

MCA SYLLABUS FOR ADMISSION BATCH 2018-21

Code No	Subject	Theory			Practical			Marks
		Lecture	Credit	University	Internal	Hours/Week	Credit	
		Hrs/Week	Theory	Marks	Evaluation	L/T	Practical	
	Semester – 2							
NMCA 201	Data Structure using C	3	3	100	50	06	1	50
NMCA 202	Object Oriented Programming using C ++	3	3	100	50	2	1	50
NMCA 203	Operating systems	3	3	100	50	2	1	50
NMCA 204	Principles and Practice of Management	3	3	100	50			
NMCA 205	Green IT	3	3	100	50			
NMCA 206	Mathematical Computing	3-1	4	100	50			
TOTAL		19	19	600	300	10	03	150
TOTAL Marks: 1050								
Total Credits: 22								

NMCA 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, Sartaj Sahni, 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).

NMCA 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, Exceptions 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)

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TEXTBOOKS

1. Object Oriented Programming using C++, Ira Pohl, PEARSON EDUCATION
2. Object Oriented Programming in C++, Robert Lafore
3. UML in 21 Days, Tech Media

NMCA 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)

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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. Dhamdhare: 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

NMCA 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 (Taylor), Administrative Management Theory (Fayol), Behaviouristics Management (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)

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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, Cengage Learning, India, 2009
3. Robbins, Management, 9th edition Pearson Education, 2008,
4. Griffin, Management Principles and Applications, Cengage Learning, India First Edition
5. Harold Koontz, O'Donnell and Heinz Wehrich, 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

NMCA 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)

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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 Babak Akhgar; Colin Pattinson; Mohammad Dastbaz Publisher : Morgan Kaufmann
3. Green Services engineering, Optimization, and Modeling in the Technological Age by Xiaodong Liu; Yang Li Publisher: IGI Global
4. Environmental Studies, Basak, Pearson

NMCA 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

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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 company, 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

NMCA201 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

NMCA202 OBJECT ORIENTED PROGRAMMING LAB

LIST OF EXPERIMENTS:

1. Illustrate passing by Reference
2. Illustrate use of static inside a class
3. Demonstrate usage of Friend Function
4. Demonstrate Friend Class
5. Complex No.s adding and multiplying
6. Copy constructor demo
7. User defined copy constructor demo
8. Operator +, * overloading
9. Adding Rational Numbers
10. Overloading Auto increment operator.
11. Interactive Constructor
12. Real Time Digital Clock
13. Virtual base class Demo
14. 'Is-a', 'has-a' relationships
15. Polymorphism using Pointer to Object
16. Virtual base class Demo
17. Binary File Demo
18. Creating large file
19. File split, File join
20. Template sorting
21. Demo of Class Template
22. Matrix Multiplication
23. Linked list implementation
24. Stacks simulation
25. Demo of using keyword CONST
26. Drawing lines
27. Storing image on Disk
28. Animation
29. Using Mouse
30. Visual Basic form creation

Reference:

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

NMCA203 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 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