



**University of Engineering & Management**

**Department of Computer Applications (CA)**

**MCA Syllabus**

**Academic Session: 2021-23**

**Objective:**

The primary objective of this program is to provide an expertise on computing principles and business practices for effectively using/managing information systems and enterprise software. It helps students analyze the requirements for system development and exposes students to business software and information systems. This course provides students adequate knowledge to specialize in legacy application software, system software or mobile applications.

**Eligibility:**

To be eligible for PG admissions, the applicants must have passed/appeared/ be due-to-appear in undergraduate programs such as BCA/Graduation in Science/Arts/Commerce discipline with Mathematics or Information Technology (IT) must be one of the subjects during the undergraduate course.

**Program Educational Objectives (PEO)**

PEO No.	PEO Description
PEO1	Technical Expertise: Develop the ability to plan, analyze, design, code, implement, test and maintain the software product for real time systems that are technically sound, economically feasible and socially acceptable.
PEO2	Successful Career: Exhibit professionalism, ethical attitude with updated technologies in Computer Application based career and capability to set up their own enterprise in various sectors of Computer Applications.
PEO3	Soft Skills: Develop communication skills, team work and leadership quality in their professional, multidisciplinary projects and adapt to current trends by engaging in lifelong learning.
PEO4	Continuous Learning: Prepare the students to pursue higher studies by acquiring knowledge in mathematical, computing and engineering principles in the field of computing and related fields and to work in the fields of teaching and research.

**Program Outcome (PO)**

PO No.	PO Description
PO1	<b>Application of Knowledge:</b>
PO2	<b>Problem Analysis:</b> Ability to analyze a problem, then identify and formulate the computing requirements appropriate to its solution.
PO3	<b>Development of Solutions:</b> Ability to design, implement and evaluate a Computer based problems with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO4	<b>Conduct Investigations of Complex Problem:</b> Ability to design and conduct experiments, as well as to analyze and interpret data to reach valid conclusions.
PO5	<b>Modern Tool Usage:</b> Ability to create, select and apply appropriate techniques, skills, and modern tools necessary for computing practice.

PO6	<b>Impact on Society:</b> An ability to analyze the local and global impact of computing on individuals, organizations, and society.
PO7	<b>Environment and Sustainability:</b> Ability to understand the impact of the proposed solutions in societal and environmental contexts, and demonstrate the need for sustainable development.
PO8	<b>Ethics:</b> Ability to apply ethical principles and commit to professional ethics and responsibilities and norms while proposing solution for various Computer Application problems.
PO9	<b>Individual and Team Work:</b> Ability to function effectively individually and on teams, including diverse and multidisciplinary environment to accomplish a common goal.
PO10	<b>Communication:</b> Ability to communicate effectively on complex computational problems with the business community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project Management and Finance:</b> Ability to demonstrate knowledge and understanding of the technical and management principles and apply these to one's work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO12	<b>Continuous Learning:</b> Ability to engage in professional development through continuous learning in the context of rapid technological changes happening globally.

### **MCA First Year First Semester Structured Syllabus**

<u><b>THEORY</b></u>							
SL.NO.	COURSE CODE	TOPIC	CONTACT(PERIODS/WEEK)				CREDIT
			L	T	P	Total	
1	MCA101	Computer Organization and Architecture	3	1	0	4	3
2	MCA102	Computer Programming with C	3	1	0	4	4
3	MCA103	Data Structures with C	3	1	0	4	4
4	MCA104	Discrete Mathematical Structure	3	1	0	4	3
5	MCA105	Business English and Communication	3	1	0	4	3
6	IVC(MC) 101	Essential Studies for Professionals–I	3	1	0	4	0
Total of Theory						24	17
<b>PRACTICAL</b>							
7	MCA191	Micro Programming and Architecture Laboratory	0	0	3	3	3
8	MCA192	C Programming Laboratory	0	0	3	3	3
9	MCA193	Data Structures with C Laboratory	0	0	3	3	3
Total of Practical						9	9
<b>SESSIONAL</b>							
10	IVC(MC) 102	Skill Development for Professionals–I	2	1	0	3	0
11	MC181	Mandatory Additional Requirement (Co-Curricular/ Extra Curricular Activity)	0	0	0	0	1
Total of Sessional						3	1
<b>Total of Semester</b>						<b>36</b>	<b>27</b>

### **MCA 1st Year Second Semester Structured Syllabus**

<b>THEORY</b>							
SL.NO.	COURSE CODE	TOPIC	CONTACTS(PERIODS/WEEK)				CREDITS
			L	T	P	TOTAL	
1	MCA201	Database Management System	3	1	0	4	4
2	MCA202	Object-Oriented Programming with Java	3	1	0	4	4
3	MCA203	Data Communication & Computer Networks	3	1	0	4	3
4	MCA204	Graphics and Multimedia	3	1	0	4	3
5	MCA205	Statistics and Numerical Techniques	3	1	0	4	3
6	IVC(MC)201	Essential Studies for Professionals–II	3	1	0	4	0
Total of Theory						24	17
<b>PRACTICAL</b>							
7	MCA291	Database Management System Laboratory	0	0	3	3	3
8	MCA292	Object-Oriented Programming with Java Laboratory	0	0	3	3	3
Total of Practical						6	6
<b>SESSIONAL</b>							
9	IVC(MC)202	Skill Development for Professionals–II	2	1	0	3	0
10	MC281	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)	0	1	0	1	1
Total of Sessional						4	1
Total of Semester						34	24

### **MCA 2nd Year First Semester Structured Syllabus**

<b>THEORY</b>							
SL.NO.	COURSE CODE	TOPIC	CONTACTS(PERIODS/WEEK)				CREDITS
			L	T	P	TOTAL	
1	MCA301	Operating Systems and Systems Software	3	1	0	4	3
2	MCA302	Data Science and Data Analytics	3	1	0	4	4
3	MCA303	Unix and Shell Programming	3	1	0	4	3
4	MCA304	Software Engineering & TQM	3	1	0	4	4
5	MCA305	Values and Ethics	2	0	0	2	1
6	IVC(MC)301	Essential Studies for Professionals-III	3	1	0	4	0
Total of Theory						22	15
<b>PRACTICAL</b>							
7	MCA391	Minor Project	0	0	12	12	6
8	MCA392	Data Science and Data Analytics Laboratory	0	0	3	3	3
9	MCA393	Unix Laboratory	0	0	3	3	3
10	MCA394	Software Project Management Laboratory	0	0	3	3	3
Total of Practical						21	15
<b>SESSIONAL</b>							
11	MCA381	Industrial Training	0	0	0	0	2
12	IVC(MC)302	Skill Development for Professionals -III	2	1	0	3	0
13	MC381	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)	0	1	0	1	1
Total of Sessional						4	3
Total of Semester						46	33

### **MCA 2nd Year 2nd Semester Structured Syllabus**

<b>THEORY</b>							
SL.NO.	COURSE CODE	TOPIC	CONTACTS(PERIODS/WEEK)				CREDITS
			L	T	P	TOTAL	
1	MCA401 A/B/C/D	Elective-I	3	1	0	4	3
2	MCA402A/B/C	Elective-II	3	1	0	4	3
3	MCA403	Operation Research & Optimisation Techniques	3	1	0	4	3
4	MCA404	Environment and Ecology	3	0	0	3	2
5	MCA405	Management & Accounting	2	0	0	2	2
6	IVC(MC)401	Essential Studies for Professionals-IV	3	1	0	4	0
Total of Theory						21	13
<b>PRACTICAL</b>							
7	MCA491	Major Project	0	0	30	30	15
Total of Practical						30	15
<b>SESSIONAL</b>							
8	MCA481	Industrial Training	0	0	0	3	1
9	IVC(MC)402	Skill Development for Professionals -IV	2	1	0	3	0
10	MC481	Mandatory Additional Requirement (Co-Curricular/Extra Curricular Activity)	0	1	0	1	1
Total of Sessional						7	2
Total of Semester						58	30

Elective No.	Course Code	Topic
I	MCA401A	Distributed Database Management
	MCA401B	Image Processing
	MCA401C	Parallel Programming
	MCA401D	Cloud Computing
II	MCA402A	Compiler Design
	MCA402B	Mobile Computing
	MCA402C	Embedded Systems

Semester	Credit
I	27
II	24
III	33
IV	30
<b>Total</b>	<b>114</b>

**PAPER NAME: COMPUTER ORGANIZATION AND ARCHITECTURE**

**PAPER CODE: MCA101**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 3**

<b>Course Code</b>	MCA101				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Computer Organization and Architecture				
	<b>Contents</b>				
	Basic Computer Organization and Architecture concept (number system, logic gates, adders, multiplexer, Sequential circuits, Karnaugh Map, Coder, Decoder, Counter etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of mathematics, Logic Gates.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to design logic circuits.
2. Learn how to create pictorial representations of the logic circuits.
3. Learn how to apply logic for problems and choose best way to solve problem.
4. Enhance their logic circuit design skills.

**Detailed Syllabus:**

**Module 1:**

**Overview of Number system:** Data and number representation- binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, (r-1)'s & r's complement representation, binary arithmetic.

**Basic logic operations:** Structure of a digital machine (VON-Neumann architecture), Logic gates, basic logic operations, truth tables, Boolean expression, simplification.

**Module 2:**

**Karnaugh Map:** Karnaugh Map, Coder, Decoder, Counter – Asynchronous & Synchronous. Flip Flops – RS, JK, and D & T.

**Combination circuits:** Combination circuits, adders, multiplexer.



**Sequential circuits:** Registers, ROM, PROM, EPROM and dynamic RAM, Digital Components, bus structure- Address bus, Data bus & DMA controller.

**Module 3:**

**Computer Organisation:** Basic Computer Organisation & Design, Micro-programmed Control.

**Registers and CPU:** Data representation, Register transfer & micro-operations, Central processing unit, Pipeline & vector processing, Computer arithmetic.

**Module 4:**

**Memory organization:** Input - output organisation, Memory organization.

**CPU structure:** CPU architecture, instruction format, addressing mode, stacks and handling of interrupts.

**Module 5:**

**Microprocessors:** Microprocessors (8085), Personal Computing.

**Assembler:** Assembly language – Elementary problems.

**Recommended Books:**

1. Computer System Architecture, Morris Mano, PHI
2. Computer Organization, Hamacher, MGH
3. Computer Architecture, Carter, Schaum Outline Series, TMH

**Reference Book:**

1. System Architecture, Buad, VIKAS
2. The Fundamentals of Computer Organization, Raja Rao, Scitech
3. Computer Organization & Design, Pal Chowdhury, PHI

**PAPER NAME: COMPUTER PROGRAMMING WITH C**

**PAPER CODE: MCA102**

**CONTACT HOUR: 3L + 1 T**

**CREDIT: 4**

<b>Course Code</b>	MCA102				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Computer Programming with C				
	<b>Contents</b>				
	Basic C programming Development concept (variables, data types, loops, selection statement, arrays, strings, pointer, function, structure, file handling, pre-processor)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of number system and computer fundamentals				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Students will be able to learn how to build the algorithms for problems.
2. Students will be able to learn how to create pictorial representations of the program.
3. Students will be able to learn how to apply logic for problems and choose best way to solve problem.
4. Students will be able to enhance their programming skills.

