MCA Structure
Scheme of Instruction and Evaluation
I-VI Semester of MCA Programme
Choice Based Credit System
1st year MCA

Code No	Subject	Theory				Practical		
		Lecture Hrs/Week	Credit Theory	University Marks	Internal Evaluation	Hours/Week L/T	Credit Practical	Marks
	Semester – 1							
MCA 101	Problem Solving and Programming Using C	3	3	100	50	6	3	50
MCA 102	Computer Organization and Architecture	3	3	100	50	2	2	50
MCA 103	Business Information System	3	3	100	50			
MCA 104	Computer Oriented Numerical Methods	3	3	100	50			
MCA 105	Engineering Economics	3	3	100	50			
MCA 106	Business Communication	3	3	100	50	2	1	50
TOTAL		18	18	600	300	10	06	150
TOTAL Marks: 1050								
Total Credits: 24								

FIRST SEMESTER MCA SYLLABUS FOR ADMISSION BATCH 2016-17

Code No	Subject	Theory				Practical		
		Lecture Hrs/Week	Credit Theory	University Marks	Internal Evaluation	Hours/Week L/T	Credit Practical	Marks
	Semester – 2							
MCA 201	Data Structure using C	3	3	100	50	06	2	50
MCA 202	Object Oriented Programming using C ++	3	3	100	50	2	2	50
MCA 203	Operating systems	3	3	100	50	2	2	50
MCA 204	Principles and Practice of Management	3	3	100	50			
MCA 205	Green IT	3	3	100	50			
MCA 206	Mathematical Computing	3-1	3	100	50			
TOTAL		19	18	600	300	10	06	150
TOTAL Marks: 1050								
Total Credits: 24								

FIRST SEMESTER MCA SYLLABUS FOR ADMISSION BATCH 2016-17

Code No	Subject	Theory				Practical		
		Lecture Hrs/Week	Credit Theory	University Marks	Internal Evaluation	Hours/Week L/T	Credit Practical	Marks
	Semester – 3							
MCA 301	Design Analysis and Algorithms	3	3	100	50	2	2	50
MCA 302	Theory of Computation	3	3	100	50			
MCA 303	Computer Networks	3	3	100	50	2	2	50
MCA 304	Database Management Systems	3	3	100	50	2	2	50
MCA 305	Quantitative Techniques (OR & SM)	3	3	100	50			
MCA 306	Advance OS	3	3	100	50			
MCA 307	Minor Project					6	2	100
TOTAL		18	18	600	300	14	08	250
TOTAL Marks: 1150								
Total Credits: 26								

FIRST SEMESTER MCA SYLLABUS FOR ADMISSION BATCH 2016-17

Code No	Subject	Theory				Practical		
		Lecture Hrs/Week	Credit Theory	University Marks	Internal Evaluation	Hours/Week L/T	Credit Practical	Marks
	Semester – 4							
MCA 401	Programming with Java	3	3	100	50	2	2	50
MCA 402	Computer Graphics and Multimedia	3	3	100	50	2	1	50
MCA 403	Software Engineering	3	3	100	50	2	1	50
MCA 404	Compiler Design and Language Processor	3	3	100	50	2	1	50
MCA 405	Personality and Soft Skill Development					6	2	150
MCA 406	Elective I	3	3	100	50			
MCA 407	Group Discussion/Seminar					4	2	100
TOTAL		15	15	500	250	16	09	400
TOTAL Marks: 1200								
Total Credits: 24								

FIRST SEMESTER MCA SYLLABUS FOR ADMISSION BATCH 2016-17

Code No	Subject	Theory				Practical		
		Lecture Hrs/Week	Credit Theory	University Marks	Internal Evaluation	Hours/Week L/T	Credit Practical	Marks
	Semester – 5							
MCA 501	Artificial Intelligence and Expert System	3	3	100	50	2	1	50
MCA 502	Object Oriented Analysis and Design with UML	3	3	100	50	2	1	50
MCA 503	Internet Technology and Enterprise Java	3	3	100	50	2	1	50
MCA 504	**Elective II**	3	3	100	50			
MCA 505	**Elective III**	3	3	100	50			
MCA 506	**Elective IV (Open)**	3	3	100	50			
MCA 507	Professional Ethics	2-1	2	100	50			
MCA 508	Minor In-house Project and Viva					6	3	150
MCA 509	Summer Internship Evaluation					0	2	100
TOTAL		21	20	700	350	12	08	700
TOTAL Marks: 1750								
Total Credits: 28								

Sixth Semester						
	Training cum Project				Evaluation Scheme	
Code	**Course Name**	**Hours/week L/T**	**Credit Theory**	**Total Marks**		**Marks**
MCA 601	Industrial Training cum Project/ Entrepreneurship Training cum Project	30	20	1000	Evaluation by the Industry	500
					Evaluation by the Institute (Report & Institute Viva)	500
Total		30	20	1000		1000
Total Marks:1000						
Total Credits:20						

Elective – I (Choose any one)

1. MCA 406A: **Embedded System**
2. MCA 406B: **Data Mining and Analysis/ Data Mining Techniques**
3. MCA 406C: **Wireless Communication and Mobile Computing**
4. MCA 406D: **ERP and E-commerce**
5. MCA 406E: **PHP and My SQL**

Elective – II (Choose any one)

1. MCA 504A: **Cryptography and Cyber Law**
2. MCA 504B: **Business Analytics and Big Data**
3. MCA 504C: **Cloud Computing**
4. MCA 504D: **Information Security and Management**
5. MCA 504E: **Dot Net Programming**

Elective – III (Choose any one)

1. MCA 505A: **Distributed System/ Distributed technology**
2. MCA 505B: **Parallel Computing**
3. MCA 505C: **Soft Computing**
4. MCA 505D: **Foundations of Statistical Natural Processing(NLP)**
5. MCA505E: **Microprocessor and Assembly Level Language Programming**

Elective – IV (Open - Choose any one)

1. MCA 506A: **Mobile Application Development**
2. MCA 506B: **Software Testing**
3. MCA 506C: **Open Source Technology**
4. MCA 506D: **E-Governance and Practice**
5. MCA506E: **Internet of Things**
6. MCA506F: **Entrepreneurship Development**
7. MCA507G: **Marketing Management**
8. MCA508H: **Environmental Engineering**

Note- Minimum Pass Mark from Industry Evaluation is 300 (i.e. 60%).

Distribution of Credit Semester wise:

Semester	Credit
First	24
Second	24
Third	26
Fourth	24
Fifth	28
Sixth	20
Total	14

Internal Evaluation Scheme

Assignment	05
Surprise Test	05
Quiz	10
Class Test I & II	30
Total	50
Class Test Time(Hrs.): 1	

Pass Mark in Internal is 50% of total marks i.e. 25

External Evaluation Scheme

University Semester Examination of 3 Hours duration.

Pass mark will be 35% which means students have to score 35 out of 100.

Practical/Sessional Evaluation Scheme

Pass mark will be 50% which means students have to score 25 out of 50.

Evaluation Scheme

Daily Performance -10

Lab Record - 10

Lab Quiz - 05

Final Experiments & Viva – 25

Total=50

1st Semester MCA

MCA 101. PROBLEM SOLVING AND PROGRAMMING USING C

Module 1 (10 hours)

Introduction to Computers: Basic Organization of a Computer, Number System, Conversion.
Programming Basics: Algorithm, Flowchart, Structured Programming Approach,Structure of a C Program, Compiling, Linking and Executing Programs.
C Language Fundamentals: Character Set, Key Words, Identifiers, Data Types, Variables and Constants, Operators, Expressions, Type Conversions, Statements, Managing Console Input and Output Operations.
Control Structures: Decision Making and Branching - If and Switch, Loop Structures - While, Do While and For, Unconditional Jumps - Continue, Break and Go To.

Module 2 (10 hours)

Arrays: Concept, Declaration and Manipulation of Arrays, One Dimensional, Multidimensional Array and their Applications.
Strings: Concept of Strings, String Handling Functions, Array of Strings.
Pointers: Pointer Variable and its Importance, Dereferencing, Pointer Arithmetic and Scale Factor, Pointers and Arrays, Pointer and Strings, Array of Pointers, Pointers to Pointers.
Functions: Designing Structured Programs, User Defined and Standard Functions, Formal and Actual Arguments, Function Prototype, Parameter Passing, Functions Returning Multiple Values, Functions Returning Pointers, Pointers to Functions, Nesting of Functions, Recursion, Passing Arrays to Functions.
Scope and Extent: Scope Rules, Storage Classes - Auto, Extern, Register and Static.

Module 3 (10 hours)

Structures, Unions and Enumerations: Declaration and Initialization of Structures, Structure as Function Parameters, Structure Pointers, Unions, Enumerations.

Module 4 (10 Hours)

File Input and Output: Defining, Opening a File and Closing a File, Input/output Operations in Files, Random Access to Files, Error Handling.
Command Line Arguments, Dynamic Memory Management, Pre-Processor Directives.
Graphics using C programming.

Module 5 (6 Hours)(as per choice of faculty) Graphics using C.

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text Book:

1. PradipDey, ManasGhosh, “Programming in C”, First Edition,OxfordUniversity Press, 2011.
2. E. Balagurusamy, “Programming in ANSI C”, 4th edition, 2007, McGraw-Hill Publication, New Delhi.
3. Brian W. Kernighan, Dennis Ritchie, “The C Programming Language” (2nd Edition), 1988, Prentice Hall.
4. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

Reference Books:

1. K.R. Venugopal, S.R. Prasad, “Mastering C”, McGraw-Hill Education India.
2. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Second Edition, Tata McGrawHill,2006.
3. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley(India) Pvt. Ltd., Pearson Education in South Asia, 2011.

MCA 102 COMPUTER ORGANIZATIONS AND ARCHITECTURE

Module 1 (10 Hours)

Introduction: Basic architecture of computer, Functional units, Operational concepts, Bus structures, Von Neumann Concept.

Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction Cycle & Execution Cycle, Instruction format, Addressing modes, Micro instruction, Data path and control path design, Micro programmed vs. Hardwired controlled unit, RISC vs. CISC.

Arithmetic: Design of ALU, Binary arithmetic, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic.

Digital Electronics: Boolean algebra, Digital Logic, Truth Tables, K map, Number system, Flip - Flop

Module 2 (10 Hours)

Memory: Memory Hierarchy, RAM, ROM, Cache memory organization, Mapping techniques, Virtual memory, Memory Interleaving, Secondary Storage, Flash drives.

Module 3(10 Hours)

Input/output: Accessing I/O devices, I/O mapped I/O, Programmed I/O, Memory Mapped I/O, Interrupt Driven I/O, Standard I/O interfaces, Synchronous and Asynchronous Data transfer, DMA data transfer.

Introduction to Parallel processing: Flynn's Classification, Pipelining, Super Scalar processors, Array processing, vector processing.

Module 4 (10 Hours)

8085 Microprocessor and Assembly level Programming using 8085 microprocessor

Module 5 (6 hours)(as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text Books:

1. Mano.M. "Computer System and Architecture" (3rd Ed) (PHI).
2. Computer Architecture by Hwang and Briggs. (MGH).
3. Fundamentals of Computer Organisation by M V L N Raja Rao; Scitech publ.
4. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "ComputerOrganization", 5th Edition, McGraw-Hill Education India

Reference Books:

1. William Stalling,"Computer Organization and Architecture", Pearson Education
2. J. P. Hayes, "Computer Architecture and Organization",MGH
3. A.S. Tananbaum, "Structured Computer Organization", Pearson Education

MCA 103 BUSINESS INFORMATION SYSTEM

This course will give a high level understanding of what information is, what business is and how information is key to successful execution of a business. It will help understanding the evolution of information system from a traditional way of dealing with information to a level how information is a business enabler. It also covers the tools and techniques deployed to expedite the information processing and controlled dissemination of information.

Module 1(10 Hours)
Introduction to Business Information System: What is information and what is Business. Why information System, perspectives of information system, contemporary approaches to information system, Learning to use information system- key management issues.

Module 2 (10 Hours)
Information System in the enterprise: Major types of information system, systems from a functional perspective, integrating functions and business processes, Management opportunities, Challenges and Solutions

Module 3 (10 Hours)
Information systems, organizations, management and strategy: Organizations and information systems, how information system impact organizations and business firms, impact of IT on management decision making, management information system and business strategy, management opportunities challenges and solutions

Module 4(10 Hours)
The digital farm: Electronic Business and electronic commerce and digital farm, e-Commerce, e-Business and digital farm, management opportunities, challenges and solutions, ethical and social issues in digital farm, ethics in an information society, moral dimensions of information system.
IT infrastructure and Platforms: IT infrastructure, infrastructure component, contemporary hardware platform trend, contemporary software platform trends, organizing data in a traditional file environment, database approach to data management, Telecommunications, network and the internet, contemporary networking infrastructure, Internet, social media.

Module 5 (6 Hours) (as per choice of faculty)
Portion covered can be tested through Internal evaluation only not to be included in University examination)
MS Suit of products (Excel, Access, Power-point) covering information extraction using Scenarios, Pivot, Macros. Animated presentations, small scale database design and reporting.

References
1. Management Information Systems by Kenneth C Laudon- Prentice Hall.
2. Business Information Systems by Robert C Nickerson, Prentice Hall

MCA 104 COMPUTER ORIENTED NUMERICAL METHODS

Module 1(10 Hours)
Computing Arithmetic, Significant Digits and Numerical Instability, Root finding methods-Bisection, Newton Raphson, Secant and RegulaFalsi, methods for multiple roots.

Module 2 (10 Hours)
System of Linear Algebraic Equations and Eigenvalue problems-Gauss Elimination, LU Decomposition- Jacobi-Gauss-Seidel and SOR methods, Interpolation and Approximation-spline approximation- Linear, quadratic and Cubic,

Module 3 (10 Hours)
Differentiation and Integration-Richardson's extrapolation, Gauss Quadrature methods, ordinary differential equations-Initial and Boundary Value Problems, introduction to numerical solutions of Partial Differential Equations.

Module 4 (10 Hours)
Flowchart and Algorithms and programming in C implementations.

Module 5 (06 Hours)
(as per choice of faculty)
Portion covered can be tested through Internal evaluation only not to be included in University examination)

References:

1. Numerical Methods for Scientific and Engineering Computation by M.K. Jain, SRK Iyengar and R.K.Jain
2. Numerical Methods for Engineers by S.C. Chopra and Raymond P. Canale
3. Introductory Methods of Numerical Analysis by Sastry
4. Numerical Analysis by E.W. Cheney and D.R.Kincaid

MCA 105 ENGINEERING ECONOMICS

Module 1 (8 Hours)
Introduction to Economics: definition, scope and nature of economics, consumption laws, demand & supply analysis, elasticity of demand, indifference curve analysis, consumer surplus and its application.

Module 2 (10 Hours)
Production : factors of production, production function, law of variable proportion, laws of return to scale, elasticity of factor-substitution, optimal combination of factor-inputs, production efficiency, economies of scales,
Cost of Production: types of costs, economic costs: fixed cost and variable costs, Average and Marginal costs, short-run and long-run cost functions.

Module 3 (10 Hours)
Market Structure: pure competition, perfect competition, imperfect market, monopoly and oligopoly. Indian Banking System, Functions and Roles of Commercial Banks and Reserve Bank of India.

Module 4 (12 Hours)
Foundations of Engineering Economics, Time value of money and interest formulae, Nominal and effective rate of interest, Present, Annual and Future worth analysis, Rate of Return Analysis, Cost-Benefit analysis in Public sector projects.
Module 5 (06 Hours)(as per choice of faculty)
Portion covered can be tested through Internal evaluation only not to be included in University examination)

References:

1. Koutsoyiannis, A., 'Modern Microeconomics', English Language Book Society, Macmillan.
2. Pindyck, R S, Rubinfeld, D L &Mehta , 'Microeconomics', 6 th Edition, Pearson Education India.
3. Varian, H R, 'Intermediate Microeconomics', 7th edition, East West Press India.
4. Samuelson, Paul A, 'Economics', 5th edition, McGraw Hill New York.
5. Basics of Engineering Economy; Leland Blank and Anthony Tarquin, TMH
6. Contemporary Engineering Economics, Chan. S Park, Pearson
7. Engineering Economics, Paneerselvam, PHI
8. Engineering Economics; Sasmita Mishra, PHI

MCA 106 BUSINESS COMMUNICATION

Objectives:
To develop communication skills and soft skills of students
To enhance the ability of students to participate in group discussions and personal interviews

Module 1 (10 Hours)
Introduction to Business Communication: Meaning, importance, the process of communication, principles of communication, verbal and non-verbal communication, barriers to communication, channels of communication, cross cultural communication.Difference between Professional and General communication.

Module 2 (10 Hours)
Functional Grammar: Verbs, Tense, Voices, Negation and interrogation, conditionals, concord, phrasal verbs, direct and indirect speech, Elimination of common errors.

Module 3 (10 Hours)
Paragraph Writing, Business Letters, Job Application Letters, Resume
Reports – Types, Format, Choice of Vocabulary, Coherence and Cohesion
Proposals: Purpose, Characteristics, Types, Structure

Module 4 (10 Hours)
Oral Presentations, Interviews, Group discussion, Soft Skills, Business Etiquette
Module 5 (06 Hours)(as per choice of faculty)
Portion covered can be tested through Internal evaluation only not to be included in University examination)

Value-based Text Reading:

A. Study of the following essays from the text book with emphasis on writing skills:
   1. Man and His Environment by Robert Arvill
   2. The Language of Literature and Science by Aldous Huxley
   3. Humanistic and Scientific Approach to Human Activityn by Moody E Prior
   4. Gods in this Godless Universe by Bertrand Russell
   5. Religion- An Inevitable Part of Human Life by J Milton Yinger

B. Readings of selected short stories:
   1. The Renunciation by Rabindranath Tagore
   2. The Lament, by Anton P. Chekhov
   3. The Barber's Trade Union by Mulk Raj Anand
   4. The Eyes Are Not Here by Ruskin Bond

Text Books:

1. Business Communication Today; Bovee et al, Pearson
2. Business Communication, Meenakshi Raman and Prakash Singh, Oxford
3. Improve Your Writing' ed. By V N Arora and Laxmi Chandra, Oxford University Press, New Delhi
4. Technical Communication- Principles and Practices' by M R S Sharma, Oxford University Press, New Delhi.

Practical

MCA 101 PROGRAMMING IN C LABORATORY

1. Find Area, Perimeter of Square & Rectangle.
2. Find max. Among 3 nos.
3. Check leap year
4. Factorial of Number
5. Calculate a b
6. Prime Number.
7. Perfect Number.
8. Armstrong Number.
9. Floyd's Triangle
10. Fibonacci Series
11. Inter conversion of Decimal, Binary & Hexadecimal no.
12. LCM & GCD of numbers
13. Insert & Delete an element at given location in array.
14. Transpose of matrices
15. Multiplication of matrices
16. Display upper & lower diagonal of matrices
17. Array of Structure e.g. student result, Employee pay slip , Phone bill
18. Function with no parameter & no return values
19. Function with parameter & return values
20. Function with parameter & no return values
21. Function with call by reference
22. Recursion function e.g. sum of digit, reverse of digit
23. String manipulation function e.g. string copy, concatenation, compare, stringlength, reverse
24. Pointer Arithmetic
25. File handling e.g. Read / Write file, copy file, merging file
26. Random access of file
27. File handling with command line arguments
28. Drawing line, rectangle, circle, ellipse by using graph
29. Changing foreground/ background color
30. Changing color & font of text
31. Swapping of numbers by using bit wise operator.
32. Macro expansion
33. File Inclusion
34. IO interfacing & Device Driver using C.
35. Graphics using C

MCA 102 COMPUTER ORGANIZATIONS AND ARCHITECTURE (LAB)

I–CYCLE: DigitalLogicDesignExperiments:

1. Multiplexers & Decoders
2. Counters
3. Shift Registers
4 Binary Adders&Subtractors
5 A L U

II–CYCLE: 8085AssemblyLanguageProgramming:

1. 8085AssemblyLanguageProgrammingaccordingtotheorycourse microprocessors-usingthefollowingtrainers:KeyboardMonitorof8085µPTrainer.SerialMonitorof8085µPTrainerwithTerminal
8085LineAssemblerof8085µPTrainerwithPCasTerminal8085CrossAssemblerusingIn-CircuitEmulator(ICE)with8085µPTrainerandPCasTerminalGradedProblemsaretobeusedaccordingtothesyllabusof

2. COMPUTER ORGANIZATION

PentiumclassPCarchitecturefamiliarizationhardware&softwarepartsdemonstration, Troubleshooting of PC,Laptops, Server and Loading of Operating System, Antivirus and other software packages

MCA 106 BUSINESS COMMUNICATION LABORATORY

Describe the communication process and the major types of written, verbal, and nonverbal communications used in business and professional communication.
Demonstrate the ability to compose a letter or memo using clear, concise language as required for a defined audience.
Demonstrate the ability to communicate a variety of types of business messages that may include good news, unfavorable news, persuasive messages, sales messages, or general information.
Compose business reports or proposals that demonstrate the ability to gather, organize, and present information.
Demonstrate the ability to prepare and deliver an oral business presentation in a clear, confident, and effective manner, with visual aids (if needed).
Discuss the interpersonal communication skills needed to build interpersonal cooperation in the business environment including meetings and work teams.
Discuss the communication principles and processes that improve the effectiveness of an organization’s communication climate.
Describe strategies for communicating across cultures.

COURSE/LAB OUTLINE

1. Understanding business communication
2. Work-team communication
3. Communication technology
4. Developing business writing skills
5. Writing basic correspondence (routine, persuasive, and bad-news messages)
6. Report writing
7. Oral and employment communication

MCA 201 Data Structure using C

Module 1 (10 hours)

Fundamentals: Introduction to Data Structures, Classification of Data Structures, Algorithms, Measuring Space and Time Complexities, Asymptotic Notations, Abstract Data Types.
Arrays: Storage Structures for Arrays, Sparse Matrixes, Strings, Pattern Matching.
Linked Lists: Dynamic Memory Management, Single Linked Lists, Double Linked Lists, Circular Linked Lists, Operations on Polynomials.
Stacks and Queues: Representation, Linked Stacks and Queues, Operations on Stacks and Queues, Applications of Stack and Queues.

Module 2 (10 hours)

Trees: Terminology, Representation, Binary Trees, Binary Search Trees, Searching, Insertion and Deletions Operations in a Binary Search Tree, Height Balanced Trees, M-way Search Trees, B-Trees, B+ Trees, General Trees, Representation of General Trees and Binary Trees, Forests, Application of Trees.

Module 3 (10 hours)

Graphs: Terminology, Representation, Path Matrix, Graph Traversal, Shortest Path Problems, Topological Sort.
Searching and Sorting Techniques: Linear and Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap and Heap Sort, Radix Sort, Comparison of Sorting Techniques.

Module 4 (10 Hours)

Hashing: Hash Functions and Hashing Techniques. External sorting, Implementation using programming in C.

Module 5 (06 Hours)(as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text Book

1. Data Structures Using C - Aaron M. Tenenbaum
2. Tremblay, Jean-Paul, and Paul G. Sorenson, "An introduction to data structures with applications", McGraw-Hill, Inc., 1984.

Reference Books

1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, 2008, Universities Press Pvt. Ltd. Hyderabad.
2. Seymour, Lipchitz. “Data Structures with C.”TMH (2010).

MCA 202 Object Oriented Programming using C++

Module I (12 Hours)

Fundamentals of object oriented programming: Introduction to Object Oriented Paradigm, procedural Paradigm, An overview of classes, objects and Methods, inheritance and polymorphism

Basic OF C++: Structure of c++ program, data types and declaration, Expressions and operator precedence, Program flow control, functions, scope of variables, Inline functions and default arguments, dynamical location new and delete operators.

Module II (12 Hours)

Classes as objects, user defined data types, constructors & destructors, controlling and accessibility, class members, member functions, Friend functions, this pointer, static and const member functions.

inheritance: Derived classes, syntax of derived classes, Types of Inheritance, Virtual Functions and Virtual Base Classes.

Adhoc Poly morphism: Overloading and Function selection, Friend Functions, overloading operators such as assignment subscripting, I/O, pointer to class member, new and delete.

Module III (16 Hours)

Templates: Introduction algorithms, sequence containers, iterators, specialized iterators, associative containers, strong user-defined object, function objects. Generic Classes, Class Templates, Function Templates Parameterizing Vectors, STL, Containers, Iterators, Function Adapters, String Library

Exceptions: Using assert signal. throwing exceptions, Try Blocks, handlers, Exception specification, standard exceptions and uses.

I/O streams: Output and Input class streams, Ostream, Istream, File handling, using strings as streams

Module 4 (10 Hours)

Pointer : Addresses and pointers. The address of operator and pointer and arrays. Pointer and Function pointer and C++ types string. Memory management : New and Delete, pointers to objects, debugging pointers.

Module 5 (6 Hours) (as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

TEXTBOOKS

1.ObjectOrientedProgrammingusingC++,IraPohl,PEARSONEDUCATION

2.ObjectOrientedProgramminginC++,RobertLafore

3.UMLin21Days,Tech Media

MCA 203 Operating Systems

Module 1 (10 Hours)

Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

Module 2 (10 Hours)

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

Module 3 (10 Hours)

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance. Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Module 4 (10 Hours)

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. I/O Management – I/O software and its types, Disk Scheduling. Shell Programming: Concept of shell, Types of shell, Editors for shell programming (e.g. vi), basics of Shell programming. Case Study- UNIX, LINUX, and Windows NT.

Module 5 (6 Hours)(as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text Books

1. Silberschatz& Galvin: Operating System Concept, Wiley, Latest Edition.

2. Milan Milenkovic: Operating Systems, Tata McGraw – Hill, Latest Edition.

3. William Stallings: Operating Systems, PHI, Latest Edition.

Reference Books

1. YashawantKanetkar: Unix Shell Programming, BPB.
2. A.S. Tanenbaum: Modern Operating Systems, latest edition Pearson/PHI.
3. Dhamdhere: Operating Systems, Tata McGraw Hill.
4. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time

MCA 204 Principles and Practices of Management

Module 1(10 Hours)

Nature and functions of Management: What Managers do? Definition, Management as a Science, Art, Profession, Levels of Managers, Management Process, Skills of Managers, Role of Managers. Scientific Management Theory (Taylo*r)*, Administrative Management Theory (Fayol), BehaviouristicsManagement (Mayo). Systems Theory, Contingency Management theory..

Module 2 (10 Hours)

Planning Nature and Purpose of Planning, The Planning Process, Principles of Planning, Types of Planning, Advantages and Limitations of Planning and Steps to make it effective.

Organizing: Nature and Purpose of Organizing, Key components of organizing, Bases of Departmentation, Span of Management and its determinants, Line and Staff Relationship, Line-Staff Conflict, Bases of Delegation, Kinds of Delegation and Decentralization.

Module 3 (10 Hours)

Staffing: Importance, manpower planning, Recruitment and selection, Training and Development, Performance appraisal

Leadership: Different sources of power, Management and leadership Approaches to leadership and styles.

Module 4 (10 Hours)

Controlling: Concept and Process of Control, Control Techniques, Human Aspects of Control, Control as a Feedback System, Feed Forward Control, Preventive Control, Profit and Loss Control, Control Through Return on Investment, The Use of Computer for Controlling and Decision Making, The Challenges Created by IT as a Control Tool. Decision Making Process, Individual Decision Making Models.

Module 5 (6 Hours) (as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Reference Books:

1. Stephen P. Robbins, David A. Decenzo, Sanghmitra Bhattacharya, Madhushree Nanda Agarwal, Fundamentals of Management, Pearson Education, 2009
2. Kreitner, Management Theory and Applications, CengageLearning,India, 2009
3. Robbins, Management, 9th edition Pearson Education, 2008,
4. Griffin, Management Principles and Applications, CengageLearning,India First Edition
5. Harold Koontz, O'Donnell and Heinz Weihrich, Essentials of Management. New Delhi, Tata McGraw Hill, 2006
6. Stoner, Management, PHI Learning, 2008
7. Richard L. Daft, Principles Of Management, Cengage Learning,India, 2009
8. Principles of Management, Meenakshi Gupta, PHI
9. Principles of Management, RN Gupta, S.Chand

MCA 205 Environmental Studies and Green IT

Module 1 (10 Hours) Environmental studies: Scope and importance of environmental studies, environment and its components, ecosystem, environmental pollution; Air, water, soil, Thermal, nuclear and solid waste management, e-waste management

Module 2 (10 Hours)

Winning with Green IT- Basic Green Concepts, Green and IT, IT Ecosystem, Why Green IT now, Do's and Don't of Green IT, Making business case for Green IT, Policies for change, balancing carbon Foot print, Standards and Metrics, Emerging standards with IT practices, reviewing Established and emerging Standards Assessing organization's current energy and needs, Understanding energy terms and terminology, Building Audit for energy requirement, policy based management, Efficiency factors, Carbon reduction options, putting a master plan for go green

Module 3 (10 Hours)

Greening the data center, foundation for Green data management, formalizing best practices for Green IT, Information life cycle management, Tired storage architecture, Going greener with Hosted Data Center Services, maximizing data center efficiency- proper site selection, consolidating physical infrastructure, usage of green servers, managing servers for energy efficiency, planning data center cooling factors- basics of cooling system, bench marking cooling system's efficiency , managing the storage system from green perspective, managing the network to become green

Module 4 (10 Hours)

Virtualization, understanding virtualization, building virtual infrastructure, enabling virtual, using energy efficient machines, desktop virtualization, usage of thin client, collaboration tools – text, voice, video, Video conference, Tele Presence

Paperless office, changing printing habits, using digital documents, evaluating green gadgetry, powering gadgets intelligently, greening the facility, lighting for less, landscaping in a sustainable way, Improving the indoor environment, recycling throughout the office, usage of renewable energy, safe disposal policy

Module 5 (6 Hours)

(as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Text books and References

1. Green IT For Dummies; Carol Baroudi; Jeffrey Hill; Arnold Reinhold; JhanaSenxian Publisher: For Dummies
2. Green Cloud Computing and Risk Management by BabakAkhgar; Colin Pattinson; Mohammad Dastbaz Publisher : Morgan Kaufmann
3. Green Services engineering, Optimization, and Modeling in the Technological Age by Xiaodong Liu; Yang LiPublisher: IGI Global
4. Environmental Studies, Basak, Pearson

MCA 206 Mathematical Computing

Module 1 BASIC SET THEORY (10 hours)

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination - Relations- Properties of relations - Matrices of relations - Closure operations on relations - Recurrence relations- Functions - injective, subjective and objective functions.

Module 2 MATRIX ALGEBRA (10 Hours)

Matrices, Rank of Matrix, Solving System of Equations-Eigen Values and Eigen Vectors-Inverse of a Matrix - Cayley Hamilton Theorem

Module 3 MATHEMATICAL LOGIC (10 Hours)

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus - Predicate calculus.

Module 4 (10 Hours) Topics in Graph Theory:

Basic terminology, Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring. Trees: definition and properties, tree traversals— preorder, inorder, postorder, binary trees, spanning trees, cut sets, Graph traversals — BFS and DFS, Minimum cost spanning trees-Prim's and Kruskal's algorithm, Shortest paths in weighted graphs-Dijkstra's algorithm.

Module 5 (06 Hours) (as per choice of faculty)

Introduction to Maple
(a) Symbolic and numerical computation
(b) Graphing
(c) Maple worksheets
(d) Variables, expressions and functions
Recurrence relations:
(a) Fibonacci numbers.
(b) Solving recurrence relations.
(c) Stability of numerical computations.
(d) Approximation of functions.
Use of MATLAB
Portion covered can be tested through Internal evaluation only not to be included in University examination)

REFERENCES:

1. Kenneth H.Rosen, " Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4,5)
3. A.Tamilarasi&A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers,2nd Edition 2005.
4. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing ompany, 2nd Edition,1989.
5. JurajHromkovic, "Theoretical Computer Science", Springer IndianReprint, 2010.
6. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
7. Maple 14 at the Maple soft web store

Practical

MCA201 Data Structure Lab

LIST OF EXPERIMENTS.

1 ADT Stack implementation and use it for evaluation of post-fix expression.

2 Conversion of prefix expression into post-fix form using recursion.

3 Implementation of circular queue (using array) with menu options like insert, delete, display and exit.

4 Implementation of a priority queue (using pointers) and use it to organize student records prioritized by marks.

5 Implementation of ADT doubly linked circular list to hold strings and use it for organizing a sequence of cities constituting at our program.

6 Implementation of a binary search tree with menu options: Construct a tree, insert anode, delete anode, traverse and display preorder, in order and post order sequence of its nodes.

7 Implementation of di-graphs using adjacency matrix and find the transitive closure using Warshall's algorithm.

8 Implementation of a weighted graph and find minimal cost spanning tree using PRIM's Algorithm.

9 Generate 70 random integers in a given range and sort them using quick sort. Apply both binary search and Interpolation search to locate a given integer and compare the search algorithms based on the number of comparisons / probes required or a successful as well as unsuccessful search..

10 Heap Sort

11 Merge Sort.

12 Implementation of a small Real World Application illustrating DS usage

MCA202 Object Oriented Programming Lab

LIST OF EXPERIMENTS:

1.Illustrate passing by Reference
2.Illustrateuseofstaticinsideaclass
3.Demonstrate–usageofFriendFunction
4.Demonstrate Friend Class
5.Complex No.s adding and multiplying
6.Copyconstructordemo
7.Userdefinedcopyconstructordemo
8.Operator+,*overloading
9.AddingRationalNumbers
10.OverloadingAutoincrementoperator.
11.InteractiveConstructor
12.RealTimeDigitalClock
13.VirtualbaseclassDemo
14.'Is–a','has-a'relationships
15. PolymorphismusingPointertoObject
16. VirtualbaseclassDemo
17. BinaryFileDemo
18. Creating large file
19. Filesplit,Filejoin
20. Templatesorting
21. DemoofClassTemplate
22. Matrix Multiplication
23. Linkedlistimplementation
24. Stacksimulation
25. DemoofusingKeywordCONST
26. Drawinglines
27. StoringimageonDisk
28. Animation
29. UsingMouse
30. VisualBasicformcreation

Reference:

Object Oriented Programming with C++, M.P.Bhaveand S.A.Patekar, Pearson Education

MCA203 Operating System Laboratory

OBJECTIVES:

The student should be made to:

- Learn shell programming and the use of filters in the UNIX environment.
- Be exposed to programming in C using system calls.
- Learn to use the file system related system calls.
- Be exposed to process creation and inter process communication.
- Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance

LIST OF EXPERIMENTS:

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
   - Sequential
   - Indexed
   - Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
   - Single level directory
   - Two level
   - Hierarchical
   - DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms
   - FIFO
   - LRU
   - LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications