p>CO-2. Analyze the nature of consumer buying behavior &amp; its difference from Organisational buying behavior</p> <p>CO-3. a. Describe a marketing strategy, emphasizing the STP &amp; the different competitive strategies b. Explain Marketing program &amp; PLC for a given product highlighting the diffusion of innovation</p> <p>CO-4. Formulate a marketing plan for a given product</p>
2 CC11 Human Resource Management	<p>CO 1. Define concepts in Human Resource management.</p> <p>CO 2. Describe the processes involved in Human Resource Management.</p> <p>CO 3. Apply the concepts and processes of HRM in specific situations.</p> <p>CO 4. Analyse problems involving people working in organisations.</p>
2 CC12 Operations management	<p>CO-1. To define the basic concepts and terminologies used in Operations Management</p> <p>CO-2. To explain the principles, problems and practices of Operations Management</p> <p>CO-3. To apply the concepts, techniques and theories learned, in various situations pertaining to organisations</p> <p>CO-4. To analyse various situations arising in organizations using principles and techniques of Operations Management</p>
2 CC 13 Operations research	<p>CO-1. Recall the characteristics of different types of decision making environments and the appropriate decision making approaches and tools to be used in each type</p> <p>CO-2. Identify and develop operational research models from the verbal description of the real</p> <p>CO-3. Design new simple models like CPM PERT etc to improve decision making and develop critical thinking</p> <p>CO-4. Formulate a real world problem as a mathematical programming model</p> <p>CO-5. Effectively communicate ideas, explain procedures and interpret results and solutions</p>
2 CC 14 Management Information System & Cyber Security	<p>CO-1. Define the terms related to information systems (TPS, MIS, DSS, EIS), and those concerning cyber security correctly</p> <p>CO-2. Explain the functions of IS, steps in building an IS, differences between the different types of IS, business process reengineering, role of AI, challenges for IS implementation and how to secure IS</p> <p>CO-3. Analyze the requirements for the functioning of an information</p>

	system in an organization from the collected information CO-4. Develop a plan for an information system with the collected data to integrate the business processes that fully meets all the stated requirements of the organization
2 CC 15 Organisational Behavior	<ol style="list-style-type: none"> <li>1. <ol style="list-style-type: none"> <li>a) List the theories of OB</li> <li>b) Define all the important terms used in organizational behaviour</li> </ol> </li> <li>2. Describe the key terms and concepts used in context of understanding the human interactions in the organizations and</li> <li>3. <ol style="list-style-type: none"> <li>a) Explain different theories of individual, group and organizational levels of behavior</li> <li>b) Discuss the micro and macro level approaches in OB</li> </ol> </li> <li>4. Analyze the real problems and arrive at appropriate solutions.</li> </ol>
2 CC 16 Entrepreneurship and Project management	<p>CO-1. Define all the important terms used in Entrepreneurship and Project Management</p> <p>CO-2. Describe the concepts, theories, practices and strategies used in context of Entrepreneurship and Project Management</p> <p>CO-3. Analyze the conditions for entrepreneurship and how a business plan is drawn up</p> <p>CO-4. Develop business plan incorporating essential feasibility studies with the help of software tools</p>
<b>Course Outcomes MBA : <u>Semester-III</u></b>	
3 CC 18 Business Analytics	<p>CO-1. Define the terminologies of descriptive, predictive and prescriptive levels of business analytics and Key terms of big data, Cloud Computing and Artificial Intelligence technologies.</p> <p>CO-2. Explain the applications of business analytics related to business decisions making in terms of functional domains (Finance, Marketing, HR and Operations).</p> <p>CO-3. Interpret the analytical results for making business decisions.</p> <p>CO-4. Analyze descriptive and predictive level problems using statistical techniques.</p>
3 CC 19 Research methodology	<p>CO-1. Define the basic terms in research like research design, research problem, sampling, data, scales and hypotheses</p> <p>CO-2. Explain the research process, the types of research, the methods of research design, the scaling methods, the data collection methods and the format of the research report</p> <p>CO-3. Explain the research process, the types of research, the methods of research design, the scaling methods, the data collection methods and the format of the research report</p> <p>CO-4. Analyse a research problem and the data collected to meet the research objectives</p> <p>CO-5. Create a research proposal, do an independent research study and submit a research report with the analysis, findings and suggestions</p>

3 ECM 03 Product & Brand Management	<p>CO-1. Define the basic concepts in product &amp; brand management-product mix, product line, brand equity, brand personality</p> <p>CO-2. Explain the strategies and decisions involved in product planning &amp; development as well as brand building process</p> <p>CO-3. Analyze the product and brand management techniques for a diverse group of market offerings</p> <p>CO-4. Design brand architecture connecting the different elements of a brand by applying branding principles &amp; marketing communication concepts</p>
3 ECM 05 Services Marketing	<p>CO-1. Define the basic concepts in services marketing</p> <p>CO-2. Explain the different principles, theories and conceptual frameworks used in services marketing</p> <p>CO-3. Identify the services marketing concepts in a real business environment</p> <p>CO-4. Analyse the marketing strategies used by firms in various industries using the various concepts learnt in services marketing</p> <p>CO-5. Propose a marketing plan including a revised blueprint and servicescape for the firm</p>
<b>3 ECM 06 Digital Marketing</b>	<p>CO-1. Define basic concepts, terms and techniques in the practice of digital marketing</p> <p>CO-2. Explain the processes and procedures involved in using digital tools in digitally organized business firms</p> <p>CO-3. Analyze online presence, social media campaigns, customers and competitors for adapting and innovating marketing pursuits and programs</p> <p>CO-4. Develop suitable digital strategies for marketing and communication of products and services by integrating &amp; optimizing the use of online &amp; offline media</p>
<b>3 ECF02 Security Analysis &amp; Portfolio management</b>	<p>CO-1. Define the basic terms related with investment decision making and portfolio management.</p> <p>CO-2. Compare and interpret the different types of deals, trading and settlement processes and techniques of investment decision making like technical analysis and fundamental analysis</p> <p>CO-3. Apply the theoretical concepts of SAPM in real market like situation.</p> <p>CO-4. Analyze and evaluate the various models of portfolio management like CAPM and Sharpe's model.</p>
<b>3 ECF 03 Corporate Restructuring</b>	<p>CO-1. Define terminologies and concepts of corporate restructuring without any error.</p> <p>CO-2. a. Explain the legal and regulatory framework for M&amp;A's.  b. Summarize the procedural, economic, accounting, taxation and financial aspects of restructuring.  c. Compare the types of corporate restructuring with clarity and accuracy.  d. Describe the Post-merger integration process and theories of merger.</p> <p>CO-3. Apply the knowledge of principles, theory, concepts and techniques of valuation in corporate restructuring for decision making using available data with suitable assumptions.</p> <p>CO-4. Evaluate real-world cases in M&amp;A's/Corporate Restructuring of any Company using available data with suitable assumptions.</p>

<b>3 ECF 04 Bank management</b>	<p>CO-1. <b>a. Define all the key terms related with banks, banking system and banking technology.</b>  <b>b. List the major services offered by a commercial bank, different types of deposits, and types of customers.</b></p> <p>CO-2. a. Describe the structure, concepts, theories, norms, regulatory provisions, recent trends in banking, and alternate channels of banking.  b. Explain the history and evolution of banking, functions of banking, anti-money laundering Act and financial inclusion</p> <p>CO-3. a. Analyze the opportunities and challenges related with the banking system and its latest technology.  b. Compare the traditional and contemporary banking and also with online banking, mobile banking and e-banking.</p> <p>CO-4. 4. Evaluate the banking performance using important tools such as CAMEL rating, ROE Model and in accordance with BASEL Norms.</p>
<b>3 ECH01 Training &amp; Development</b>	<p>CO 1. Define concepts in training, development and performance improvement processes.</p> <p>CO 2. Describe and illustrate the processes of identifying training needs, training and development, training evaluation and performance improvement processes.</p> <p>CO 3. Demonstrate the use the methods of identifying training needs, methods of training and development, and training evaluation in specific training situations.</p> <p>CO 4. Deduce the factors from theories contributing to training and career management.</p> <p>CO 5. Design a training plan with learning objectives, course content, course planning, training methods and evaluation of training.</p>
<b>3 ECH 02 Performance &amp; Talent Management</b>	<p>CO-1. Define the various concepts in performance and talent management</p> <p>CO-2. Explain the various concepts associated with planning, measuring, evaluation and feedback of performance and identification, integration, retention of talent and effective talent management system</p> <p>CO-3. Apply the knowledge of the same in identifying the gaps the areas related to performance and talent management</p>
<b>3 ECH 03 Competency mapping</b>	<p>CO-1. Define and list the various types of competencies required for better performance.</p> <p>CO-2. Explain the various concepts and models associated with competency mapping.</p> <p>CO-3. Apply the knowledge of the same in identifying the gaps in various HR processes like- recruitment, placement, training and development, compensation</p> <p>CO-4. Design and develop competency Assessment tools for various HR processes -</p>
<b>3 ECO 01 Supply Chain management</b>	<p>CO-1. Define the key terms, concepts and terminologies used in the practice of Supply chain management,</p> <p>CO-2. Describe the concepts, processes, principles, decisions, metrics, techniques &amp; tools used in Supply chain management.</p> <p>CO-3. Apply the knowledge in supply chain management to arrive at correct solutions in typical decisions areas in supply chain management like Location,</p>

	procurement, inventory, transportation, and network design. CO-4. Construct supply chain models and distribution channels by using the knowledge gained.
<b>3 ECO 02 Total Quality maangement</b>	CO-1. Students will able to define all the important terms used in TQM CO-2. They will be able to describe the concepts used in context of quality management in production area in organizations CO-3. Acquire skills over the different tools used in Quality Management CO-4. Analyze and solve problems related to specific departmental processes of organization using quality management approaches
<b>3 ECO 04 A dvanced Project management</b>	CO-1. To explain the relevant key terms and concepts in Project Management. CO-2. To apply concepts studied in project management, in areas of Project planning, scheduling and controlling CO-3. To analyse various scenarios encountered in different stages of the project life cycle CO-4 . To create a project plan and project schedule for successful completion of the project.

**Course Outcomes Master of Business Administration  
Batch -15 Semester-III**

3ECF04	Bank Management	CO1	a. Define all the key terms related with banks, banking system and banking technology. b. List the major services offered by a commercial bank, different types of deposits, and types of customers.
		CO2	a. Describe the structure, concepts, theories, norms, regulatory provisions, recent trends in banking, and alternate channels of banking. b. Explain the history and evolution of banking, functions of banking, anti-money laundering Act and financial inclusion.
		CO3	a. Analyze the opportunities and challenges related with the banking system and its latest technology. b. Compare the traditional and contemporary banking and also with online banking, mobile banking and e-banking.
		CO4	4. Evaluate the banking performance using important tools such as CAMEL rating, ROE Model and in accordance with BASEL Norms.
3ECH01	Training and Development	CO1	Define concepts in training, development and performance improvement processes
		CO2	Describe and illustrate the processes of identifying training needs, training and development, training evaluation and performance improvement processes.
		CO3	Demonstrate the use the methods of identifying training needs, methods of training and development, and training evaluation in specific training situations.
		CO4	Deduce the factors from theories contributing to training and



		career management
		Design a training plan with learning objectives, course content, CO5 course planning, training methods and evaluation of training.
3ECH02	Performance & Talent Manager	CO1 Define the key terms in performance and Talent management
		CO2 Explain different theories of Performance and Talent management.
		CO3 Analyze the conceptual understanding in real problems and arrive at appropriate solutions with regard to performance and talent management.
3ECH03	Competency Mapping	CO1 The student would be able to distinguish among the different categories of competencies
		CO2 The students will be able to create a competency design template for performance mapping purposes.
		CO3 The students will be able to outline the processes required to perform a gap analysis for assessment purposes.
		CO4 The students will be able to articulate how companies identify areas for training and development based on any gap analysis.
3ECO01	Supply Chain Management	CO1 Define the key terms, concepts and terminologies used in the practice of Supply chain management, accurately.
		CO2 Describe, with clarity, the concepts, processes, principles, decisions, metrics, techniques & tools used in Supply chain management
		CO3 Apply the knowledge in supply chain management to arrive at correct solutions in typical decisions areas in supply chain management like Location, procurement, inventory, transportation, and network design.
		CO4 Demonstrate skill in supply chain knowledge areas like building simple Supply chain models, finding optimal solutions to supply chain problems, supply chain performance evaluation and design of simple supply chain networks, using MS Excel, from relevant data without errors.
3ECO02	Total Quality Management	CO1 Students will able to define all the important terms used in TQM
		CO2 They will be able to describe the concepts used in context of quality management in production area in organizations
		CO3 Acquire skills over the different tools used in Quality Management
		CO4 Analyze and solve problems related to specific departmental processes of organization using quality management approaches
3ECO04	Advanced Project Management	CO1 Understand the concepts, tools and techniques used in Project Management
		CO2 Analyse the concept, practices and tools to facilitate project management
		CO3 Apply project management concepts, practices and tools for successful Project Management.
		CO4 1. Create project network diagrams to calculate Critical Path.

**Course Outcomes Master of Business Administration**  
**Batch -15 Semester-IV**

4CC21	Strategic Management	CO1	Define correctly, the key terms, concepts, principles and theories in the field of strategic management, corporate governance, corporate social responsibility, social and environmental sustainability
		CO2	Explain Clearly and effectively, the components of the SM process, the principles, the tools/techniques and models used in the formulation, implementation and control of strategies key concepts, studies, recommendations by experts committees, key concepts, studies, recommendations by experts committees in the field of CG,CSR, innovation and building learning organisations, The strategies for stable and dynamic markets, SMEs and non-profit organisations.
		CO3	Apply appropriate theoretical knowledge, principles, tools/techniques used in the practice of strategic management and arrive at correct strategic decisions to any business case or situation
		CO4	Critically Examine, statements of strategic intents, strategic or tactical moves, CSR or corporate governance initiatives taken by organisations and the external environment of the organisation
		CO5	Create a workable strategic plan for a small organisation by identifying appropriate sources, collecting and analysing relevant data
4ECF08	Management of Financial Services	CO1	Define the terminologies and concepts pertaining to financial services without any error.
		CO2	a. Explain the basic theoretical framework with regard to the financial system and its technology. b. Summarize the procedural aspects of various financial institutions.c. Compare the various financial services/financial institutions. d. Describe the process and legal framework for various NBFC's, Insurance services, Asset/Fund based financial services and Fee-based/Advisory services.
		CO3	Apply the knowledge of the principles, theory and techniques in the management of financial services for decision making using available data with suitable assumptions.
		CO4	Analyze companies in the financial services industry and make inferences using available data with suitable assumptions.
4ECF10	Risk Management & Insurance Services	CO1	To recall and define the risk management process and about the various Insurances in India based on their structure of insurance industry.
		CO2	A) Explain the principles of risk management and the role of the risk Manager. B) Discuss the risks associated with loss of income, ownership of property And legal ability related to various insurances national and international Level.
		CO3	Demonstrate about common insurance policies, types of insurance, its classifications and the recent trends in insurance business related to risk management.
		CO4	Analyze and Connect insurance mechanism in risk management towards property and liability coverage along with tax planning

			benefits to an insurer based on the insurance regulations of India.
4ECM07	Consumer Behavior	CO1	Define the basic concepts and principles in consumer behavior
		CO2	Explain the different principles, theories and conceptual frameworks used in consumer behavior
		CO3	Apply the consumer behaviour concepts in specific marketing situations.
		CO4	Analyze real life consumer behaviour and link marketing strategies with consumer behaviour
		CO5	Formulate a marketing plan using the various concepts learnt in consumer behavior.
4ECM08	Customer Relationship Management	CO1	Define the basic concepts in Customer Relationship Management – Consumer-customer-client differences, meaning and types of CRM, CRM constituencies, models, relationships, databases and networks.
		CO2	Explain the scope and challenges in Customer Relationship Management and describe the frame works, systems and processes for planning, analysis, development, management and evaluation of CRM programs.
		CO3	Analyse the tools, techniques and strategies applied in augmenting the business through CRM.
		CO4	Evaluate the CRM programs strategies in vogue with various companies/ industries.
4ECH07	Counselling Skills for Managers	CO1	Define the fundamental concepts, theories & terminologies in Counseling
		CO2	Explain the need for counselling & the skills required for an effective counsellor b. Discuss the implication of theoretical approaches to effective Counseling
		CO3	Describe the Counseling Process and the essentials of Counseling cell in organizations
		CO4	Explain the application of Counseling in Organisations for various situations including disputes, strikes, conflicts, performance & change management
		CO5	Analyse client's characteristics and problems & the suitable intervention strategy to be adopted
4ECH09	Managing Interpersonal & Group Process	CO1	Define all the important terms used in organizational behaviour
		CO2	Describe the key terms and concepts used in context of understanding the human interactions in the organizations.
		CO3	Explain different theories of individual, group and organizational levels of behaviour
		CO4	Apply and analyse the conceptual understanding in real problems and arrive at appropriate solutions
4ECO07	Service Operations Management	CO1	Define the key terms, concepts, principles, processes, techniques and strategies used in the practice of service operations management, correctly
		CO2	Demonstrate knowledge about the tools for decision making in the desian/development of services. strateav formulation. service

			performance measurement and on the practices , trends, advances in the field of SOM
		CO3	Apply theory,principles, tools and techniques to service situations of demand-supply mismatch, service quality to identify problems, suggest pragmatic and cost effective solutions
		CO4	Analyse service process using mapping techniques, srvice blue print and softwares like microsoft visio or smartdraw to identify deficiencies and presentpractical solutions
4ECO09	Global Operations and Logistics Management	CO1	Define all the important terms used in Global Operations & Logistics Management
		CO2	Describe the concepts, theories, practices and strategies used in context of Global Operations & Logistics Management in organizations
		CO3	Analyze the global operations strategies being practiced in MNCs and the risks involved with the same in global context
		CO4	Critically evaluate the industry best practices related to Global Operations & Logistics Management and its scope globally

MCA

## SEMESTER 1

### **MCA101T Discrete Mathematics and Statistics**

CO 1: Define the important terms used in the various topics included in the course.

CO2: Demonstrate the Binomial & Multinomial theorems, graphs, trees, and relations

CO3 : Apply the operations of Sets, rules of inference, theory of graphs and trees and Combinatorics to solve applied problems

CO4: Design a probability modal/test of significance to solve the real world problem.

### **MCA102T Fundamentals of Data Structures**

CO 1: Define basic concepts of various linear and non-linear data structures

CO2: Explain the fundamentals and representation of data in main memory as well as secondary memory

CO3 : Apply and implement learned algorithms and data structures to solve problems and conduct performance analysis

CO4: Analyze and Compare organization of the different data structures as well as the complexities of algorithms

CO5: Design various sorting and searching algorithms on linear and nonlinear data structure

### **MCA103T Paradigms of Programming Languages**

CO 1: Understand programming language evaluation criteria and the influences it has on language design.

CO2: Understand phases in translation and compilation of a program..

CO3 : Analyze syntax and semantics and understand Imperative Programming Language.

CO4: Analyze functional, logic and object oriented programming paradigms.

CO5:Develop and understand the basics of Python Programming Language.

### **MCA104T Digital Systems & Computer Architecture**

CO1. Define various terminologies related to fundamentals of digital electronics and computer organization.

CO2. Perform Computations in number systems and design logic circuits

CO3. Explain various concepts related to basic structure of computers,logic circuits and memory management.

CO4. Compare different types of computer architecture.

### **MCA105T Problem Solving and Programming in C**

CO1. Explain the semantics of various syntax of C programming language

CO2. Apply optimum memory management techniques for declaring and processing data.

CO3. Develop C programs to solve real world problems.

### **MCA106P C Practicals**

CO1. Develop Problem solving skills to translate Algorithms to programs using C language

CO2. Write effective and efficient well structured and modular C programs

CO3. Develop Into competent programmers with the ability to solve problems of reasonable size and do a project in the C programming language.

### **MCA107P Data Structures through C – Practicals**

CO1. Identify and use a suitable data structure and algorithm to solve a real world problem

CO2. Use critical thinking skills and creativity to solve the problems.

CO3. Understand the use of various data structure such as stacks, queues, trees, etc. to solve various computing problems

CO4. Implement linear and non-linear data structures using linked lists.

CO5. Implement various kinds of searching and sorting techniques, and decide when to choose

### **MCA108T English for Professional Communication**

## **SEMESTER 2**

### **MCA201T Optimization Techniques & Numerical Methods**

CO1. Define the important terms used in the various operations research models and in numerical methods.

CO2. Explain the algorithms and techniques used in the solution of the different models.

CO3. Obtain the solution of the appropriate operation research model from the verbal description of the real system.

CO4. Apply the appropriate Numerical methods to solve the given problem.

### **MCA202T Operating Systems**

CO1. Attain knowledge on different types of operating systems as well as processor management and process scheduling techniques.

CO2. Distinguish between various inter process communication techniques and algorithms related to deadlock discovery and avoidance.

### **MCA203T Database Management Systems**

CO1. Define the basic concepts in database management systems.

CO2. Explain the terminology, features, structures and characteristics embodied in database systems

CO3. Apply logical database design principles to sketch ER diagrams and relational model.

CO4. Analyse various data models, normal forms, locking protocols and organize data using SQL.

CO5. Construct normalised databases.

## **MCA204T Data Communications & Networks**

- CO1. Detailed knowledge in data communication and networking processes.
- CO2. knowledge in layers and protocols.
- CO3. Advanced knowledge in modern networking applications.

## **MCA205T Web Technologies**

- CO1. Describe web, protocols and applications
- CO2. Explain some of the enhanced web features such as CSS, XML, DTD, and Schemas
- CO3. Demonstrate scripting languages such as JavaScript, VBScript and AJAX and its features
- CO4. Distinguish applications designed using server side programming and explore its features
- CO5. Design applications based on Ruby on Rails and Rails with databases

## **MCA206P DBMS Practicals**

- CO1. Define integrity constraints and database objects using state of the art RDBMS
- CO2. Explain the underlying concepts of database technologies
- CO3. Implement database schema for a given problem domain
- CO4. Categorise data using DML commands
- CO5. Develop triggers, functions and procedures using PL/SQL constructs.

## **MCA207P Web Technologies Practicals**

- CO1. Give the basic web applications some of the enhanced web features such as CSS, XML, DTD, and Schemas
- CO2. Explain the use of applications designed using various web technologies
- CO3. Construct a web application by applying JavaScript, Ajax, JSP and Ruby as enhanced web technologies
- CO4. Design applications for various user needs.

## **SEMESTER 3 & SEMESTER 4**

**No batch during the academic year 2018-19**

## **SEMESTER 5**

### **MCA 501 Computer Security**

- CO1: Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
- CO2 Identify and explain key management, digital signatures, digital certificates and a Public-Key Infrastructure (PKI).
- CO3: Understand the application of cryptographic techniques and protocols to protect the transmission and storage of information, provide confidentiality, integrity, protected message exchanges, data origin authentication, entity authentication and non-repudiation.
- CO4. Develop an understanding of security policies (such as authentication, integrity and confidentiality) as well as protocols to implement such policies in the form of message exchanges.
- CO5: Identify and understand the requirements to implement cryptographic applications.

### **MCA 502 Internet Technology and Distributed Application**

- CO1: To introduce TCP/IP based networking
- CO2: Understand the concept of IP addressing
- CO3 : Understanding various routing techniques and TCP and UDP applications.
- CO4 : Getting to know various functionalities of Internet like email, DNS etc
- CO5: A better understanding of how graphical applications work.

### **MCA503 Computer Graphics**

- CO1: Students must understand the concepts of 2D graphics.

- CO2: Students must understand the concepts of 3D graphics.
- CO3: Students must understand the representation of various objects on screen.

#### MCA 504 Data Mining

- CO1: Introduce the concept of Data Mining & Data Ware house.
- CO2: Enumerate the application techniques and areas of Data Mining
- CO3: Install and work with Data mining tools

#### MCA 505 Distribute Computing

- CO1: Explain what a distributed system is and what the desired properties of such systems are.
- CO2: List the principles underlying the functioning of distributed systems.
- CO3: Explain the core issues of cloud computing such as security, privacy, and interoperability.
- CO4: Describe the security, threat and secure channel associated with distributed computing.
- CO5: Illustrate the performance of Distributed Coordination based Systems.

#### MCA506 Computer Graphics Lab (using OpenGL)

- CO1: Able to implement drawings using graphic primitives in OpenGL.
- CO2: Able to apply graphic transformation on drawing objects using OpenGL
- CO3: Able to apply lighting and Shading models in OpenGL
- CO4: In a position to draw various 3D objects on screen.

#### MCA507 Seminar

- CO1: To familiarize and aware of latest technologies and techniques in the field of Computer science

#### MCA 508 Mini Project

- CO1: Develop into Competent programs with the ability to solve problems of reasonable size and do a project in any programming language of their choice.

## SEMESTER 6

#### MCA601 Project

- CO1: Develop into Competent programs with the ability to solve problems of reasonable size and do a project in any programming language of their choice.
- CO2: To prepare project documentation based on the concepts studied in Software engineering and OOMD

#### IMCA

## SEMESTER 1

#### IMCA101 ENGLISH

- CO 1: Define and identify various methods to develop communication skills.
- CO2: Discuss and describe the strategies to improve listening, speaking, reading and writing skills.
- CO3 : Explain the skills required for creating a formal speech and participating in group discussion.
- CO4: Classify the sounds of English and their symbols.
- CO5: Develop the ability to converse on any topic.

#### IMCA102 COMPUTER ORGANIZATION AND ARCHITECTURE

- CO 1: Define and identify various methods to develop communication skills.
- CO2: Discuss and describe the strategies to improve listening, speaking, reading and writing skills.
- CO3 : Explain the skills required for creating a formal speech and participating in group discussion.

CO4: Classify the sounds of English and their symbols.

CO5: Develop the ability to converse on any topic.

### **IMCA103 STATISTICS-I**

CO1: To organize, manage and present data collected by using descriptive statistics and appropriate statistical graphics.

CO 2: To calculate and apply measures of Central tendency, measures of dispersion.

CO 3: To identify the amount and direction of data skewed by applying skewness and Kurtosis.

CO 4: To understand and interpret simple linear regression analysis and use it for decision making.

### **IMCA104 INTRODUCTION TO COMPUTERS & PC HARDWARE**

CO1: Students will be able to bridge the fundamental concepts of computers with the present level of knowledge of the students.

CO2: Students will be able to understand the fundamental hardware components that make up a computer's hardware and the role of each of these components

CO 3 : Students have knowledge of and ability to comprehend and demonstrate the relation between different parts of computer.

CO4: Students will be able to analyze a problem, decide whether it can or should be solved by a replacement of a component in computer, and provide an appropriate solution.

CO5: Categorize memory organization and rate the function of each element of a memory hierarchy.

### **IMCA105 PROGRAMMING METHODOLOGY & C PROGRAMMING**

CO1: List the different datatypes, operators, statements, pre-defined functions in C.

CO2: Explain the usage of different program elements in C.

CO3: Analyze problems and write algorithms/ flowcharts / programs to Solve problems.

CO4: Discuss the different programming methodologies and evaluate their pros and cons.

CO5: Compare the different memory allocation mechanisms and elaborate how they help to create efficient solutions to problems.

### **IMCA106 PC HARDWARE PRACTICALS- OFFICE DOCUMENTS**

CO1: Students will be able to bridge the fundamental concepts of computers with the present level of knowledge of the students.

CO2: Students will be able to understand the fundamental hardware components that make up a computer's hardware and the role of each of these components.

CO3: Students have knowledge to install various Operating systems and commonly used software.

CO4: Students will be able to analyze a problem, decide whether it can or should be solved by a replacement of a component in computer, and provide an appropriate solution as part of troubleshooting.

### **IMCA107 C PRACTICALS**

CO1: Show the representation of data structures such as arrays, structures, unions

CO 2: Explain the different methods used to store data using files.

CO3: Apply modular programming concepts to develop reusable program elements.

CO4: Solve problems of varying natures using different program constructs.

CO5: Analyze problems encountered in everyday life, decide on the functionality required to solve it and create a project in C.

## **SEMESTER 2**

### **IMCA201 TECHNICAL COMMUNICATION**

CO1: Edit the sentences for grammatical accuracy.



- CO2: Identify different types of tenses, adjectives, prepositions and adverbs.
- CO3: Discuss in detail about e-mail and voice e-mail.
- CO4: Discuss various forms of written and oral communication.
- CO5: Explain various types and barriers of reading and listening skills.
- CO6: Prepare a Bio-data along with a C.V

### **IMCA202 STATISTICS- II**

- CO1: Define the important terms used in Probability, Distributions and Inferential Statistics.
- CO2: Describe the main properties of Probability Distributions and Random Variables and the characteristics and features of the types of Sampling, Estimation and Tests of significance.
- CO3: Explain the concepts of tests of hypothesis and methods of finding estimates.
- CO4: Analyze a real world problem to determine the statistical technique to be used to obtain a solution.
- CO5: Design a probability model/ test of significance to solve the real world problem.

### **IMCA203 DIGITAL SYSTEMS & LOGIC DESIGNS**

- CO1: Develop a digital logic and apply it to solve real life problems. Analyze, design and implement combinational logic circuits. Design small combinational and sequential circuits from logic gates.
- CO2: Recognize and use the following concepts Boolean algebra, flip-flops, counters and registers.
- CO3: Select appropriate methods for realization and circuit minimization.
- CO4: Identify different hardware components of the system

### **IMCA204 DATA STRUCTURES- C**

- CO1: Describe Algorithmic notation and analyze algorithms for time space requirements.
- CO2: Explain polynomial representation, string manipulation and pattern matching techniques.
- CO3: Design algorithms for manipulating single, double, and circular Linked Lists.
- CO4: Compare a linked list with an array, use stacks and queues to solve problems like backtracking, resource allocations.
- CO5: Manipulate arithmetic expressions, implement databases using Trees.
- CO6: Analyze the different sorting and searching techniques.

### **IMCA205 OBJECT ORIENTED PROGRAMMING WITH C++**

- CO1: Refresh the basic concepts of basic object oriented programming.
- CO2: Build programs using constructors, destructors and pointers.
- CO3: Solve problems based on the concepts of inheritance, polymorphism, overloading and type conversions.
- CO4: Build applications that support file i/o, templates and exception handling.

### **IMCA206 DATA STRUCTURES PRACTICALS IN C**

- CO1: Solve pattern matching problems and other primitive operations for string manipulation.
- CO2: Represent data as an array as well as a linked list, linked stack and linked queues.
- CO3: Perform conversion of infix expressions to postfix expressions.
- CO4: Illustrate binary tree traversals.
- CO5: Simulate various sorting and searching techniques.

### **IMCA207 C ++LAB**

- CO1: Develop programs based on classes, objects, friend functions, friend classes and string manipulations using objects.
- CO2: Construct programs that use constructors, destructors and pointers.
- CO3: Create applications using function overloading, operator overloading and applications that perform conversion from user

defined data type to basic types, basic to user defined data types and user defined to user defined data types.  
CO4: Build applications using the concepts of inheritance, virtual functions, files, templates and exception handling.

## SEMESTER 3

### IMCA301 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

CO1: Define the important terms used in the various topics included in the course.  
CO2: Demonstrate an understanding of relations (including partial orderings) and functions and be able to determine their properties, compositions and inverses.  
CO3: Apply the operations of Sets, rules of inference and graph theory to solve applied problems

### IMCA302 OPERATING SYSTEMS

CO1: Define terminologies related to fundamental concepts in Operating System.  
CO2: Explain various mechanisms used in process and system resource management  
CO3: Compare/Differentiate between different types of process, memory, device and file management techniques  
CO4: Apply different algorithms related to process scheduling, deadlock handling and device management and draw conclusions on the efficiency of the system

### IMCA303 DATA BASE MANAGEMENT SYSTEMS

CO1: Deconstruct the structure of a typical Database Management system  
CO2: Build and visualize E-R model from specification for given application.  
CO3: Demonstrate the use of SQL for simple database application  
CO4: Categorize and implement basic techniques like normalization to improve efficiency of database  
CO5: Analyze database transaction management and query processing

### IMCA304 MULTIMEDIA SYSTEMS

CO1: Students will be able to summarize specific components used in Multimedia Systems.  
CO2: Students have knowledge of and ability to apply and comprehend the correct argument for describing the components of Multimedia Systems.  
CO3: Students will be able apply knowledge on various properties relating to components of Multimedia Systems  
CO4: Students will be able to group those Multimedia Components that possess certain properties and elaborate some interesting application.  
CO5: Students will be able to work, to evaluate various types and categories of applications in Multimedia.

### IMCA305 VISUAL PROGRAMMING(VB.NET)

CO1: Define / Describe .NET Framework Components & Object Oriented aspects of C#.NET.  
CO2: Explain various features of C#.NET.  
CO3: Illustrate the use of arrays, strings, properties, Inheritance, interface, etc in different C#.Net Programs.  
CO4: Justify /know the environment with which different type of application /service like web service, ADO.NET application  
CO5: Design & Construct a distributed Web Application

### IMCA306 MICROPROCESSORS

CO1: **Define** basic concepts of microprocessors, microcontrollers & interfaces  
CO2: **Explain** the internal organization of microprocessor & microcontrollers along with interrupts and various interfaces to external devices  
CO3: **Apply** 8086 assembly language instructions to implement programs using software interrupts and assembler directives  
CO4: **Analyze** and **Compare** the features and instructions of various microprocessors and microcontrollers.

CO5: **Develop** assembly language programs using 8051 microcontroller

### **IMCA307 VISUAL PROGRAMMING PRACTICALS**

CO1: Understand the features of C#.NET through the C# programs.

CO2: Apply it in Console, Windows & Web application.

CO3: Evaluate the program structure.

CO4: Design & Construct a distributed web application.

## **SEMESTER 4**

### **IMCA401 ARTIFICIAL INTELLIGENCE**

CO1: Analyze the matching techniques for organizing and manipulating knowledge.

CO2: Predict pattern, based on Reasoning.

CO3: Design Knowledge building tools in various fields

### **IMCA402 Cryptography and Network Security**

CO1: Refresh the basic concepts of network security, digital signature standards etc.

CO2: Differentiate public and private key encryption techniques.

CO3: Analyze various key exchange mechanisms.

### **IMCA403 ELECTIVE I –**

#### **IMCA 403 A E-COMMERCE**

CO1: Should be able to understand and evaluate e-commerce website.

CO2: Do a preliminary design work related to a basic infrastructure.

CO3: Suggest security issues in a to-be constructed e-commerce website.

CO4: Suggest effective methods of marketing on the web

#### **IMCA 403 B CLIENT SERVER COMPUTING**

CO1: Keep up with the rapidly changing client/server technology.

CO2: Understand the client, server and network components of the architecture.

CO3: Select client/server development tools, operating system software, and database management systems.

CO4: Migrate existing applications from proprietary mainframe systems to low cost networks of PCs and servers.

### **IMCA404 DATA COMMUNICATIONS**

CO1: Understanding about signals, its types, transmission media and impairments.

CO2: To know about different coding/encoding schemes and sampling/modulation techniques in digital signal.

CO3: Understanding modulation of Analog signals and Digital data, multiplexing and channelization.

CO4: To understand different transmission modes and circuit/packet switching networks.

CO5: To understand HSDA – DSL Technology, cellular telephony and GSM generations.

### **IMCA405 MANAGEMENT INFORMATION SYSTEMS**

CO1: Develop software system requirements suiting business requirements.

CO2: Analyze the working patterns of the existing business systems

CO3: Understand the strategic role of MIS in conducting effective business.

### **IMCA406 DBMS PRACTICALS**

- CO1: Prepare SQL queries that use multiple tables.  
CO2: Prepare SQL queries that involve correlated and non-correlated sub queries, outer joins, inner joins, self joins.  
CO3: Assess the differences between subqueries and joins.  
CO4: Use built-in functions successfully.  
CO5: Produce user friendly output by using formatting features of SQL.  
CO6: Analyse the effects of various data types and the use of NULLs  
CO7: Prepare SQL queries for ordering data and grouping data.  
CO8: Prepare SQL queries that involve decision making  
CO9: Write SQL queries for data definition/manipulation/alteration.  
CO10: Describe and demonstrate issues surrounding data integrity: validity checking, uniqueness constraints, referential integrity problems, cascaded deletes and updates, triggers.  
CO11: Describe and demonstrate issues surrounding transaction processing including locking processes.  
CO12: Identify and describe security concepts including user-ids, levels of privileges, views.  
CO13: Design triggers, functions and procedures using PL/SQL.

### **IMCA407 MICROPROCESSORS PRACTICALS**

- CO1: Design and implement programs on 8086 microprocessor.  
CO2: Familiarize with the assembly level programming.  
CO3: Understands the concepts related to modular programming.  
CO4: Understand the concept of memory allocation.

DDMCA

## **SEMESTER 5**

### **DMC501 OPERATIONS RESEARCH**

- CO1: Understand how to translate a real-world problem, given in words, into a mathematical formulation .  
CO2: use operations research to:

- Solve transportation problems during allocation.
- Formulate operation research models to solve real life problem.
- Proficiently allocating scarce resources to optimize and maximize profit.
- Eliminate customers / clients waiting period for service delivery.

CO3: Use critical path analysis and programming evaluation production and review techniques for timely project scheduling and completion.

### **DMCA502 PHP PROGRAMMING**

- CO1: Learning about PHP basics, its syntax, variables, operators, control structures etc.  
CO2: To know about functions, arrays and the type of arrays used in PHP and to create sample applications.  
CO3: Understanding classes, objects, inheritance, interfaces and exceptions and creating sample applications. Also, to understand advanced applications such as auto load, reflection, type hinting, class constant.  
CO4: To understand Strings and various types of strings in PHP and create applications.  
CO5: Knowing Sessions, Forms, GET and POST data, Cookies, HTTP Headers, Databases, SQL, Joins, Prepared Statements, Transactions, Files and Streams. Students should be able to create web based applications using form input and databases.

### **DMCA503 LINUX AND SHELL PROGRAMMING**

CO1: Comfortably use basic Linux commands from the command line.

CO2: Identify and use Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security.

CO3 Usefully combine Linux tools using features such as pipes, filters, redirection, and regular expressions.

CO4: Develop shell scripts to perform more complex tasks.

CO5: Manage users and groups.

CO6: Understand various servers, automate tasks, monitor system performance and network activities.

## **DMCA504 COMPUTER NETWORKS**

CO1: Be familiar with the basics of data communication.

CO2: Be familiar with various types of computer networks.

CO3: Be exposed to the TCP/IP protocol suite and OSI model.

CO4: Describe how computer networks are organized with the concept of layered approach.

CO5: Analyze the contents in a given Data Link layer packet, based on the layer concept.

CO6: Describe the network layer

CO7: Understand routing and routing algorithms

## **DMCA505 SOFTWARE ENGINEERING**

CO1: Define software engineering, various technical terms associated with software engineering. Testing procedures and quality control procedures and various metrics related to software evaluation.

CO2: Explain Methods of development process, application of software engineering in web based applications, what is requirements engineering, Principle of quality management in software, various methods of testing and assessing the quality of software using different metrics.

CO3: Compare/Differentiate Development models, approaches to requirement analysis, various ways to monitor quality factor in software development process, different testing methodologies.

CO4: Apply the concept of understanding requirement analysis and use it in system analysis, take steps in quality management of a software development project, use appropriate testing strategy and use metrics to evaluate a project.

CO5: Create a software project development plan with requirement analysis, quality control, testing methodologies and costing methods.

## **DMCA506 SOFTWARE LAB IX - PHP LAB**

CO1: Solve programming applications based on procedure oriented programming structure which demonstrates creating simple applications based on arrays, functions, control structures, operators, variables etc.

CO2: Solve programming applications based on object oriented programming structure which demonstrates creating simple applications based on class and objects along with the basic features supported in PHP.

CO3: Create applications using the concepts such as constructors, destructors, inheritance etc.

CO4: To create applications that uses strings and pattern matching.

CO5: Creating applications that uses files to store manipulate and retrieve data. And also creating advanced applications using sessions, cookies, databases and form handling that uses validation.

## **DMCA507 SOFTWARE LAB X - LINUX AND SHELL PROGRAMMING LAB**

CO1: use basic Linux commands from the command line.

CO2: Develop shell scripts to perform more complex tasks

CO3: create and manage simple file processing operations

## **DMCA601 OBJECT ORIENTED MODELING AND DESIGN**

- CO1: Understand Object Oriented concepts, terms and principles.
- CO2: Distinguish between various system development methodologies
- CO3: Recognize the importance of good requirement gathering and risk management.
- CO4: Gain knowledge of object oriented systems analysis and design techniques and models.
- CO5: Work with and use UML for object oriented modeling.
- CO6: Develop a project scope, and a project plan with feasibility analysis
- CO7: Develop use cases - both diagrams and narratives.
- CO8: Model an overall system using UML class diagrams.
- CO9: Model system functionality using UML sequence and collaboration diagrams.
- CO10: Create Use cases, class diagram, sequence and activity diagrams.
- CO11: Create a conceptual and a physical ER model for a database to support the system.

## **DMCA602 IT INFRASTRUCTURE MANAGEMENT**

- CO1: Understand the challenges and complexity of today's computing environment.
- CO2: Analyze the existing patterns for IT systems management and use it to design similar information systems.
- CO3: Be able to have an holistic approach in IT organisation
- CO4: Explain how information security functions in an organization including the background, foundation and insights' of information security

## **DMCA603 (A)( ELECTIVE 1 ) E-COMMERCE**

- CO1 Should be able to understand and evaluate e-commerce website.
- CO2: Do a preliminary design work related to a basic infrastructure.
- CO3: Suggest security issues in a to-be constructed e-commerce website
- CO4: Suggest effective methods of marketing on the web

## **DMCA 603 (B) (ELECTIVE 1 ) CLIENT SERVER COMPUTING**

- CO1: Keep up with the rapidly changing client/server technology.
- CO2: Understand the client, server and network components of the architecture.
- CO3: Select client/server development tools, operating system software, and database management systems.
- CO4: Migrate existing applications from proprietary mainframe systems to low cost networks of PCs and servers.

# **SEMESTER 7**

## **DMCA701 MATHEMATICAL FOUNDATION OF COMPUTER SECURITY**

- CO1: Students will have a thorough understanding of traditional topics in number theory.
- CO2: Students will be able to understand and examine the positive integers and their patterns, compare and evaluate them.
- CO3: Students will be able to work and interact , to describe various types and categories of problem solving strategy used heavily in both mathematics and computer science.
- CO4: Students will be able to identify and prove integer based theorems which are bones of mathematics.
- CO5: Students can apply the knowledge establishing strong and meaningful bridge with geometry and computer science.

## **DMCA702 PRINCIPLES OF MANAGEMENT AND MARKETING**

- CO1: Students will be able to define the key management terms and the concepts of management and functions of management, and the functional areas of management like HR and Marketing.
- CO2: Students will be able to predict the suitable application of theories of management in the relevant situations.

CO3: Students will be able to design suitable management techniques to solve the problems of day to day management activities.

### **DMCA703 DATA MINING & WAREHOUSING**

CO1: Understand the functionality of the various data mining and data warehousing components.

CO2: Describe and Demonstrate basic data mining algorithms, methods, and tools used in data mining.

CO3: Analyze the strengths and limitations of various data mining and data warehousing models

CO4: Compare different approaches of data warehousing and data mining with various technologies.

CO5: Evaluate the performance of different data mining algorithms

### **DMCA704 WEB TECHNOLOGIES**

CO1: Describe web, its protocols, strategies and its applications.

CO2: Explain web features such as HTML, CSS, XML, DTD, Schemas based on web applications.

CO3: Construct a web application by applying JavaScript, AJAX, VBScript, JSP, Ruby

CO4: Analyze output data produced by the applications and compare its output.

CO5: Produce results for a given set of data.

### **DMCA705 PYTHON PROGRAMMING**

CO1: To define the basic fundamentals of Python programming language.

CO2: To describe Computational problem solving, Python data types, Control Structures, functions, Object oriented programming concepts

CO3: To apply the concepts of object oriented programming while developing Web applications

CO4: To analyze various requirements need for developing applications.

CO5: To design and develop static and dynamic web pages using django framework.

### **DMCA706 PYTHON PROGRAMMING LAB**

CO1: To identify solutions to computational problems

CO2: To describe Computational problem solving, Python data types, Control Structures, functions, Object oriented programming concepts

CO3: To apply the concepts of object oriented programming while developing Web applications

CO4: To analyze various requirements need for developing applications

CO5: To design and develop static and dynamic web pages using django framework.

### **DMCA707 SOFTWARE LAB XII -WEB TECHNOLOGIES LAB**

CO1: Write basic web features.

CO2: Rewrite basic web applications with some of the enhanced web features such as CSS, XML, DTD, Schemas based on web applications.

CO3: Construct a web application by applying JavaScript, AJAX, VBScript, JSP and Ruby as enhanced web technologies

CO4: Figure out the use of applications designed using various web technologies

CO5: Develop applications for the various users' needs.

## **SEMESTER 8**

### **DMCA801 CRYPTOGRAPHY AND NETWORK SECURITY**

CO1: Refresh the basic concepts of network security, digital signature standards etc.

CO2: Differentiate public and private key encryption techniques

CO3: Analyze various key exchange mechanisms

CO4: Solve real life problems where security to be enforced applying various techniques learned

### **DMCA802 ARTIFICIAL INTELLIGENCE**

CO1: Analyze the matching techniques for organizing and manipulating knowledge.

CO2: Predict pattern, based on Reasoning.

CO3: Design Knowledge building tools in various fields

### **DMCA803 CRYPTOGRAPHY AND NETWORK SECURITY**

CO1: Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains

CO2: Apply the algorithms and design techniques to solve problems

CO3: Analyze the complexities of various problems in different domains.

CO4: Compare between different data structures. Pick an appropriate data structure for a design situation.

CO5: Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Analyze the approximation factor of an

algorithm.

### **DMCA 804(A) (ELECTIVE – II) ANDROID PROGRAMMING**

CO1: Learning about Android basics, its basic building blocks, Intents and Intent Filters.

CO2: To know about Layouts and Drawable Resources, Activities and create applications.

CO3: Understanding more about Emulators, Intents, Basic UI design such as Layouts, Text Fields, Form Widgets, Preferences.

CO4: To understand advanced features such as Menus, UI Design, Styles and Themes, Content Providers in Android and create applications.

CO5: To understand Adapters and Widgets, Custom components and Threads.

### **DMCA 804(B) (ELECTIVE – II) USER INTERFACE DESIGN**

CO1: List the characteristics of a good user interface design.

CO2: Compare Graphical User Interface with web interface

CO3: Explain the guidelines for menu layout, dialog box design and choosing colours.

CO4. Apply the design rules learnt to create a good Graphical/Web User Interface.

CO5. Illustrate the advantages of internationalization of user interface.

### **DMCA805 COMPUTER GRAPHICS AND OPEN GL**

CO1: Understand the core concepts of Computer Graphics.

CO2: Visualize and implement 2D graphical methods

CO3: Ability to visualize 3D methods.

### **DMCA806**

CO1: Able to implement drawings using graphic primitives in OpenGL .

CO2: Able to apply graphic transformation on drawing objects using OpenGL

CO3: Able to apply lighting and Shading models in OpenGL

CO4: In a position to draw various 3D objects on screen.

## **SEMESTER 9**

### **DMCA 901 RESEARCH METHODOLOGY**

CO 1: Define terminologies related to research and publication, intellectual property rights, basic statistical measures and various tests of hypotheses

CO2: Explain the research process as well as ethical principles and challenges with respect to IPR in research and publishing.

CO3 : Compare/Differentiate between different types of research, intellectual property rights, basic statistical measures as well as various tests of hypotheses

CO4: Apply different statistical tests of hypothesis as well as statistical measures

CO5: Create a document using LATEX

### **DMCA 902 COMPILER DESIGN**

CO 1: Comprehend the background procedures when a program is executed.

CO 2: Identify the steps involved in the compilation of a program.

CO 3: Formulate grammars and resolve the meaning of any given grammar.

CO 4: Develop scanners and parsers for compiler.

### **DMCA 903 DISTRIBUTED COMPUTING**

CO 1: List and Explain the different types of distributed systems and their architecture styles.

CO 2: Summarize the types of virtualizations and Illustrate the layered cloud development model.

CO 3: Differentiate between the different forms of interprocess communication and process synchronization in a distributed environment.

CO 4: Justify the need for consistency and replication in distributed file systems.

CO 5: Compare the cloud service and deployment models and propose the cloud design challenges.

### **DMCA 904 MODELING & SIMULATION**

CO 1: Define basic concepts in modeling and simulation.



CO2: Explain various simulation models and give practical examples for each category.

CO3 : Generate and test random number and apply them to develop simulation models.

CO4: Analyze output data produced by a model and test validity of the model.

CO5: Construct a model for a given set of data and motivate its validity.

#### **DMCA 905 INTERNET TECHNOLOGY AND APPLICATIONS**

CO 1: Define terminologies and explain various protocols used in Internet and understanding IP addressing.

CO 2: Explain Subnetting, super netting, TCP, UDP concept of DNS and functioning. Better knowledge of DNS structure and how video and audio is handled on the internet.

CO 3: Compare/Differentiate Types of IP addressing, various intra and inter domain protocols, TCP and UDP based communication, Various applications running on the net and Audio and video compression techniques.

CO 4: Apply TCP /IP knowledge to design networks and also better handling of protocols, configuring mails and effectively implement audio and video on the websites.

CO 5: Create and design their own network and technically design a website

#### **DMCA906 COMPILER DESIGN LAB**

CO 1:Ability to simulate lexical analyzers.

CO 2:Ability to simulate various parsers.

CO 3: Practice the tools such as Lex and YAAC.

#### **DMCA 907 SOFTWARE LAB-XV (CLOUD COMPUTING LAB)**

CO 1:List the steps to install Dropbox, Cloud 9, Google App Engine, Hadoop and explain the usage of these software

CO 2:Deploy and test cloud applications created using the cloud platform Google App Engine

CO 3:Justify the usage of collaborative documents, forms and sheets created using Google Drive

CO 4:Design and develop applications in different programming languages using Amazon's cloud 9 platform and Codeenvy.

## **SEMESTER 10**

#### **DMCA X01 Research Element- Project II**

CO 1:To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.

CO 2:To train the students in preparing project reports and to face reviews and viva voce examination.

B.Sc and M.Sc

### **Programme Outcomes: B. Sc. Botany and Biotechnology (Dual core)**

<b>Department of Biotechnology</b>	After successful completion of three year degree program in Botany and Biotechnology a student should be able to;
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<b>Programme Outcomes</b>	<p>PO-1. Understanding of major concepts in all disciplines of Botany and Biotechnology.</p> <p>PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.</p> <p>PO-3. Understand the evolution, history of plant phylum.</p> <p>PO-4. Gain knowledge about various techniques such as ELISA techniques, DNA sequencing, DNA finger printing techniques, Somatic cell hybridization, cloning, Human Genome project etc.</p> <p>PO-5. Create an awareness of the impact of Biotechnology on the environment, society, and development outside the scientific community.</p> <p>PO-6. Use modern techniques, decent equipments and Biotechnology softwares</p> <p>PO-7. To study and understand the classification of whole phyla includes in Non chordates and Chordates with the help of charts/models/pictures.</p> <p>PO-8. Understand various physiological activities and immunological processes in human body</p> <p>PO-9. Methods to apply the knowledge from various social animals and their applications in the economic development.</p> <p>PO-10. Know the basics biochemical processes.</p>
<b>Programme Specific Outcomes</b>	<p>PSO-1. Gain the knowledge of Botany through theory and practicals.</p> <p>PSO-2. Understand and practice various techniques in the field of Recombinant DNA technology.</p> <p>PSO-3. Understand the testing of hypothesis using various biostatistical methods.</p> <p>PSO-4. Understanding animal diversity and physiological processes and applications of zoology.</p> <p>PSO-6. Understand biochemical processes by theory and practicals</p>
<b>Course Outcomes B. Sc Botany and Biotechnology : <u>Semester-I</u></b>	
<b>Course</b>	<b>Outcomes</b>
EN1CCT01 Fine-tune Your English	<p>After completion of these courses students should be able to;</p> <p>CO-1. Confidently write and speak English.</p> <p>CO-2. formal communication in English become effective</p>

BO1CRT01 Methodology of Science and An Introduction of Botany	CO-1 Impart an insight into the different types of classifications in the living kingdom. CO-2 Appreciate the world of organisms and its course of evolution and diversity. CO-3 Develop basic skills to study Botany in detail. Understand the evolution, history of phylum.
BO1CRT14 Operating system and Office automation	CO-1. Understand the basic computer applications CO-2. Analyze errors in computer applications
BO1CRT15 Cell biology, Developmental biology and Evolution	CO-1. Understand the basic chemical composition of living matter and the concept of continuity and complexity of life activities. CO-2. Analyze the mechanisms involved in the developmental stages of plants and animals. CO-3. Comprehend the process of evolution through inherited changes in the development of organisms.
BC1CMT01 Elementary Biochemistry	CO-1. understand the chemical interaction in biological systems CO-2. analyze biomolecules CO-3. separate biomolecules
ZY1CMT01 Non Chordate diversity	CO-1. identify the non-chordates in their locality with a mind of conservation CO-2. recognize the internal anatomy of organisms without dissecting it CO-3. apply the knowledge they have acquired for the sustainable use of biodiversity resources in their locality
<b>Course Outcomes B. Sc Botany and Biotechnology : <u>Semester-II</u></b>	
EN2CCT03 Issues that matter	CO-1. Exercise critical thinking and reasoning skills to discriminate and form informed opinions on issues that are relevant. CO-2. Analyze theoretical learning to current developments in the world and relate to their everyday experiences. CO-3. Enumerate ideas with confidence in group discussions. CO-4. compose imaginatively, impact fully, clearly and accurately based on their reading of the texts.
BO2CRT02 Microbiology, mycology & plant pathology	CO-1. memorizing reproductive structures and life history of fungus. CO-2. analyze and distinguish the microbes, fungus and lichen in their locality. CO-3. distinguish the various plant diseases and design proper strategies for the management of plant diseases. CO-4. apply the various measures adopted to control plant diseases.
BOBT 2CRT04 Molecular biology and methods in molecular biology	CO-1. Explain the basic theory and mechanisms of molecular biology CO-2. Apply different molecular techniques and interpret the results obtained.
BOBT2CRT03 Biophysics and Instrumentation	CO-1. gain knowledge on Biophysical techniques and their application in understanding structure and conformation of biological macromolecules CO-2. understand structure –function relationships, molecular transport within the cell and across membranes. CO-3. Develop the skills to understand the theory and practice of bio analytical techniques.

BC2CMT02 Biomolecules	CO-1. Understand the structure and function of biomolecules CO-2. Compare the structure and properties of biomolecules CO-3. Apply the structural knowledge to substantiate the phenomena occurring in biomolecules CO-4. Analyze qualitatively any biomolecule provided to them
ZY2CMT02 Chordate diversity	CO-1. identify the chordates in their locality with a mind of conservation, CO-2. recognize the internal anatomy of organisms without dissecting it CO-3. apply the knowledge they have acquired for the sustainable use of biodiversity resources in their locality
<b>Course Outcomes B. Sc Botany and Biotechnology : <u>Semester-III</u></b>	
BO3CRT03 Phycology and Bryology	CO-1. Identify the anatomical variations in lower groups of plants. CO-2. To trace the phylogeny, affinities and evolution of various groups of algae. CO-3. To describe and demonstrate the process of isolation, culture and maintenance of algae
BOBT3CRT06 Microbiology and Microbial technology	CO-1. identify different microbial strains CO-2. understand various techniques for the growth of microbial systems. CO-3. understand various approaches involved in the standardization and industrial production of microbial strains. CO-4. develop new strategies for synthesis of plant metabolites in microbial systems.
BOBT3CRT06 Immunology	CO-1. Conceptualize how the innate and adaptive immune responses coordinate to fight invading pathogens. CO-2. Determine what immunomodulatory strategies can be used to enhance immune responses or to suppress unwanted immune responses such as might be required in hypersensitivity reactions, tumours and transplantations or autoimmune diseases. CO-3. Explore strategies to use immune molecules in diagnostic and clinical immunology and to improve existing vaccines. CO-4. Critically review and determine the strengths and weaknesses of the various advancements published in the field of immunology.
BC3CMT03 Enzymology and Metabolism	CO-1. define the terminologies used in enzymology and metabolism. CO-2. describe schematically the various metabolic pathways. CO-3. apply the general concepts of enzymology and metabolism into different reactions in the body. CO-4. perform an enzyme extraction and assay.
<b>Course Outcomes B. Sc Botany and Biotechnology : <u>Semester-IV</u></b>	
BO4CRT04 Pteridology, Gymnosperms and Paleobotany	CO-1. Study the anatomical variations in vascular plants. CO-2. Understand the significance of Paleobotany and its applications.

BOBT 4CRT07 Animal Biotechnology & Nanotechnology	CO-1. Define the basic principles and techniques in animal biotechnology and Nano biotechnology. CO-2. Locate, apply and evaluate information from scholarly literature and other sources to expand their knowledge and skills on animal and nano-biotechnology.
BOBT 4CRT08 Plant Biotechnology	CO-1. Identify and explain different tools and techniques of plant biotechnology and have knowledge about exploitation of different life forms and activities for human development. CO-2. Understand about the potential of plant transgenics and various aspects of biosafety regulations, IPR and bioethic concerns arising from the commercialization of biotech products should be understood.
BC4CMT04 Nutritional and Clinical Biochemistry	CO-1. explain the clinical significance of organ based function tests CO-2. describe the biochemical basis of some important metabolic disorders. CO-3. schematize the nutritional and biological importance of vitamins and minerals. CO-4. analyse the quantity of biomolecules.
ZY4CMT04 Applied Zoology	CO-1. Identify the organisms in their natural habitat with a mind of conservation and self-employment and industry. CO-2. Recognize the ecofriendly applications of zoology in income generation. explain the clinical significance of organ based function tests
<b>Course Outcomes B. Sc Botany and Biotechnology : Semester-V</b>	
BO5B05U Mycology, lichenology and plant pathology	CO-1. memorizing reproductive structures and life history of fungus. CO-2. analyze and distinguish the fungus and lichen in their locality. CO-3. distinguish the various plant diseases and design proper strategies for the management of plant diseases. CO-4. apply the various measures adopted to control plant diseases
BO5B06U Bryology, Pteridology, Gymnosperms & Paleobotany	CO-1. Identify the anatomical variations in lower groups of plants. CO-2. Understand the significance of Paleo botany.
BO5B07U Angiosperm morphology, Taxonomy and Economic botany	CO-1. Understand scientific name of the common plants in our environment and categorize them in to their respective plant families. CO-2. Construct floral diagram and floral formula of any of the flower in our environment. CO-3. Understand useful and economically important plants in our area.
BO&BT5B <sub>BT</sub> 08U Cell biology, Development biology & Evolution	CO-1. Understand the basic chemical composition of living matter and the concept of continuity and complexity of life activities. CO-2. Analyze the mechanisms involved in the developmental stages of plants and animals. CO-3. Comprehend the process of evolution through inherited changes in the development of organism. explain the clinical significance of organ based function tests
BC5D001U Human health and Nutrition	CO-1. based function tests know the position of nutrients in health, various effective methods of food processing and storage CO-2. recognize different diseases related to improper nutrition CO-3 suggest effective methods to cure such type of disorders in human.

<b>Course Outcomes B. Sc Botany and Biotechnology : Semester-VI</b>	
<b>BO6B09</b> Plant Physiology & Biochemistry	CO-1. understand the basic principles related to various physiological functions in plant life. CO-2. role, structure and importance of the bio molecules associated with plant life.
<b>BO6B10 U</b> <b>Environmental Science &amp; Ecotourism</b>	CO-1. State the core concepts and methods of ecological sciences and ecotourism. CO-2. Explain and interpret environmental issues scientifically CO-3. Devise proper strategies for the sustainable progress of environment and ecotourism
<b>BO6B11U</b> Genetics, Plant breeding & Horticulture	CO-1. define the basic principles and inheritance in animal and plants. CO-2. apply the science of horticulture in human welfare. CO-3. apply their understanding and knowledge attained for crop improvement. CO-4. develop skill in gardening technique
<b>BO6B13 U</b> Phytochemistry & Pharmacognosy	CO-1. apply their skills for identifying and isolating the phytochemical components of the plant having pharmaceutical property. CO-2. find out adulteration of seeds. CO-3. Understand variations in ayurvedic formulations

## **Programme Outcomes: M. Sc. Molecular Biology and Genetic engineering**

<b>Department of Biotechnology</b>	After successful completion of two year degree program in Molecular biology and genetic engineering a student is able to;
<b>Programme Outcomes</b>	<p>PO1. Identify, formulate and analyze complex genetic problems and reaching substantiated conclusions using the principles of genetics, natural sciences, and biotechnology.</p> <p>PO2. Apply the scientific knowledge to the solution of complex problems in lifesciences.</p> <p>PO3. Design solutions for complex genetic problems with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</p> <p>PO4. 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.</p> <p>PO5. Communicate effectively on complex biotechnological activities with the scientific community and with society</p> <p>PO6. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of biotechnological change</p>

<b>Programme Specific Outcomes</b>	<p>PSO-1. Practical work in the laboratory along with the theory classes in biotechnology, bioinformatics and molecular biology fields enables the students to be specialized in the molecular biology and genetic engineering</p> <p>PSO-2. Project work and the preparation of Dissertation helps them to creating research aptitude among the post graduate students</p>
<b>Course Outcomes M. Sc. Molecular Biology and Genetic engineering: <u>Semester-I</u></b>	
<b>Course</b>	<b>Outcomes</b> After completion of these courses students should be able to;
Paper I Fundamental Genetics	<p>CO-1. postulate the Mendel's basics on the inheritance of characters and additional insights that modern genetics has brought to this field</p> <p>CO-2. apply the principles of quantitative traits in polygenic inheritance</p> <p>CO-3. analyze the concept of extra chromosomal inheritance.</p>
Paper II Molecular organization of Chromosome	<p>CO-1. Describe basic principles and techniques in this discipline. T</p> <p>CO-2. Evaluate and apply information from scholarly literature and other sources to expand personal understanding and knowledge on molecular organization of chromosome.</p> <p>CO-3. Design an experiment with step-by-step instructions to address a research problem</p>
Paper III Molecular Structure of Nucleic acids , gene regulation and expression	<p>CO-1. identify and understand the mechanisms of molecular biology concepts.</p> <p>CO-2. design molecular strategies for identifying the gene mutations.</p>
Paper IV- practical 1	<p>CO-1 The vision and scope of the biomolecules – proteins, amino acids, vitamins, hormones and fats at molecular level have developed a normal trend in research of biotechnology and the functional mode of these molecules prior to the entry of molecular interpretation.</p> <p>CO-2 Despite providing the basic information of about the molecules, a clear understanding on the functional diversity of the molecules in this metabolism will be an outcome for extending the student's knowledge at application level</p> <p>CO-3 The importance of biomolecules will be convinced by doing the experiments on the isolation, purification and quantification of these molecules so that the students will get a clear concept about its biological relevance at application level and they get enough practical knowledge for applying it at industrial scale.</p> <p>CO-4 The interpretation of the experimental data will be done by analysis it statistically using illustrations and graphs and figures.</p>

<b>Course Outcomes M. Sc. Molecular Biology and Genetic engineering: Semester-II</b>	
Paper V Biomolecules: Synthesis, Structure & Metabolism	CO-1. understand the biochemical systems of organisms and able to develop adequate mechanism for modification of gene in molecular level.
Paper VI Molecular Analysis of biomolecules	CO-1.To understand use and applications of various types of Microscope CO-2. To know, How HPLC and GC works. CO-3. Capable to do SDS PAGE and other electrophoretic techniques.
Paper VII Oncology Immunopathogenesis and Diagnostics	CO-1. understand the cell are responsible for cancer CO-2. how to diagnosis and how to develop the immunity to resist them by the application of modern tools of molecular biology.
Paper VIII- practical 2	CO-1. Isolation of good quality intact RNA is pre-requisite for gene expression studies. Hence hands on training in RNA isolation from different source is the major outcome of the course CO-2 Molecular Biology & Genetic Engineering very closely associate with handling microorganisms to study recombinant DNA technology. Hence a clear understanding on the tools and techniques in handling and culturing microorganism will extend the student's knowledge at application level CO-3. The study of analytical experiments like chromatographic techniques, purification of proteins molecules will enable the student to get a clear concept about its biological relevance at application level and they get enough practical knowledge for applying it at industrial scale.
<b>Course Outcomes M. Sc. Molecular Biology and Genetic engineering: Semester-III</b>	
Paper IX Transgenics- Microbes and Plants	CO-1. Describe the science and methods of transgenics in microbes and plants CO-2. Locate and evaluate the importance of transgenic technology from scholarly literature and other sources CO-3. Apply their personal understanding and knowledge on a research problem and design an experiment with step-by-step instructions
Paper X Transgenics Animal, IPR and Bioethics	CO-1 conceptually design a transgenic experiment, considering all the pros and cons CO-2. adept at and be able to conduct biotechnology research abiding to Biosafety, Bioethics and IPR guidelines.
Paper XI Proteomics, Gendata bank	CO-1 Describe basic principles and techniques in this discipline CO-2 Undertake advanced study in any of the various sub-disciplines CO-3 Critically evaluate and apply information from scholarly literature and other sources to expand personal understanding and knowledge on bioinformatics tools. CO-4 Design an experiment with step-by-step instructions to address a research problem
Paper XII- practical 3	CO-1.Since the course plan of paper XII focusses on the molecular analysis of DNA and RNA using modern tools and techniques of genomics, the first level will be to define the necessity of learning the practical skills in genomics by providing students the theoretical concept of the biomolecules and at what extend they can be utilized in application level.



	<p>CO-2. After defining the course plan, it is essential to interpret the experiments by highlighting its possible ways of understanding their skill without further complication.</p> <p>CO-3. We have to provide on-hand experience to the students for doing the experiments and they have to repeat the experiments by their own way for implementing the practical skill at application level and how much it can be incorporated at industrial scale for the well being for the society</p> <p>CO-4. Apart from learning the craft of doing the experiments as well as the on hand experience in doing them, the analysis of the data for interpreting the results through illustration and figures for convincing the public</p>
<b>Course Outcomes M. Sc. Molecular Biology and Genetic engineering: Semester-IV</b>	
Paper XIII- Dissertation	Being a biotechnology post graduate programme in molecular biology and genetic engineering, the professional part of the course depends on the practical skill and the on-hand experience of the students in handling the molecular experiments. Hence, the fourth semester of the course is being designed exclusively for research leading to the dissertation work.
Paper XIV- Comprehensive viva voce and presentation of Dissertation	In order to check the theoretical expertise of the students on the subjects taught from first to third semester, comprehensive viva voce is incorporated at the last semester. Moreover, the students have to present the entire research work of his/her dissertation highlighting the novelty of methodology and the major observations of the work as separate entity.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

On completion of the course our MCA/IMCA/BCA students will be able to,

1. Apply knowledge and skills for problem solving and decision making in industry, academia or as researchers and entrepreneurs.
2. Exhibit leadership skills or work as a team in diverse professional environments, through demonstration of good analytical, design and implementation skills.
3. Integrate social and environmental responsibilities in their professional career and business enterprises.

## **PROGRAMME OUTCOMES (POs):**

On completion of the course our MCA/IMCA/BCA students will have the ability to:

1. Apply the knowledge of mathematics and computing fundamentals to various real life applications
2. Apply appropriate modern computing tools and techniques and use them with effectively
3. Develop computer applications to meet desired needs within realistic constraints
4. Communicate effectively