**Detailed Syllabus:**

**Module 1:**

**Overview of C** History of C, Importance of C, Sample Program, Basic Structure of C Program, Programming Style, Executing C program

**Constants, variables, data types:** Introduction, Character Set, Tokens, Keywords and identifiers, Constants, Variables, Data types, Declaration of variables, Declaration of storage class, Assigning values to variables.

**Operators and Expressions :** Introduction, Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operators, Bitwise operators, Special operators, Arithmetic expression, Evaluating expression, Precedence of arithmetic operators, Type conversions in expression, Operator precedence and associativity

**Managing Input and Output operations:** Introduction, Reading a Character, Writing a Character, Formatted Input, Formatted Output.

## **Module 2:**

**Decision making and branching:** Introduction, Decision making with IF statement, IF...ELSE statement, Nesting of IF..ELSE statement, ELSE..IF ladder, Switch statement, The? : Operator, GOTO statement.

**Decision making and looping:** Introduction, the WHILE statement, The DO statement, The FOR statement, Jumps in LOOPS.

## **Module 3:**

**Arrays :** What are Arrays?, One dimensional Array Declaration, One dimensional array Initialization, Two dimensional array declaration, Two dimensional array initialization.

**Character Arrays and Strings:** Introduction, Declaring and initializing string variables, Reading strings, writing strings, Arithmetic operations on characters, Putting strings together, Comparison on two strings, String handling function.

## **Module 4:**

**User-defined Functions :** Introduction, Need for user-defined function, A multi-function program, Elements of user-defined function, Definition of functions, Return values and types, Function calls, Function declaration, Categories of function, Nesting of function, Recursion, Passing arrays to function, Passing strings to function, Scope, visibility and lifetime of variables.

**Pointers: Introduction,** Understanding Pointer, Accessing address of a variable, Declaring pointer variable, Initialization of pointer variable, Accessing a variable through its pointer, Pointer expression, Pointer Increments and scale factor, Pointers and arrays, Pointer and character strings, Array of pointers, Pointers as function arguments, Functions returning pointers, Pointer to function, Pointer and structure.

## **Module 5:**

**Structures and Union :** Introduction, Defining structure, Declaring structure variables, Accessing structure members, Structure initialization, Copying and comparing structure variables, Operations on individual members, Arrays of structures, Structure within structure, Structure and function, Union.

**File Management in C:** Introduction, Defining and opening a file, Closing a file, Input/Output Operations on Files, Error handling during I/O operations, Command Line Arguments.

**The Pre-processor:** Introduction, Macro substitution, File inclusion, Compiler Control Directives.

## **Recommended Books:**

1. ProgrammingWith C, Gottfried, TMH
2. PROGRAMMING IN ANSI C by E.Balagurusamy, 5thEdition, TataMcGraw Hill

## **Reference Book:**

1. Practical C Programming, Oualline, SPD/O'REILLY

**PAPER NAME: DATA STRUCTURE WITH C**

**PAPER CODE: MCA103**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA103				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Data Structures with C				
	<b>Contents</b>				
	Basic concepts of Data Structure (array, link list, stack, queue, tree, heap, search, recursion, garbage collection, hashing, file etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of mathematics, C programming.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to understand a data structure.
2. Learn how to create pictorial representations of a data structure.
3. Learn how to apply logic for data structure problems and choose best way to solve them.
4. Enhance their data structure design skills.
5. Learn how to implement a data structure using C programming language.

**Detailed Syllabus:**

**Module 1:**

**Algorithm concept:** Algorithm concept, Complexity – Big O- Notation, time space trade-off.

**Array:** Array- Row/Column major representation, sparse matrix, shifting.

**Linked List:** Linked List- Singly, circular, doubly, doubly & circular.

**Module 2:**

**Stack:** Stack- Push, Pop, Conversion from infix – to postfix, evaluation of postfix expression. Stack representation using array & linked list.

**Queue:** Queue – insert, delete, representation using array & linked list, circular queue (operations), deque (operations), priority queue (operations)-Both iterative & recursive implementation.

### **Module 3:**

**Garbage collection:** Garbage collection-different techniques.

**Tree:** Tree- definition – traversal algorithms (pre, post, in). Threaded tree (One Way & Two Way), heaptree, Avl tree-balancing, B-tree, Trie Binary search tree, Huffman algorithm.

**Heap:** Creation of Heap, Sorting with complexity analysis – bubble, merge, quick, selection, insertion, shell, tournament, radix, heap.

### **Module 4:**

**Search:** Search- Linear & Binary (Complexity Analysis).

**Recursion:** Recursion Technique- overview including tail recursion.

### **Module 5:**

**Hashing:** Hashing- definition. Functions- Midsquare, Folding, remainder, Collision resolution & linear probing.

**File:** Overview On – Sequential file, random access file, indexed sequential, hash file.

**Pattern matching algorithms:** Pattern matching algorithms- Brute force, Knuth-Morris-Pratt.

### **Recommended Books:**

1. Data Structure Using C, Ajay Agarwal, Cyber Tech
2. Data Structure Using C & C++, Tannenbaum, PHI

### **Reference Book:**

1. Data Structure Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL
2. C and Data Structures, Radhaganesan, Scitech
3. Data Structures & Program Design in C, 2nd Ed, Kruse, Tondo & Leung, PHI
4. Mastering Algorithms With C, Loudan, SPD/O'REILLY

**PAPER NAME: DISCRETE MATHEMATICAL STRUCTURE**

**PAPER CODE: MCA104**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 3**

<b>Course Code</b>	MCA104				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Discrete Mathematical Structure				
	<b>Contents</b>				
	Basic concepts of Discrete Mathematical Structure (Set Theory, Propositional logic, permutation and combination, Graph Theory, tree, finite automata, grammar, fuzzy set etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of mathematics, linear algebra.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn what discrete structure is.
2. Learn Propositional logic.
3. Learn how to apply logic for solving discrete structure problems and choose best way to solve them.
4. Enhance their discrete structure implementation skills.

**Detailed Syllabus:**

**Module 1:**

**Set Theory :** Set Theory foundation mapping (bijective, surjective, injective), Relations-equivalence, Poset, Lattice.

**Module 2:**

**Propositional logic :** Mathematical induction, Propositional logic, Logical equivalence.

**Permutation and combinations :** Permutation and combinations.

**Module 3:**

**Function and relations:** Generating functions, Recurrence relations.

**Graph Theory:** Concepts of Graph Theory, sub-graphs, cyclic graphs, Isomorphism, Homomorphism of Graphs.

**Module 4 :**

**Tree:** Trees, spanning trees, binary trees.

**Algorithms:** Algorithms- Kruskal's , Prim's , Dijkstra's , Flyod's ,Warshall's, DFS, BFS.

### **Module 5:**

**Finite automata:** Finite automata – Construction & Conversion of NFA, DFA, State minimization, Mealy M/C, Moore M/C.

**Grammars:** Definition Of Grammars – Type 0,1,2,3.

**Fuzzy set :** Fuzzy sets – basic properties

### **Recommended Books:**

1. Theory of Computer Science, Mishra & Chandrasekharan, PHI
2. Discrete Mathematics for Comp. Scientists & Mathematicians, Mott, Kandel & Baker, PHI

### **Reference Book:**

1. Discrete Mathematical Structure, C.L.Liu, TMH
2. Discrete Mathematical Structure, G.S.RAO, New Age International
3. Discrete Mathematics With Applications, Rosen, TMH, 5th Ed
4. Discrete Mathematics, Ash & Ash, MH.
5. Discrete Mathematical Structure, Somasundaram, PHI
6. Discrete Mathematical Structure, Dubey, EXCEL BOOKS
7. Discrete Mathematics, Iyenger, VIKAS
8. Discrete Structure and Graph Theory, Bhisma Rao, Scitech



**PAPER NAME: BUSINESS ENGLISH AND COMMUNICATION**

**PAPER CODE: MCA105**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 3**

<b>Course Code</b>	MCA105				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Business English and Communication				
	<b>Contents</b>				
	Basic concepts of Business English and Communication (technical report writing, business communication, business letter writing, precise writing, practical communication skill, business presentation with multimedia, poster presentation, writing technical document, preparing software user manual, preparing project documentation etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of English.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to write a business letter, precise, reports.
2. Learn enhance communication skill, business presentation skill.
3. Learn how to create poster, business presentation, software user manual.
4. Enhance their project document preparation skill.

**Detailed Syllabus:**

**Module 1:**

**Technical writing:** This should cover general and technical writing, oral communications and listening skills.

**Module 2:**

**Communications and listening skills:** Letter writing, technical report writing, and business communication.

**Module 3:**

**Expression:** Practical communication skill development, business presentation with multimedia.

**Module 4 :**

**Speaking skill:** prepared speech, extempore speech.

**Reading skill:** comprehension test.

**Module 5:**

**Writing:** precise, technical/business letter, organization of writing material, poster presentation, writing technical document, preparing software user manual, preparing project documentation.

**Recommended Books:**

1. Business Correspondence & Report Writing, Sharma, TMH
2. Business Communication Strategies, Monipally, TMH

**Reference Book:**

1. English for Technical communication, Laxminarayanan, Scitech
2. Business Communication, Kaul, PHI
3. Communication Skill for Effective Mgmt., Ghanekar, EPH

**PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS - I**

**PAPER CODE: MCA(GS)101**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 2**

<b>Course Code</b>	MCA(GS)101				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Essential Studies for Professionals - I				
	<b>Contents</b>				
	Basic concepts of Essential Studies for Professionals - I (history, geography, economics, constitution etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	3	1	-	2	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of English.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Know about ancient history.
2. Know about basic geography.
3. Know about basic economics.
4. Know about constitution.

**Detailed Syllabus:**

**Module 1:**

HISTORY - 1 (Protestant religion: Ancient):

1. Indus valley Civilisation: Excavation, Time period, Creator, Extent, Characteristic, Art and architecture, Decline, Significance.
2. Vedic Age: Time period, creator, Social, political, economic and religious conditions during Rig vedic period, later vedic period, vedic literature.
3. 16 mahajanapadas: Time period, Location.
4. Rise of Magadha: Hariyanka Dynasty, Sishunag Dynasty, Nanda Dynasty, Mauryan Dynasty Buddhism, Jainism, Ajibaka Religion.

**Module 2:**

GEOGRAPHY

1. Earth and Universe: Origin of the earth, Geological time scales (Era, Epoch, Periods)
2. Rocks and volcanoes: Igneous rocks, Sedimentary rocks, Metamorphic rocks. Types of volcanoes
3. Human Geography and Population Geography: Determinism, Possibilism, Neo determinism, French and German school of thought, Demographic transition model, Indexes, Laws of migration.
4. Soil geography of India
  - Soil formation
  - Soil Horizons

- Types of Soil
  - Soil erosion and conservation in India
5. National wildlife and parks of India

### **Module 3:**

#### **ECONOMICS-1(MICRO)**

- 1) Basic economics- Types of Economy, Branches of economics, Feature of Indian Economy, HDI.
- 2) Demand & supply- law of demand, factors of demand, law of supply, different elasticity.

### **Module 4 :**

#### **CONSTITUTION-1(basic)**

- 1) Historical background- The company Rule (1773-1858), The crown rule(1858-1947), making of constitutions, features of constitution.
- 2) The Preamble- Ingredients, keywords, amendment of preamble.
- 3) Part & schedule- Details concept on part, schedule & articles & their amendments .
- 4) Citizenship- Constitutional provisions, Citizenship act, Comparing PIO & OCI card holders.

### **Recommended Books:**

#### **History:**

1. India's Ancient Past (Ancient History) : R.S. Sharma
2. History of medieval India (Medieval History): Satish Chandra

#### **Geography:**

1. Savindra Singh, R.D Dixit

#### **Economics:**

1. Indian Economy- TATA McGraw Hill/Ramesh Singh
2. Indian Economy – Arihant

#### **Constitution:**

1. Indian Constitution- D.D. Basu
2. Our Constitution- Subhash.C. Kashyap

### **Reference Book:**

#### **History:**

1. History of Modern India (Modern History): Bipin Chandra
2. India's struggle for Independence (Modern History): Bipin Chandra

**PAPER NAME: MICRO PROGRAMMING AND ARCHITECTURE LABORATORY**

**PAPER CODE: MCA191**

**CONTACT HOUR: 3P**

**CREDIT: 3**

<b>Course Code</b>	MCA191				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Micro Programming and Architecture Laboratory				
	<b>Contents</b>				
	Basic concept of Micro Programming and Architecture Laboratory (etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	-	-	3	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standard mathematics.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. learn how to create Logic Gates, Flip- Flop, Multiplexer
2. learn how to create Coder & Decoder
3. learn how to operate 8085 Microprocessor.
4. learn how to operate 8085 Assembler.

**Content:**

- Basic skills lab in using Personal Computer and common software tools
- Logic Gates, Flip- Flop, Multiplexer
- Coder & Decoder, 8085 Assembly Language (TurboAssembler), Micro processor (8085 Kit).

**PAPER NAME: C PROGRAMMING LABORATORY**

**PAPER CODE: MCA192**

**CONTACT HOUR: 3P**

**CREDIT: 3**

<b>Course Code</b>	MCA192				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	C Programming Laboratory				
	<b>Contents</b>				
	Basic concept of C Programming (variables, data types, loops, selection statement, arrays, strings, pointer, function, structure, file handling, pre-processor etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	-	-	3	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of programming and logic.				

**Course Outcome (CO)**

At the end of the course, a student will be able to:

1. Students will be able to learn how to build the algorithms for problems.
2. Students will be able to learn how to create pictorial representations of the program.
3. Students will be able to learn how to apply logic for problems and choose best way to solve problem.
4. Students will be able to enhance their programming skills.

**Content:**

- Implement C program to write variables, data types, loops.
- Implement C program to write selection statement, arrays.
- Implement C program to write strings, pointer, function, structure.
- Implement C program to write file handling, pre-processor.

**PAPER NAME: DATA STRUCTURE AND C LABORATORY**

**PAPER CODE: MCA193**

**CONTACT HOUR: 3P**

**CREDIT: 3**

<b>Course Code</b>	MCA193				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Data Structure with C Laboratory				
	<b>Contents</b>				
	Basic concept of Data Structure with C programming (array, link list, stack, queue, tree, heap, search, recursion, garbage collection, hashing, file etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	-	-	3	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of C programming.				

**Course Outcome (CO)**

At the end of the course, a student will be able to:

1. learn how to understand a data structure.
2. learn how to create pictorial representations of a data structure.
3. learn how to apply logic for data structure problems and choose best way to solve them.
4. enhance their data structure design skills.
5. learn how to implement a data structure using C programming language.

**Content:**

- Implementation of array, link list, stack.
- Implementation of queue, tree.
- Implementation of heap.
- Implementation of search, recursion.
- Implementation of garbage collection, hashing, file.

**PAPER NAME: SKILL DEVELOPMENT FOR PROFESSIONALS - I**

**PAPER CODE: MCA(GS)181**

**CONTACT HOUR: 2T+1L**

**CREDIT: 1**

<b>Course Code</b>	MCA(GS)181				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Skill Development for Professionals - I				
	<b>Contents</b>				
	Basic concept of Skill Development for Professionals - I (history, geography, economics, constitution etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-I
	2	1	-	1	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII history, geography, economics, constitutions.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn about history.
2. Learn about geography.
3. Learn about economics.
4. Learn about constitution.

**Content:**

**Module-1**

Quantitative Numerical aptitude level-1

Quant foundation- Vedic maths& Collective tricks.

Basic Multiplication – multiplying by numbers ending in zeroes, Multiplying by 2,3,4,5,6,7,8 9, 11,12& 111.multiplying 2 digits numbers ending in 9 & whose tens digit at to 10, Multiplying by 2 digits number of 9, multiplying by any 2 digit numbers ending in 9,

Division- Divisibility by 2,3,4,5,6,7,8, 9, 11 & 13, Dividing by 5,9, 15,25,125,Dividing by factors.

squaring numbers- squaring any 2 digit numbers ending in 5, squaring any number ending in 5, squaring any 3 digit numbers ending with 25, squaring any numbers ending in 9, squaring any numbers consisting only nines. squaring any 2 digit numbers. Cube & cube roots.

Percentage- Basic concept of percentage &it's shortcut rules & their applications.

Ratio- Basic concept of Ratio & Proportion, Shortcut tricks & their applications.

Simple equation- Linear equation of 2 & more than two variables.

Variation- Ratio , Proportion, Variation, concept of directly proportional &

Partnership – concept, rules & Applications, Percentage Advanced problems & shortcuts.

Profit & Loss- Basic concept, formulae, shortcut tricks & their Application.

**Module-2**

Objective English-1

1. Introduction of Parts of speech



2. Kinds of Noun, Rules & Application.
3. Definition of Pronoun, Examples, Rules & Application
4. Kinds of Adjectives & Degree of comparison.
5. Kinds of Verbs & Usages.

### **Module-3**

Logical Mental Ability-1

**CODING AND DECODING & DIRECTION SENSE**

- a)Conditional Coding ,b)Word-Pattern Coding, c)Chinese Coding, d)Direction Sense Test,
- e)Direction Distance Test, f)Shadow based Questions

**SERIES & NUMBERS**

- a)Alphabet Series, b)Random Series, c)Number Series, d)Letter Gap, e)Missing Number Series,
- f)Series Completion, g)Order And Ranking, h)Interchange, i)Comparison

**BLOOD RELATIONS**

Family Tree Questions, Indication Type BR, Coding Blood Relations, Miscellaneous Blood Relations

**ANALOGY**

Word Analogy, Classification, Odd-Out

**CUBE**

Dice, Miscellaneous Problems

**DATA SUFFICIENCY**

- a) Problems on Blood Relation, ages, Numbers
- b) Logical Test Based on Data Sufficiency

**NON VERBAL REASONING**

- a) Image Formation
- b) Water –Images
- c) Mirror Image
- d) Image completion
- e) Paper Cutting And Folding

### **Module-4**

Computer proficiency: Basics of C programming.

Books:

Numerical Aptitude

Fastrack objective Arithmetic: Arihant

Quantitative aptitude for Competitive exam (4th Edition): TATA McGraw Hill

Quantitative aptitude for Competitive exam (3rd Edition): PEARSON

Objective English

Objective English: Kiran Publication

General English: Arihant

Logical Mental Ability

Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication, A modern approach to verbal & non verbal Reasoning: R.S. Agarwal

**PAPER NAME: DATABASE MANAGEMENT SYSTEM**

**PAPER CODE: MCA201**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA201				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Database Management System				
	<b>Contents</b>				
	Basic concept of Database Management System (three-level architecture, relational model, concept of key, SQL, normalization, storage structure, indexing, transaction processing, DDBMS etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standards of table structure.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to create a table.
2. Learn how to create database.
3. Learn how to apply logic for problems and choose best way to solve problem of database.
4. Enhance their database design skills.

**Detailed Syllabus:**

**Module 1:**

**Introduction to DBMS :** Introduction to DBMS, architecture, administration roles, data dictionary, Traditional models.

**Three-level architecture :** three-level architecture, hierarchical model, network model and relational model.

**Module 2:**

**Relational model :** Relational model – definitions and properties, keys integrity rules, relational algebra, joins, set operations.

**Relational calculus:** Tuple relational calculus and Domain relational calculus.

**Query & its optimization techniques :** SQL constructs, PL/SQL, Query & its optimisation techniques. ANSI SQL2: DDL, DML, constraints and assertions, views, database security.

**Module 3:**

**Normalization :** Singled valued functional dependencies.

Database design, conceptual, logical and physical models, ER diagram and model, normal forms (1,2,3,BCNF). Multivalued dependencies, theory of normalisation-4NF, 5NF, 6NF, DKNF

#### **Module 4 :**

**Storage structure :** Storage structure- Sequential, Indexed Sequential.  
B+ tree – creation, insertion & deletion.

**Indexing :** Indexing- Primary, Secondary, Multi Level.

#### **Module 5:**

**Transaction processing :** Transaction processing, concurrency control, Recovery management. Transaction model properties, lock base protocols, Two-phase locking, Live – Lock, Time- Stamp Protocol.

**Distributed database :** Brief introduction to distributed database, temporal database and object-oriented database.

#### **Recommended Books:**

1. Data Base System Concepts, Silverchatz, Korth&Sudarshan, MH.
2. Data Base Management Systems, Majumder& Bhattacharyya, TMH

#### **Reference Book:**

1. Oracle PL/SQL Programming, Feuerstein, SPD/O'REILLY
2. Data Base Management System, A.K. Pujari, ISTE/EXCEL
3. Fundamentals of Data Base Mgmt. System, Vig&Walia, ISTE/EXCEL
4. Data Base Management Systems, Leon, VIKAS
5. Data Base Processing: Fundamentals, Design & Implementation, Kroenke, PHI
6. SQL PL/SQL for Oracle 8 & 8i, P.S Deshpande, Wiley Dreamtech
7. Data Base Management Systems, V.K Jain, Wiley Dreamtech
8. Beginning SQL Programming, Kauffman, SPD/WROX

**PAPER NAME: OBJECT-ORIENTED PROGRAMMING WITH JAVA**

**PAPER CODE: MCA202**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA202				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Object-Oriented Programming with Java				
	<b>Contents</b>				
	Basic concept of Object-Oriented Programming with Java (OOps Concept, Data Types - variables and arrays, Operators, Control statements, Classes and objects, Inheritance, Applets, Event handling etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of programming language.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Understand the basic concepts of object-oriented programming and difference between Procedure –Oriented Programming and Object-Oriented Programming.
2. Get a clear understanding of basics of Java Programming.
3. Analyse the concepts of Inheritance, Exception and Packages in java.
4. Learn how GUI can be designed and developed in Java using Applets and Swings.
5. Study how to handle events and multi-threaded programming in java.

**Detailed Syllabus:**

**Module 1:**

**Introduction:** Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

**Objects and Classes:** Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes.

**Module 2:**

**Inheritance and Polymorphism:** Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

**Module 3:**

**Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI

components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

#### **Module 4 :**

**I/O Programming:** Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

#### **Module 5:**

**Multithreading in Java:** Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

#### **Recommended Books:**

1. Object Oriented Programming with JAVA, Wu, TMH
2. JAVA 2: The Complete Reference, Schildt, TMH

#### **Reference Book:**

1. Beginning JAVA 2 :SDK 1.4, Horton, SPD/WROX
2. Programming in JAVA, EXCELBOOKS
3. Object Oriented Programming with C++ & Java, Samanta, PHI
4. Object Oriented Application ,Development using JAVA, Doke, VIKAS
5. Programming with Java 2, Xavier, Scitech
6. Projects on Java 2, Xavier, Scitech

**PAPER NAME: DATA COMMUNICATION & COMPUTER NETWORKS**

**PAPER CODE: MCA203**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA203				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Data Communication & Computer Networks				
	<b>Contents</b>				
	Basic concept of Object-Oriented Programming with Java (OOPs Concept, Data Types - variables and arrays, Operators, Control statements, Classes and objects, Inheritance, Applets, Event handling etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of programming language.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Know about network.
2. Know about signals – digital, analog.
3. Know about different topologies.
4. Learn how to write programs for network.

**Detailed Syllabus:**

**Module 1:**

**Introduction :** Introduction to computer network- Topology.

Base Band & Broad Band Topology, Guided & Unguided Media.

**Module 2:**

Overview of Data & Signal Bits. Baud & Bit Rate. Modulation (AM, PM, FM);

Multiplexing (TDM, FDM, STDM).

**Module 3:**

**Encoding :** Encoding (RZ, NRZ, BIPLOAR, MANCHESTER, DIFF. MANCHESTER).

**Digital To Analog Signal:** Digital To Analog – ASK, PSK, FSK, QPSK.

**Transmission methods :** Transmission methods – Synchronous & Asynchronous, Flow Control, Error Control, Error Detection methods.

**Module 4:**

**Goals of Layered protocols :** Goals of Layered protocols- Introduction to OSI, TCP/IP, IBM, SNA, ATM. Bit oriented (BSC) & Character oriented Protocol (SDLC, LAPB, LAPD, LLC) HDLC- frame format, station, states, configuration, access control.

**LAN Topology** – Ethernet (IEEE 802.3), Token Bus (IEEE 802.4), Token Ring (IEEE 802.5)

**Introduction to WAN** – DQDB (IEEE 802.6) & FDDI.

**Switching Technologies** – Circuit, Message, and Packet.

X. 5, X.21, RS-232 C – frame format, channel, packet frames, facilities (In brief Only).

ISDN- D channel, B-Channel, International Standards, NT1, NT2, TA, TE Devices.

### **Module 5:**

**leased lines** : Introduction to leased lines, DSL, Digital Carriers.

**Bridging & Routing** :- Static & Dynamic (In Brief).

**IP addressing** : IP, IP addressing, ICMP, ARP, RARP.

Congestion Control, TCP, UDP.

HTTP, FTP, Telnet, SMTP.

**Data security** : Introduction to data security (private key, public key, ISO standards).

**Mobile technology** : Introduction to Mobile technology (Topology, FDM, TDM, CDMA),  
Satellite Communication (LEO, GEO, TDM).

### **Recommended Books:**

1. Data Communication & Networking, Forouzan, TMH
2. Computer Networks, Tannenbaum, PHI
3. Data & Computer Communications, Stallings, PHI

### **Reference Book:**

1. Communication Networks, Walrand, TMH
2. Computer Communication Networks, Shanmugam & Rajeev, ISTE/EXCEL
3. Data Communications, Prakash C. Gupta, PHI
4. Computer Networking, Tittel, Schaum Outline Series, TMH
5. Data & Network Communications, Miller, VIKAS
6. Data Communication & Network, Dr. Prasad, Wiley Dreamtech
7. Computer network Theory, Prasad, Scitech
8. TCP/IP Network Administration, Hunt, SPD/O'REILLY

**PAPER NAME: GRAPHICS AND MULTIMEDIA**

**PAPER CODE: MCA204**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA204				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Graphics and Multimedia				
	<b>Contents</b>				
	Basic concept of Graphics and Multimedia (CRT, raster scan, random scan, line drawing algorithms, circle drawing algorithm, clipping, rendering, shadowing etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge Xth standard geometry.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Know about graphics.
2. Know about multimedia.
3. Know about 2D and 3D images.
4. Learn how to implement graphics programs.

**Detailed Syllabus:**

**Module 1:**

**Introduction to Computer Graphics:** Application of Computer Graphics, Graphics Devices, Cathode Ray Tube, Raster Scanning, Raster Refresh graphics displays.

**Module 2:**

**Graphics Operations :** Graphics Operations –2D & 3D Graphics, Bezier, B-Spline, Hermite, Bresenham Line & Circle Drawing Algorithms, Polygon filling, Edge Filling Algorithms.

**Module 3:**

**Clipping :** Clipping—Cohen-Sutherland subdivision line clipping algorithm, Mid-Point subdivision algorithm, 2-dimensional clipping algorithm (Convex Boundaries & Partially visible lines), Cyrus-Beck algorithm for Partially & Totally Visible Lines) ,

**Visible Surfaces :** Visible Surfaces- Floating Horizon Algo. ,Upper& Lower Horizon, Roberts algo, Warnock algo, Scan-line Z-buffer algo.

**Module 4:**

**Rendering :** Rendering- introduction (illumination models), shading- Gouraud Shading, Phong Shading.

**Shadowing :** Shadowing- Shadow Algorithms  
Introduction to GKS.

**Module 5:**



**Multimedia :** Multimedia, concepts, design, hardware, standards – MPEG, JPEG, MIDI, multimedia design methodology, development and testing.

**Recommended Books:**

1. Computer Graphics, 2nd Ed., Hearn & Baker, PHI
2. Procedural & Mathematical Elements in Computer Graphics, Rogers, TMH
3. Computer Graphics, Plastock, Schaum Outline Series, TMH

**Reference Book:**

4. Engineering Graphics, K. Venugopal, New Age International
5. Computer Graphics, EXCEL BOOKS
6. Introduction to Computer Graphics, A. Mukherjee, VIKAS
7. Fundamentals of Computer Graphics & Multimedia, Mukherjee, PHI

**PAPER NAME: STATISTICS AND NUMERICAL TECHNIQUES**

**PAPER CODE: MCA205**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 4**

<b>Course Code</b>	MCA205				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Statistics and Numerical Techniques				
	<b>Contents</b>				
	Basic concept of Statistics and Numerical Techniques (etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	4	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standard mathematics.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

- 1 Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- 2 Apply numerical methods to obtain approximate solutions to mathematical problems.
- 3 Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- 4 Analyse and evaluate the accuracy of common numerical methods.
- 5 Implement numerical methods in Matlab.
- 6 Write efficient, well-documented Matlab code and present numerical results in an informative way.

**Detailed Syllabus:**

**Module 1:**

**Basic Statistics :** Basic Statistics-measure of central tendency, dispersion, Probability, distribution introduction to mass function, density function, distribution function (Binomial, Poisson, Normal), estimation of parameters (unbiasedness-concept of noise/error, consistency).

**Module 2:**

**Interpolation :** Interpolation-Newton's Forward, Backward, Sterling & Bessel's Interpolation formula, Lagrange's Interpolation.

**Integration :** Integration- Trapezoidal, Simpson's 1/3 rd, Weddel's Rule, Romberg Integration, Gauss-Legendre two & three point formula, Newton Cotes Formula.

**Module 3:**

**Orthogonalisation :** Gram-Schmidt orthogonalisation, Tchebycheff polynomial Solution of transcendental equations- Method of Iteration, Method of Bisection, Newton-Raphson Method, Regula-Falsi method, Secant Method.

**Module 4 :**

Linear equations Solution of system of linear equations- Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel, LU factorization, Tri-diagonalization, Inverse Interpolation.

**Module 5:**

Least Square Curve fitting- linear & non-linear

Solution of Differential Equations- Picard's method, Euler-modified method, Taylor's Series method, Runge-Kutta method, Milne's Predictor-Corrector method.

**Recommended Books:**

1. Numerical Analysis, Shastri, PHI
2. Numerical Analysis, S. Ali Mollah
3. Numerical Analysis, James B. Scarborough
4. Numerical Methods for Mathematics ,Science&Engg., Mathews, PHI

**Reference Book:**

1. Numerical Analysis, G.S.Rao, New Age International
2. Programmed Statistics (Questions – Answers), G.S.Rao, New Age International
3. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH
4. Computer Oriented Numerical Mathematics, N. Dutta, VIKAS
5. Numerical Methods, Arumugam, Scitech
6. Probability and Statistics for Engineers, Rao, Scitech
7. Numerical Methods in Computer Application, Wayse, EPH

**PAPER NAME: ESSENTIAL STUDIES FOR PROFESSIONALS - II**

**PAPER CODE: MCA(GS)201**

**CONTACT HOUR: 3L + 1T**

**CREDIT: 2**

<b>Course Code</b>	MCA(GS)201				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Essential Studies for Professionals - II				
	<b>Contents</b>				
	Basic concept of Essential Studies for Professionals - II (history, geography, economics, constitutions etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	3	1	-	2	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class Xth standard History, Geography, Economics, Constitutions.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn ideas of History.
2. Learn ideas of Geography.
3. Learn ideas of Economics.
4. Learn idea of Constitutions.

**Detailed Syllabus:**

**Module 1:**

**HISTORY-2**

1. Post Mauryan Empire: The Sungas, The Indo-greek, Sakas
2. Gupta Period: Chandragupta-I, Samudragupta, Chandragupta II, Kumargupta I, Skandagupta, Economic condition, land grants, caste system, position of women, education system
3. History of South India: Cholas, Chalukyas, Pallavas
4. Post Gupta period: Palas, Senas

**Module 2:**

**GEOGRAPHY**

**Physiographic Divisions of India**

1. The Himalayas: Greater Himalayas, Middle Himalayas, Shiwaliks
2. Northern Plains: Punjab plains, Ganga Brahmaputra plain
3. Deccan plateau
4. Coastal plains and islands: Western coastal plains, Eastern coastal plains, Lakshadweep islands, Andaman and Nicobar islands
5. Indian monsoon and climate: Factors affecting climate of India, Summer season, Local winds, S.W monsoon winds, Season of retreating monsoon, Winter Season and westerly disturbances, Vagaries of monsoon.

**Module 3:**

**ECONOMICS (MICRO)**

- 1) Production- Factors of production, fixed inputs, variable inputs, PPC, concept of TP, AP, MP, concept of revenue, AR, MR.
- 2) Cost- Concept of implicit & explicit cost, sunk cost, opportunity cost, shapes of

FC, AFC, AC, MC, VC, AVC. Relation between AR & MR, AC & MC.

3) Market structure- perfect competition, monopoly, oligopoly, duopoly, monopsony, duopsony, oligopsony.

#### **Module 4 :**

##### **CONSTITUTION**

1) Fundamental Rights- Concept & different articles, Right to equality, prohibition of discrimination on certain ground, Equality of opportunity, abolition of untouchability & titles, right to freedom, right to education, right against exploitation, right to freedom of religion, cultural & educational rights, different writes & scopes

2) DPSP- Classification of directive principle, sanctioned of directive principal, criticism, Distinction between fundamental rights & directive principle

3) Fundamental Duties, criticism, significance

4) Union Legislature, President, Vice President, Lok Sabha, Rajya Sabha, P.M., Speaker of Lok Sabha

5) State Legislature, CM & Governor. Legislative assembly and Legislative Council

#### **Recommended Books:**

History:

1. India's Ancient Past (Ancient History) : R.S. Sharma

2. History of medieval India (Medieval History): Satish Chandra  
History of Modern India (Modern History): Bipin Chandra

Geography:

1. India- Khullar

Economics:

1. Indian Economy- TATA McGraw  
Hill/Ramesh Singh

2. Indian Economy – Arihant

Constitution:

1. Indian Constitution- D.D. Basu

2. Our Constitution- Subhash.C. Kashyap

#### **Reference Book:**

History:

1. India's struggle for Independence (Modern History): Bipin Chandra

**PAPER NAME: DATABASE MANAGEMENT SYSTEM LABORATORY**

**PAPER CODE: MCA291**

**CONTACT HOUR: 3P**

**CREDIT: 3**

<b>Course Code</b>	MCA291				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Database Management System Laboratory				
	<b>Contents</b>				
	Basic concept of Database Management System Laboratory (etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	-	-	3	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standard mathematics and table creation.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to create a table.
2. Learn how to create database.
3. Learn how to apply logic for problems and choose best way to solve problem of database.
4. Enhance their database design skills.

**Content:**

- Study of commercial DBMS package (Oracle-latest version).
- Developing database application with Oracle,
- Creation of a database,
- Writing SQL queries
- Retrieving data.

**PAPER NAME: OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY**

**PAPER CODE: MCA292**

**CONTACT HOUR: 3P**

**CREDIT: 3**

<b>Course Code</b>	MCA292				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Object-Oriented Programming with Java Laboratory				
	<b>Contents</b>				
	Basic concept of Object-Oriented Programming with Java Laboratory (class, object, inheritance, polymorphism etc.)				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	-	-	3	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII standard mathematics and table creation.				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Learn how to create class and object.
2. Learn how to implement inheritance and polymorphism.
3. Learn how to write program in Java.
4. Enhance their skill for Multithreaded Programming, Applets, Event handling.

**Content:**

- Implementation of class, object, inheritance, polymorphism.
- Implementation of String and string buffer, Packages, Interfaces, Exception Handling.
- Implementation of Multithreaded Programming, Applets, Event handling.

**PAPER NAME: SKILL DEVELOPMENT FOR PROFESSIONALS - II**

**PAPER CODE: MCA(GS)281**

**CONTACT HOUR: 2T+1L**

**CREDIT: 1**

<b>Course Code</b>	MCA(GS)281				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Skill Development for Professionals - II				
	<b>Contents</b>				
	Basic concept of Skill Development for Professionals – II (history, geography, economics, constitution etc. )				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-II
	2	1	-	1	
<b>Pre-requisites (if any)</b>	Basic knowledge of Class XII history, geography, economics, constitutions.				

**Course Outcome (CO)**

At the end of the course, a student will be able to:

1. Learn about history.
2. Learn about geography.
3. Learn about economics.
4. Learn about constitution.

**Content:**

**Module -1**

Quantitative Numerical Aptitude-2

- 1) Average- Concept on average, different missing numbers in average estimation, shortcuts& their application.
- 2) Mixture & Allegation – Proportion & mixtures in percentages, populations & liquids, shortcuts& their application.
- 3) Number system- concept of different numbers, remainder theorem, factors.
- 4) Time & Work- Basic concept, Different problems & their shortcut tricks. Time& Speed & Tides- concept of speed, time & Distance, relative speed, formulae & their application. Upstream& Downstream, pipes & cistern.

**Module -2**

Objective English-2

1. Types of Adverbs & Application.
2. Types of Conjunctions & Application.
3. Fill in the blanks with Prepositions & Articles.
4. Present Tense & Usages.
5. Past & Future Tenses.

**Module-3**

Logical Mental ability -2

SYLLOGISM

- a) Logical Venn Diagram
- b) The If Else Statement

SEATING ARRANGEMENT



- a) Circular seating arrangement
- b) Square seating Arrangement
- c) Line Arrangement

#### **PUZZLES**

- a) Seating Arrangement
- b) Classification
- c) Seating Arrangement with Blood relations.

#### **Module-4**

Computer Proficiency: Advanced C programming.

#### **Recommended Books:**

Quantitative:

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA McGraw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON

Verbal Ability:

1. Objective English: Kiran Publication
2. General English: Arihant

#### **LOGICAL REASONING :**

1. Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication
2. A modern approach to verbal & non verbal Reasoning: R.S. Agarwal

**Paper Name: Operating Systems and Systems Software**

**Code: MCA301**

**Contacts: 3L + 1 TCredits: 3**

<b>Course Code</b>	MCA301				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Operating Systems and Systems Software				
<b>Scheme and Credits</b>	L	T	P	Credit	Semester-III
	3	1	-	3	
<b>Pre-requisites (if any)</b>	Basic knowledge of Data Structures and Computer Organization				

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,.
2. Analyze important algorithms eg. Process scheduling and memory management algorithms.
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques.
4. Demonstrate the ability to perform OS tasks

**Detailed Syllabus:**

**Module 1:**

**Importance of OS**-Basic concepts and terminology, types of OS, different views, journey of a command execution, design and implementation of OS

**Process**-Concept and views, OS view of processes, OS services for process management, scheduling algorithms, performance evaluation, Inter process communication and synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problem of concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks. Resource manager, file management, processor management, device management.

**Module 2:**

**Memory management** – paging, swapping, page replacement algorithm, and design issues for paging system, segmentation, and Scheduling algorithm and performance evaluation

**Security and protection-** policies and mechanism, authentication, protection and access control, formal models of protection, cryptography, worms and viruses.

### **Module 3:**

**In-process communication & synchronization-** File systems, security and protection mechanism, Input/output systems, processes and processors in distributed system  
Performance measurement, monitoring and evaluation.

**Multiprocessor system-** classification and types, OS functions and requirements, introduction to parallel computing, multi-processor inter connection synchronization.

### **Module 4:**

**Distributes OS-**rationales, algorithms for distributed processing.

**Introduction to compilers-** Assemblers, loaders & linkers, Introduction to OS, OS services and kernel, Multi programming and time sharing, Processor scheduling.

**Performance measurement and monitoring** – measures, evaluation techniques, bottlenecks and saturation, feedback loops. Introduction to Unix OS.

### **Recommended Books:**

1. Operating Systems, Galvin & Silverschatz, John Wiley
2. Operating Systems, Milenkovic, TMH
3. Modern Operating System, 2nd Ed, Tannenbaum, PHI

### **Reference Book:**

4. Systems Programming & Operating Systems, Dhamdhare, TMH
5. Systems Programming, Donovan, TMH
6. Guide to Operating Systems, Palmer, VIKAS
7. Operating Systems, Prasad, Scitech
8. Operating System ,P.Bhatt, PHI

**Paper Name: Data Science and Data Analytics**  
**Code: MCA302**  
**Contacts: 3L + 1T**  
**Credits: 4**

<b>Course Code</b>	MCA302			
<b>Category</b>	Master of Computer Applications			
<b>Course Title</b>	Data Science and Data Analytics			
	Contents			
	Introduction to Data Mining, Big Data Analytics			
<b>Scheme and Credits</b>		T	P	Credit
		1	-	4
<b>Pre-requisites (if any)</b>	Basics of statistics, vectors, matrices, and all the operations			

**Course Outcome (CO):**

1. Students will demonstrate proficiency with statistical analysis of data.
2. Students will develop the ability to build and assess data-based models.
3. Students will execute statistical analyses with professional statistical software.
4. Students will demonstrate skill in data management.
5. Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

**Detailed Syllabus:**

**Module 1:**

**Introduction to Data Management:** Brief idea about Data Warehousing, Architecture and Data Flows, Data pre-processing before analysis, Data preparation, OLAP & OLTP, Case study.

**Introduction to Data Mining:** Brief idea about Data Mining, It's goals and techniques, Architecture and KDD Process, Knowledge representation methods.

**Module 2:**

**Statistics and Analytics:** Data Visualization, Summarize and describe data sets using a measures such as Central tendency and variability, Learn probability, Central Limit Theorem and much more to draw inferences, Case study based on R Programming.

**Introduction to Big Data Analytics:** Understand the basic concepts of Big Data and Hadoop as processing platforms for Big Data, Managing Big Data - Learn and Use Hadoop Ecosystem tools for data ingestion, extraction and management. Introduction to Hive.

**Module 3:**

**Cloud Computing:** Introduction to Cloud Computing, types, services, applications, Security & research scope.

**Internet of Things:** Introduction to IOT and WSN, Basic concepts of Robotics Using Arduino & Raspberry Pi Programming.

**Introduction to NLP & AI:** Introduction to artificial intelligence, Brief idea about Natural Language Processing.

**Module 4:**

**Basic concepts of Machine Learning:** To implement linear regression, Data classification,

**Data clustering** - To learn how to create segments based on similarities using K-Means and Hierarchical clustering, Case study using Python.

**Basic concepts of Machine Learning:** To implement linear regression, Data classification, Data clustering - To learn how to create segments based on similarities using K-Means and Hierarchical clustering, Case study using Python.

**Applications of Machine Learning:** Time series, Decision trees, Support Vector Machine, Neural Networks, and Case Study Using MATLAB.

**Recommended Books:**

1. Data Mining: Concepts and Techniques by Jiawei Han and Micheline Kamber
2. Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain" by Amit Konar.
3. Big Data" by Anil Maheshwari.

**Reference Books:**

1. "Mastering Cloud Computing: Foundations and Applications Programming " by Raj KumarBuyya
2. "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" by L.Fausett

**Paper Name: UNIX and Shell Programming Paper**  
**Code: MCA303**  
**Contacts: 3L+1T**  
**Credits: 3**

Course Code	MCA303				
Category	Master of Computer Applications				
Course Title	Unix and Shell Programming				
Schemes and Credits	L	T	P	Credits	Semester-III
	3	1	-	3	
Pre-requisites (if any)	Basic idea about operating system, DOS related commands.				

**Course Outcome (CO):**

On completion of the course students will be able to

1. Understand the various concepts of UNIX and UNIX like operating systems.
2. Run basic commands to control the Unix like environment.
3. Applying shell programming skills to solve problems.
4. Acquire the knowledge of system administration and security of OS.
5. Learn basics about various applications of UNIX, LINUX like platforms.

**Module 1:**

**Getting Started** -The Operating System, The UNIX Operating System, Knowing your machine, A brief session, Conclusion,

**The File System** -The File, What's in a (File) Name, The Parent-Child relationship, The HOME variable: the home directory, Absolute path names, Relative path names, ls : listing directory contents, The UNIX file system

**Module 2:**

**Handling Ordinary Files ,Basic File Attributes**, The Shell's interpretive cycle, Pattern matching the wild card, Escaping and Quoting, /dev/null and /dev/tty: Two special files

**The Process** -Process basics, ps: process status, Mechanism of Process Creation, Internal and External Command, Running Jobs in Background

**More File Attributes** - File Systems and Inodes, Hard links, Symbolic links and ln

**Simple Filters** -The Sample Database,pr: paginating Files, head: Displaying the Beginning of a File, tail: Displaying the End of a File, cut: Slitting a File Vertically, paste: Pasting Files, sort: Ordering a File,uniq: Locate Repeated and Nonrepeated Lines,tr: Translating Characters.

### **Module 3:**

**Filters using Regular Expressions- grep and sed**-grep: Searching for a Patter, Basic Regular Expression, Extended Regular Expression (ERE) and egrep,sed: The Stream Editor, Line Addressing, Using Multiple Instructions (-e and -f), Context Addressing, Writing Selected Lines to a File (w)

**Essential Shell Programming** -Shell Scripts, read: Making Scripts Interactive, The Logical Operators && and ||, the if Condition, Using test and [] to Evaluate Expressions, The case Condition,expr, While, for.

### **Module 4:**

**Essential System Administration** root: The system administrator's login, The administrator's privileges, Maintaining security, User management, Startup and shutdown, Managing Disk Space, Device files,cpio, tar

**awk-An advanced filter** Simple awk filtering.

### **Recommended Books:**

1. UNIX-Concepts & Applications, Sumitava Das, TMH.
2. UNIX Shell Programming,Yashavant Kanetkar,BPB Publications.

### **Reference Books:**

1. Essentials Systems Administration, Frisch, SPD/O'REILLY.
2. Learning UNIX Operating System, Peek, SPD/O'REILLY

**Paper Name: Software Engineering & TQMPaper**

**Code: MCA304**

**Contacts: 3L+1T**

**Credits: 4**

Course Code	MCA304				
Category	Master in Computer Application				
Course Title	Software Engineering & TQM				
Schemes and Credits	L	T	P	Credits	Semester-III
	3	1	-	4	
Pre-requisites (if any)	Basic Programming Skills				

**Course Outcome (CO):**

1. Students will be able to decompose the given project in various phases of a lifecycle.
2. Students will be able to choose appropriate process model depending on the user requirements.
3. Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
4. Students will be able to know various processes used in all the phases of the product.
5. Students can apply the knowledge, techniques, and skills in the development of a software product.

**Module 1:**

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, specialized process models, The Unified process.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.



## **Module 2:**

Design Engineering: Design process and Design quality, Design concepts, the design model, pattern based software design. Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into software architecture. Modeling component-level design: Designing class-based components, conducting component-level design, object constraint language, designing conventional components. Performing User interface design: Golden rules, User interface analysis, and design, interface analysis, interface design steps, Design evaluation.

## **Module 3:**

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics: Software Quality, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality

## **Module 4:**

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan. Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

## **Recommended Books:**

1. Software Engineering, Rogers G.Pressman, MH
2. Fundamentals of Software Engineering, 2nd Ed., Ghezzi, PHI
3. Software Engineering, Pankaj Jalote, PHI
4. Classical and Object Oriented Software Engineering, Schach, TMH
5. Software Engineering: Principles & Practice, Van Vliet, SPD/JOHNWILEY

## **Reference Books:**

1. Software Engineering, K. K. Aggarwal & Yogesh Singh, New Age International
2. Software Engineering, Leon, VIKAS
3. Software Testing Fundamentals: Methods & Metrics, Marmie Hutcheson, And Wiley Dreamtech
4. Managing for Total Quality, Logothetis, PHI, TQM, J.Kiron, EPH

**Paper Name: Values and Ethics**

**Paper Code: MCA305**

**Contacts: 2L**

**Credits: 1**

Course Code	MCA305				
Category	Master of Computer Applications				
Course Title	Values and Ethics				
Schemes and Credits	L	T	P	Credits	Semester-III
	2	-	-	1	
Pre-requisites (if any)	NA				

**Course Outcome (CO):**

1. To create an awareness on Engineering Ethics and Human Values.
2. To instill Moral and Social Values and Loyalty
3. To appreciate the rights of others.
4. To create awareness on assessment of safety and risk

**Module 1:**

Science, Technology and Engineering as Knowledge and as Social and Professional Activities

**Module 2:**

**Effects of Technological Growth:**

Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of

growth; sustainable development

Energy Crisis; Renewable Energy Resources

Environmental degradation and pollution. Eco-friendly Technologies.

Environmental Regulations. Environmental Ethics

Appropriate Technology Movement of Schumacher: later developments

Technology and developing nations. Problems of Technology transfer.

Technology assessment, impact analysis

Human Operator in Engineering projects and industries. Problems of man machine interaction.

Impact of assembly line and automation.

Human centered Technology

**Module 3:**

**Ethics of Profession:**

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics.

Whistle blowing and beyond. Case studies.

**Module 4:**

**Profession and Human Values:**

Value Crisis in contemporary society

Nature of values: Value Spectrum of a 'good' life

Psychological values: Integrated personality; mental health

Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution

Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility

**Recommended Books:**

1. Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL
2. Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS

**Reference Books:**

1. Business Ethics, Pherwani, EPH
2. Ethics, Indian Ethos & Mgmt., Balachandran, Raja, Nair, Shroff Publishers

**Paper Name: Essential Studies for Professionals - III**

**Code: MCA (GS) 301**

**Contacts: 3L+1T**

**Credits: 2**

<b>Course Code</b>	MCA(GS)301				
<b>Category</b>	Master of Computer Applications				
<b>Course Title</b>	Essential Studies for Professionals - III				
<b>Schemes and Credits</b>	L	T	P	Credits	Semester-III
	3	1	-	2	
<b>Pre-requisites (if any)</b>	NA				

**Course Outcome(CO):**

At the end of the course, a student will be able to:

1. Know about ancient history.
2. Know about basic geography.
3. Know about basic economics.
4. Know about constitution.

**Module-1**

History-3:

Pre sultanate age: Md. Bipin Karim, Aluptagin, Sabuktagin, Sultan Mamud, Md. Ghori  
Delhi Sultanate: Slave dynasty, Khalji dynasty, Tughlaw dynasty, Sayyed dynasty, Lodhi dynasty  
Bhakti and Sufi movement: Kabir, Gurunanak, Chaitanya, Namdev  
Mughal Period: Babur, Humayun, Sher shah suri, Akbar, Jehangir, Shah Jahan,  
Aurangzeb, Administrative system, Din-i-ilahi, Art and architecture, Land revenue system

**Module-2**

**GEOGRAPHY**

1. Drainage system

- Types of river (Perennial, Non perennial, Inland drainage)
- Courses of river: Upper, Middle, Lower courses
- Landforms carved out by river based on the courses.
- Basic terminologies: Antecedent rivers, Consequent rivers, Fault guided river, Tributary, Distributary
- Indian river system (Himalayan, Peninsular, Coastal)

2. Types of Irrigation in India

- Well
- Tanks

### **Module-3**

#### **MACRO ECONOMICS**

- 1) National income- Concept of GDP, GNP, NNP both in FC & MP, PCI
- 2) Tax – Concept of TAX , objective of TAX, Direct & Indirect Tax, Progressive, Regressive & Proportional tax.
- 3) RBI & Banking- Traditional Functions of RBI, CRR, SLR, REPO, Reverse repo, MSF, LAF market, capital market, capital market, Money market, FOREX.
- 4) Budget- concept of budget, components of budget, different types of deficit
- 5) Keynesian outlook- IS, LM & different multipliers.
- 6) Inflation & Deflation- Inflation & its impact, Deflation & its impact, WPI, CPI, GDP deflator.

### **Module-4**

#### **CONSTITUTION-3(Advance)**

- 1) Central State relation, Interstate relation,
- 2) Supreme Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Ad-hoc Judge, Procedure of the court, writ jurisdiction, Power of Judicial review
- 3) High Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Adhoc Judge, Procedure of the court, writ jurisdiction, Power of Judicial review
- 4) Duties & Powers of Attorney & Advocate General in Brief
- 5) Panchayati Raj- Three tier system, Different committee's recommendation
- 6) Municipality, Municipal Council & Corporation, Official Languages & related Articles.

### **Reference Books:**

History: India's Ancient Past (Ancient History):

R.S.Sharma

History of medieval India (Medieval History):

Satish Chandra

History of Modern India (Modern History): Bipin Chandra

India's struggle for Independence (Modern History): Bipin Chandra

Geography:

India- Khullar

Economics:

Indian Economy- TATA McGraw Hill/Ramesh Singh

Indian Economy–Arihant

Constitution:

Indian Constitution- D.D.Basu

Our Constitution

Subhash.C.Kashyap

**Paper Name: Minor Project**

**Code: MCA391**

**Contacts: 12P**

**Credits: 6**

Course Code	MCA 391				
Category	Master of Computer Applications				
Course Title	Minor Project				
Schemes and Credits	L	T	P	Credits	Semester-III
	0	0	12	6	
Pre-requisites (if any)					

Students are supposed to submit a minor Research based project under the guidance of the faculty members.

**Paper Name: Data Science and Data Analytics Laboratory**

**Paper Code: MCA392**

**Contacts: 3P**

**Credits: 3**

Course Code	MCA 392				
Category	Master of Computer Applications				
Course Title	Data Science and Data Analytics Laboratory				
Schemes and Credits	L	T	P	Credits	Semester-III
	0	0	3	3	
Pre-requisites (if any)					

Lab complement to MCA302



**Paper Name: UNIX Laboratory**

**Code: MCA 393**

**Contacts: 3P**

**Credits: 3**

Course Code	MCA 393				
Category	Master of Computer Applications				
Course Title	Unix Laboratory				
Schemes and Credits	L	T	P	Credits	Semester-III
	0	0	3	3	
Pre-requisites (if any)					

Lab complement to MCA303

**Software Project Management Laboratory**

**Code: MCA394**

**Contacts: 3P**

**Credits: 3**

Course Code	MCA 394				
Category	Master of Computer Applications				
Course Title	Software Project Management Laboratory				
Schemes and Credits	L	T	P	Credits	Semester-III
	0	0	3	3	
Pre-requisites (if any)					

Lab to complement MCA304.

Exercises in using commercial CASE tool for software engineering practice. Using project management software using MS Project.

**Paper Name: Skill Development for Professionals–III**

**Paper Code: MCA (GS) 381**

**Contacts: 2L+1T**

**Credits: 1**

Course Code	MCA(GS)381				
Category	Master of Computer Applications				
Course Title	Skill Development for Professionals–III				
Schemes and Credits	L	T	P	Credits	Semester-III
	0	0	3	3	
Pre-requisites (if any)					

**Content:**

**Module-1**

Quantitative Numerical aptitude-3

- 1) Simple & Compound Interest- Basic concept of SI & CI, different formulas & their applications, concept of Growth & Contraction of Business.
- 2) Data Interpretation- Tables, pie chart, histogram, Bar chart, solution tricks & mtechniques.
- 3) Quant Review- Miscellaneous problems from different chapters & short cuts.
- 4) Indices & Surds- Basic concept, Formulae & their applications, Finding out the square roots, Elimination of Surds, Equation solve.
- 5) Quadratic Equation- polynomials, degree, powers, Equation & factors  
Solution. Progression- Concept of AP, GP & HP

**Module-2**

Objective English-3

1. Error based on Noun & Pronoun.
2. Error based on Adjective & Degree of comparison.
3. Error based on Adverb & Synonym And Antonym.
4. Error Based on Verbs & Some Special Phrasal Verbs.
5. Reading Comprehension Passage.

**Module-3**

Logical Mental Ability-3

- a)Statement And Assumption, b)Statement And Conclusion, c)Statement And Course Of Action, d)Cause And Effect, e)Drawing Inference

Machine Input-Output

- a) Pattern Based I/O

Inequality

a) Coded Inequality, b) Jumbled Inequality, c) Conditional inequality  
Calendar And Clock  
a) Miscellaneous Problems

#### **Module-4**

Computer proficiency: C programming, Basics of C++.

#### **Recommended Book :**

1. Numerical Aptitude Fastrack objective Arithmetic Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA McGraw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON Verbal Ability

#### **Reference Books:**

1. Objective English: Kiran Publication General English: Arihant LOGICAL REASONING
2. Analytical & Logical Reasoning: M.K. Pandey/B.S.C. Publication
3. A modern approach to verbal & non verbal Reasoning: R.S. Agarwal.

**Elective–I:****Paper Name:Distributed Database Management****Paper Code: MCA401A CONTACTS: 3L + 1 T****CREDITS: 3**

Course Code	MCA401A				
Category	Master of Computer Applications				
Course Title	Distributed database management				
Schemes and Credits	L	T	P	Credits	Semester-IV
	0	0	3	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. Understand distributed database systems architecture and design
2. Be able to apply methods and techniques for distributed query processing and optimization
3. Understand the broad concepts of distributed transaction process
4. Understand the basic concepts of Data warehousing and OLAP technology
5. Be able to apply methods and techniques for association analysis, data classification and clustering

**Detailed Syllabus:****Module 1:**

Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, replication. Distributed database design – fragmentation, allocation criteria.

Storage mechanisms. Translation of global queries. / Global query optimisation. Query execution and access plan. Concurrency control – 2 phases locks. Distributed deadlocks.

Time based and quorum based protocols. Comparison. Reliability- non-blocking commitment protocols.

### **Module 2:**

Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2 phase unit protocols. Architectural aspects. Node and link failure recoveries.

### **Module 3:**

Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled. Alternative architecture. Development tasks, Operation- global task management. Client server databases- SQL server, open database connectivity. Constructing an application.

### **Recommended Books:**

1. Database System Concepts, Silberschatz Korth, Sudarshan, MH
2. Database Management Systems, Ramakrishnan, MH

### **Reference Books:**

1. Beginning SQL Server 2000 programming, Dewson, SPD/WROX
2. Database Management Systems, Leon, VIKAS
3. My SQL :Enterprise Solutions, Alexender Pachev, Wiley Dreamtech

**Paper Name: Image Processing**

**Paper Code: MCA401B**

**CONTACTS: 3L + 1 T**

**CREDITS: 3**

Course Code	MCA401B				
Category	Master of Computer Applications				
Course Title	Image Processing				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study image restoration procedures.
4. To study the image compression procedures

**Detailed Syllabus**

**Module 1:**

**Introduction and Digital Image Fundamentals:** Digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Gray scale and Color images, image sampling and quantization

**Image enhancement in Spatial domain:** Basic gray level Transformations, Histogram Processing Techniques, Spatial Filtering, Low pass filtering, High pass filtering

**Module 2:**

**Filtering in the Frequency Domain:** Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering.

**Image Restoration and Reconstruction:** Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering

**Module 3:**

**Color Image Processing:** Color Fundamentals, Color Models, Pseudo color image processing

**Image Compression:** Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard

**Module 4:**

**Morphological Image Processing:** Erosion, dilation, opening, closing, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons

**Module 5:**

**Image Segmentation:** point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform

**Object Recognition and Case studies Object Recognition-** patterns and pattern classes, recognition based on decision – theoretic methods, structural methods, case studies – image analysis Application of Image processing in process industries

**Recommended Books:**

Digital Image Processing & Analysis, Chandra & Majumder,  
PHI Fundamentals of Digital Image Processing, Jain, PHI

**Reference Books:**

Image Processing, Analysis & Machine Vision, Sonka, VIKAS



**Paper Code: Parallel Programming**  
**Paper Code: MCA401C**  
**CONTACTS: 3L + 1 T**  
**CREDITS: 3**

Course Code	MCA401C				
Category	Master of Computer Applications				
Course Title	Parallel Programming				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

At the end of the course the students will be able to do following:

1. Understand the evolution of High Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents
2. Understand, appreciate and apply parallel and distributed algorithms in problem Solving.
3. Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
4. Gain hand-on experience with the agent-based and Internet-based parallel and distributed programming techniques.
5. Master skills to measure the performance of parallel and distributed programs.

**Detailed Syllabus:**

**Module 1:**

Processes and processors. Shared memory. Fork. Join constructs. Basic parallel programming techniques- loop splitting, spin locks, contention barriers and row conditions. Variations in splitting, self and indirect scheduling.

**Module 2:**

Data dependency-forward and backward block scheduling. Linear recurrence relations. Backward dependency.

**Module 3:**

Performance tuning overhead with number of processes, effective use of cache.

Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event timesimulation.

Parallel Programming constructs in HPF, FORTRAN 95. Parallel programming under Unix.

**Recommended Books:**

1. Parallel Computing, Quinn,TMH
2. Introduction to Parallel Processing ,SashiKumar,PHI
3. Elements of Parallel Computing, Rajaraman,PHI

**Reference Books**

1. Fundamentals of Parallel Processing, Jordan, PHI
2. Advanced Computer Architecture, Hwang, TMH

**Paper Name: Cloud Computing**

**Paper Code: MCA401D**

**CONTACTS: 3L + 1 T**

**CREDITS: 3**

Course Code	MCA401D				
Category	Master of Computer Applications				
Course Title	Cloud Computing				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. Understand the fundamental principles of distributed computing.
2. Understand how the distributed computing environments known as Grids can be built from lower level services.
3. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
4. Analyze the performance of Cloud Computing.
5. Understand the concept of Cloud Security. CO6: Learn the Concept of Cloud Infrastructure Model

**Detailed Syllabus:**

**Module 1:**

**Introduction:** Cloud computing definition, reference model, Characteristics, Benefits, Challenges, Distributed Systems, Virtualization, Service-oriented computing, Utility-oriented computing.

**Overview on computing platforms & technologies** – AWS, Google AppEngine, MS Azure, Hadoop, Salesforce.com, Manjrasoft Aneka

**Parallel & Distributed Computing:** Parallel vs. Distributed computing, Elements of parallel computing, Parallel processing - hardware architecture & approaches, Concept & Component of Distributed Computing, RPC, Service-oriented computing

## **Module 2:**

### **Virtualization:**

Cloud reference model – IaaS, PaaS, SaaS. Types of clouds – Public, Private, Hybrid, Community, Cloud interoperability & standards, scalability & fault tolerance, Security, trust & privacy Concurrent Computing, High-throughput Computing and Data-Intensive Computing:

## **Module 3**

Programming applications with Threads, Thread API, Parallel computation with Threads, Task computing, Frameworks for Task computing, Task-based application model, Data-intensive computing, characteristics, technology

**Cloud Platforms and Applications:** Overview on Amazon Web Services, Google AppEngine and Microsoft Azure, Cloud applications in scientific, business and consumer domain

### **Recommended Books:**

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill
2. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press

### **Reference Books:**

1. Aravind Doss, Cloud Computing, Tata McGraw Hill
2. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Learning

**Elective – II :**

**Paper Name: Compiler Design**

**Paper Code: MCA402A**

**CONTACTS: 3L + 1 T**

**CREDITS: 3**

Course Code	MCA402A				
Category	Master of Computer Applications				
Course Title	Compiler Design				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

At the end of course students will be able to:

1. Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
2. Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3. Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.
4. Use modern tools and technologies for designing new compiler.

**Detailed Syllabus:**

**Module 1:**

Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA Scanners. Top down parsing, LL grammars. Bottom up parsing.

**Module 2:**

Polishing expressions Operator precedence grammar. LR grammars. Comparison of parsing methods. Error handling.

**Module 3:**

Symbol table handling techniques. Organisation for non-block and block structured languages. Run time storage administration. Static and dynamic allocation. Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation. Code optimisation, folding, and redundant sub-expression evaluation.

Optimisation within iterative loops.

**Recommended Books:**

1. Compiler Design, Aho & Ullman
2. Compiler Design in C, Holub, PHI

**Paper Name: Mobile Computing**

**Paper Code: MCA402B**

**CONTACTS: 3L + 1 T**

**CREDITS: 3**

Course Code	MCA402B				
Category	Master of Computer Applications				
Course Title	Mobile Computing				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. Define mobile technologies in terms of hardware, software, and communications.
2. Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures.
3. Evaluate the effectiveness of different mobile computing frameworks.
4. Describe how mobile technology functions to enable other computing technologies.

**Detailed Syllabus:**

**Module 1:**

Introduction and Application of Mobile Computing

Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems, Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA; TORA: Fixed TORA, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TORA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access

**Module 2:**

CDMA: Spread Aloha multiple access

Telecommunication Systems: GSM: Mobile Services, System Architecture, radio

interface, Protocols, Localization and Calling, Handover, Security, New Data Services,

DECT, Systems Architecture Protocol Architecture:

TETRA I, UMTS and IMT-2000, UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode

### **Module 3:**

Satellite Systems: History, Applications, Basics: GEO, LEO, MEO, Routing, Localization. Handover

Examples: Broadcast Systems: Overview, Cyclic Repetition, Digital Audio; broadcasting: Multimedia object transfer Protocol; Digital Video broadcasting

Wireless LAN: Infrared vs. Radio Transmission, Infrastructure and Ad Hoc networks, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, Medium

Access Control Layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical Layer Channel access control. Sub layer, Medium Access control sub layer, Information bases and networking;

Bluetooth: User Scenarios, Physical Layer, MAC layer, Networking, Security, Link management. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model;

### **Module 4:**

Handover: Handover reference model, Handover requirements, Types of handover,

Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol.

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration,

### **Module 5**

Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.

Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile tcp, Fast retransmit/fast recovery, Transmission/time- out freezing, Selective retransmission, Transaction oriented TCP. Support for Mobility:

### **Module 6:**



File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that might help wireless access, System architectures;

Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language; WML script, Wireless telephony application, Examples "Stacks with WAP, Mobile databases, Mobile agents. Security and privacy aspects of Mobile

**Recommended Book:**

1. Jochen Schiller, Mobile Communications, 2nd Edition, Pearson
2. William Stallings, Wireless Communications and Networks, PHI

**Reference Books:**

1. Rappaport, Wireless Communications Principles and Practices , PHI
2. YI Bing Un , Wireless and Mobile Network Architectures, John Wiley

**Paper Name: Embedded Systems**

**Paper Code: MCA402C**

**CONTACTS: 3L+1T**

**CREDITS: 3**

Course Code	MCA402C				
Category	Master of Computer Applications				
Course Title	Embedded Systems				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

The student will be able to:

1. Understand the concept of embedded system, microcontroller, different components of microcontroller and their interactions.
2. Get familiarized with programming environment to develop embedded solutions.
3. Program ARM microcontroller to perform various tasks.
4. Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.

**Module 1:**

**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Relation between Microcontroller and Embedded System, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems

**Embedded processors:** Types of Embedded Processors, Microprocessors, Microcontrollers, DSP, Embedded Processors from Future Electronics, Applications for embedded processors, Choosing the Right Embedded Processor.

**Module 2:**

**Embedded Systems-** Application- and Domain- Specific: Washing Machine-Application Specific Example of Embedded System, Automotive- Domain Specific Example of Embedded System. Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Embedded Memories: Scratchpad Memories,

Cache Memories, Flash Memories, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators. Communication Interface: Onboard and External Communication Interfaces.

### **Module 3:**

**Embedded Firmware:** Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

**RTOS Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

### **Module 4:**

**Task Communication:** Shared Memory, Message Passing, Remote Procedure Call and Sockets,

**Task Synchronization:** Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

**Trends in Embedded Industry:** Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends

### **Recommended Books:**

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. Embedded Systems - Raj Kamal, TMH.
3. Introduction to Embedded Systems - Shibu K V, TMH

### **Reference Books:**

1. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer - David E. Simon, Pearson Education.

**Paper Name: Operation Research & Optimisation Techniques**

**Code: MCA403**

**CONTACTS: 3L + 1 T**

**CREDITS: 3**

Course Code	MCA403				
Category	Master of Computer Applications				
Course Title	Operation Research & Optimisation				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

At the end of this course students will be able to...

1. Formulate and obtain the optimal solution for Linear Programming problems.
2. Determine the optimal solution for Transportation problems.
3. Determine the optimal solution for Assignment problems.
4. Determine the best strategy and value of the given game model.

**Detailed Syllabus:**

**Module 1:**

Linear Programming-Simplex Method, Duality Method, Assignment Problem, Transportation Problem.

**Module 2**

Integer Programming-Cutting Plane, Branch & Bound Network Optimisation Models-The shortest path problem, Minimum Spanning Tree Algorithm, Maximal Flow Algorithms, PERT/CPM.

**Module 3**

Dynamic Programming-Characteristics, Deterministic & Probabilistic Dynamic Programming. Queuing Theory- Basic Structure, Exponential distribution, Birth-and-Death Model, M/M/IQueue.

**Module 4**

Game Theory-Two person Zero Sum game, saddle point determination, algebraic method, graphical method etc.

Inventory Control-Determination of EOQ , Components, Deterministic Continuous & Deterministic Periodic Review Models, Stochastic Continuous & Stochastic Periodic Review Models.

Sequencing-Two men two machines, Three Men Two Machines

**Recommended Book:**

1. Operation Research, Kanti Swaroop
2. Operation Research, V.K. Kapoor
3. Operation Research, Paneer Selvam, PHI
4. Operations Research, Hillier & Lieberman, TMH

**Reference Books:**

1. Operations Research, Kalavati, VIKAS
2. Operation Research, Humdy Taha, PHI
3. Statistics, Random Process & Queuing Theory, Prabha, Scitech
4. Operations Research, Vijayakumar, Scitech
5. Quantitative Techniques, Vol.1 & II, L.C. Jhamb, EPH

**Paper Name: Environment and Ecology**

**Paper Code: MCA404**

**CONTACTS: 3L**

**CREDITS: 3**

Course Code	MCA404				
Category	Master of Computer Applications				
Course Title	Environment and Ecology				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	0	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
2. Appreciate key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Appreciate that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.

**Module 1:**

Introduction, components of the environment, environmental degradation

Ecology: Elements of Ecology; Ecological balance and consequences of change, principles of environmental impact assessment

**Module 2:**

**Air Pollution and Control:** Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

**Water Pollution and Control:** Hydrosphere, natural water, pollutants: their origin and effects, river / lake / ground water pollution, standards and control.

### **Module 3:**

**Land Pollution:** Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes); their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

**Noise Pollution:** Sources, effects, standards and control.

### **Recommended Book**

1. Environmental Science, Cunningham, TMH
2. Environmental Science, Wright & Nebel, PHI
3. Fundamentals of Ecology, Dash, TMH
4. Environmental Pollution Control Engineering, C.S. Rao, New Age International
5. Environmental Pollution Analysis, S.N. Khopkar, New Age International

### **Reference Books:**

1. Environmental Management, N.K. Oberoi, EXCEL BOOKS
2. Environmental Management, Mukherjee, VIKAS
3. Ecosystem Principles & Sustainable Agriculture, Sithamparanathan, Scitech

**Paper Name: Management and Accounting**

**Paper Code: MCA405**

**Contacts: 2L**

**Credits: 2**

Course Code	MCA405				
Category	Master of Computer Applications				
Course Title	Management and Accounting				
Schemes and Credits	L	T	P	Credits	Semester-IV
	2	0	0	2	
Pre-requisites (if any)					

**Course Outcome (CO):**

1. Explain the application of management accounting and the various tools used
2. Make inter-firm and inter-period comparison, of financial statements
3. Analyse the financial statement using various ratios
4. Prepare Fund Flow Statement and Cash Flow Statement
5. Prepare different budgets for the business

**Detailed Syllabus**

**Module 1:**

Basics of management; Planning, scheduling, organising, staffing, directing, controlling  
Managerial economics and financial management, productivity management  
Human resource development and management, selection, training and role of IT

**Module 2:**

Introduction to management control systems: goals, strategies; Performance measures  
Strategy: firm and its environment, strategies and resources, industry structure and analysis,  
corporate strategies and its evaluation, strategies for growth and diversification, strategic planning

**Module 3:**

Financial accounting, financial statements and analysis  
Conceptual framework of cost accounting  
Cost-volume profit (CVP) relationship, budgeting, cost accumulation system, variable and  
absorption costing system  
Financial accounting computer packages



**Recommended Books:**

1. Essentials of Management, Koontz, TMH
2. Management: Text & Cases, Satya Raju, 2nd Ed, PHI
3. BO and Principles of Management, A. Roy, TMH
4. Mgmt. Text & Cases, V.S. P. Rao & Harikrishna, EXCEL BOOKS
5. Mgmt. Concept & Strategies, Chandan, VIKAS
6. Management Science, Rao, Scitech
7. Principal & Practice of Mgmt., Ghanekar, EPH
8. Principal & Practice of Mgmt, Amrita Singh, EPH
9. Management Accounting, Khan & Jain, TMH
10. Management Accounting, M.E. Thukaram Rao, New Age International

**Reference Books:**

1. Financial Accounting for Business Managers, Bhattacharyya, PHI
2. Management Accounting, I.M. Pande, VIKAS
3. Accounting and Financial management for MCA & MBA Students, Ramachandran, Scitech
4. Management Accounting for non-specialists, Atrill, PHI
5. Management Accounting, A.P. Rao, EPH

**Paper Name: Essential Studies for Professional - IV**

**Paper Code: MCA (GS) 401**

**Contacts: 3L +1T**

**Credits: 2**

Course Code	MCA(GS)401				
Category	Master of Computer Applications				
Course Title	Essential Studies for Professional - IV				
Schemes and Credits	L	T	P	Credits	Semester-IV
	3	1	0	3	
Pre-requisites (if any)					

**Course Outcome (CO):**

At the end of the course, a student will be able to:

1. Know about ancient history.
2. Know about basic geography.
3. Know about basic economics.
4. Know about constitution.

**Detailed Syllabus:**

**Module-1**

Indian Geography

1. Natural vegetation of India
2. Minerals and multipurpose river projects of India
3. Agriculture of India
  - Types of Agriculture (Intensive subsistence, Extensive subsistence, Mixed farming, Jhoom cultivation)
  - Types of crops (Rice, Wheat, Sugarcane, Pulses, Cotton, Jute, Tobacco)

**Module-2**

HISTORY

1. Socio cultural Changes: Introduction of western Education, Ram Mohan Roy and Bramho Samaj, Young Bengal movement, Arya samaj, Ramkrishna Mission, Aligarh movement, Vidyasagar
2. Revolt of 1857: Cause, Character, cause of failure, impact
3. Partition of Bengal: Cause, Swadeshi and Boycott, Newspaper

#### 4. Indian National congress

### **Module-3**

#### **INDIAN POLITY**

- 1) Election Commission- Related Articles, Power & Function & Provision of Election
- 2) Emergency Provisions- Related Articles, Conditions Application, Supreme power during emergency.
- 3) National Commission for SC/ST/OBC, Function of the commissions, Special offer & related articles for SC/ST/OBC
- 4) Different amendments of Indian Constitution & the related articles
- 5) Formation UPSC, Related Articles, Scope & Power, Duties of CAG, Formation SPSC, Related Articles, Scope & Power.

### **Module-4**

#### **Economics- (Indian Economy)**

- I. Indian Planning & NITI Aayog
- II. Indian Foreign trade and International organizations
- III. Balance of Payment and Balance of Trade.

### **Reference Books:**

#### **History:**

India's Ancient Past(Ancient History): R.S.Sharma

History of medieval India (Medieval History): Satish Chandra

History of Modern India (Modern History): Bipin Chandra

India's struggle for Independence (Modern History): Bipin Chandra

Geography: Savindra Singh, R.D Dixit

#### **Economics:**

Indian Economy- TATA McGraw

Hill/Ramesh Singh Indian

Economy–Arihant

Constitution: Indian

Constitution- D.D.Basu

Our Constitution-Subhash.C.Kashyap

**Paper Name: Major Project**

**Paper Code: MCA491**

**Contacts: 30P**

**Credits: 15**

Course Code	MCA491				
Category	Master of Computer Applications				
Course Title	Major Project				
Schemes and Credits	L	T	P	Credits	Semester-IV
	0	0	30	15	
Pre-requisites (if any)					

Students are supposed to submit a Research based project under the guidance of the faculty members.

**Paper Name: Skill Development for Professionals - IV**

**Paper Code: MCA (GS) 481**

**Contacts: 2L + 1T**

**Credits: 1**

Course Code	MCA(GS)481				
Category	Master of Computer Applications				
Course Title	Skill Development for Professionals - IV				
Schemes and Credits	L	T	P	Credits	Semester-IV
	2	1	0	1	
Pre-requisites (if any)					

**Contents:**

**Module-1**

Quantitative Numerical Aptitude -4 (advance)

- 1) Permutation & Combination.
- 2) Probability- basic concepts of probability , different theorems & applications, binomial, poison & normal Distributions.
- 3) Geometry- Concept of different shapes like triangle, quadrilateral, rectangle, square, circle etc. different theorems & their applications.
- 4) Mensuration- Formulae on triangles, square, Rhombus, parallelogram, sphere, circle, cone, pyramid etc, Application based problem solving. Coordinate Geometry- Locus, Straight lines, Circle etc

**Module-2**

Verbal English

1. Miscellaneous Corrections on Tense part 1.
2. Miscellaneous Corrections on Tense part 2.
3. Fill in the blanks ( Single Blank)
4. Miscellaneous Vocabulary

**Module-3**

1. Communication Develop Ment.
2. Personality Development.

**Module-4**

Problem Based learning on C&C++ **P**

**Recommended Books:**

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA McGraw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON