

Rajasthan Technical University, Kota
FACULTY OF COMPUTER APPLICATIONS
Master of Computer Applications
SYLLABUS
Session 2007-08

Rajasthan Technical University, Kota

FACULTY OF COMPUTER APPLICATIONS

Master of Computer Applications

SYLLABUS

Session 2007-08

MCA Year 1 Semester I								
S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMEN T	ESE	Subject TOTAL
			L	T	P			
1	MCA-101	Computer Architecture	3	1		20	80	100
2	MCA-102	Accounting and Financial Management	3	1		20	80	100
3	MCA-103	Database Management System	3	1		20	80	100
4	MCA-104	Programming in C	3	1		20	80	100
5	MCA-105	Discrete Mathematics	3	1		20	80	100
Practicals								
1	MCA-151	Office management Lab			4	20	80	100
2	MCA-152	DBMS Lab			4	20	80	100
3	MCA-153	Programming in C Lab			4	20	80	100
4	MCA-154	Microprocessor Lab			4	20	80	100
		Total				180	720	900

1	MCA-101	Computer Architecture	3	1		20	80	100
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Combinational Digital Circuits: Gates, Boolean Functions and Expressions, Designing Gate Networks, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-Flops and Registers, Sequential Circuits, Useful Sequential Parts, Programmable Sequential Parts, Clocks and Timing of Events.

Computer System Technology: Components to Applications, Computer Systems and their Parts, Generations, Processor and Memory Technologies, Peripherals I/O and Communications, Software Systems and Applications.

Instruction and addressing, instruction formats, types, addressing modes. Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading, 8085 Instruction Set.

Arithmetic/Logic Unit: Number Representation, Arithmetic Operations, Floating-Point Arithmetic.

Memory System Design: Main Memory Concepts, Cache Memory Organization, Mass Memory Concepts, Virtual Memory and Paging.

Input/Output and Interfacing, Input/Output Devices, Input/Output Programming, Interrupts.

Vector And Array Processing, Shared-Memory, Multiprocessing, Distributed Multi Computing. Programming in 8085 Microprocessor.

Text/References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)

3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)
4. Computer Organization & Design, Patterson & Hennessy, ELSEVIER

2	MCA-102	Accounting and Financial Management	3	1		20	80	100
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Definition of Accounting and its advantages & limitations, Scope of accounting, Branches of Accounting – Financial Accounting – Cost Accounting – Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System, Types of Accounts and Rules for Debit and Credit. Cash and Credit Transaction, Cash discount and Trade discount. Preparation of Journal, Ledger and Trial Balance. Final Accounts and Accounting Ratios, Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments.

Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios Computation of following ratios only:

Gross Profit Ratio, Net Profit Ratio, Stock Turnover Ratio, Operating Ratio, Current Ratio, Liquid Ratio, Debtors Ratio, Creditors Ratio, Return on Capital Employed, Earning Per Share, Return on shareholders fund.

Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations Budgetary Control, Definitions – Advantages – Limitations, Procedure for setting up Budgetary Control, Different types of budgets, Advantages and limitations of Cash Budget and preparation of Cash Budget.

Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio, Application of Marginal Costing including simple problems on make or buy and product mix.

Text/References:

1. Accounting for Management – Vijay Kumar, Tata McGraw-Hill.
2. Accounting: Text and Cases(SIE) - Anthony, N. Robert, Hawkins and Merchant, McGraw-Hill.
3. Advanced Management Accounting, Vol. 1&2 – S. N. Maheshwari, and S. K. Maheshwari, Vikas Publishing House.
4. Advanced Management Accounting - Kaplan and Atkinson, 3rd ed. Prentice Hall.
5. Cost Accounting and Costing Methods - H. J. Weldon, Macdonald and Evans.
6. Managerial Finance - Weston, John. Fred. Thomas, E. Copeland, Dryden press.
7. Basic Business Finance: A Text. R. D. Irwin - Pearson Hunt, Charles Marvin Williams, Gordan Donaldson.
8. Basic Financial Management - Khan & Jain, Tata McGraw-Hill.
9. Financial Decision Making: Concepts, Problems and Cases - Hampton, J. John, Prentice – Hall International.
10. Financial Management - Periasamy, Tata McGraw-Hill.

3	MCA-103	Database Management System	3	1		20	80	100
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Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS

Introduction to data models: entity relationship model, hierarchical model: from network to hierarchical, relational model, comparison of network, hierarchical and relational models.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Relational model: storage organizations for relations, relational algebra, relational calculus. Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

Text/References:

1. Date C J, "An Introduction To Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley
4. Paul Beynon Davies, "Database Systems", Palgrave Macmillan
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6. Majumdar & Bhattacharya, "Database Management System", TMH
7. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
8. Bharti P.K, "An introduction to Database Systems", JPNP

4	MCA-104	Programming in C	3	1	20	80	100
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Problem Solving with Computers: Algorithms, and Flowcharts. Data types, constants, variables, operators, data input and output, assignment statements, conditional statements, string and character handling, data validation examples.

Iteration, arrays, strings processing, defining function, types of functions, function prototype, passing parameters, recursion.

Storage class specifiers, pre-processor, header files and standard functions. Pointers: Definition and uses of pointers, pointer arithmetic, pointers and array, pointers and functions, pointer to pointer. Structures, union, pointers to structures, user-defined data types, enumeration. Data files: Opening, closing, creating, processing and unformatted data files. Introduction to Dynamic Memory Allocation, command line arguments, systems calls.

Text/References:

1. C Programming Language, Kernighan & Ritchie, PHI.
2. C How to Program, Dietel & Dietel, PHI
3. The Complete Reference C, Schildt, TMH

5	MCA-105	Discrete Mathematics	3	1	20	80	100
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Introduction to Discrete Mathematical Structures, Formal Methods: Introduction and Analogy, Abstraction.

Fundamentals: Sets & Relations- Sets, Types of Sets, Multi Sets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, Methods of Proof-Direct Proofs, Indirect Proofs, Mathematical Induction, Method of Contradiction.

Combinatorics: Permutations and Combinations, Pigeon Hole Principle, Principle of Inclusion and Exclusion, Sequence and Series, Generating Functions.

Mathematical Logic, Posets and Lattices: Partial Order Set, Bounding Elements, Well Ordered Set, Topological Sorting, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Proposition and Propositional Calculus.

Graphs and Group Theory: Basic Introduction of Graphs- Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Shortest Path Algorithms, Group, Definitions and Properties, Coset & Subgroup, Normal subgroup, Homomorphism of groups, Cyclic Group, Permutation Group.

Finite State Machines and Languages: Grammar and Languages- Phrase structure Grammar, Types of Grammars and Languages, Finite State Machines and Languages, Minimization of Finite State Machines.

Text/References:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", TMH
2. C.L. Liu, "Elements of Discrete Mathematics", TMH.
3. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.
4. Narsingh Deo, "Graph Theory With Application to Engineering and Computer Science", PHI
5. Trembly J.P. & Manohar P., "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill..

MCA Year 1 Semester II								
S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMEN	ESE	Subject TOTAL
			L	T	P			
1	MCA-201	C++ and Algorithm and Data Structure	3	1		20	80	100
2	MCA-202	Computer Oriented Numerical and Methods	3	1		20	80	100
3	MCA-203	Programming in Java	3	1		20	80	100
4	MCA-204	Operating System	3	1		20	80	100
5	MCA-205	Data Communications and Computer Networks	3	1		20	80	100
Practicals								
1	MCA-251	Data Structure Lab			4	20	80	100
2	MCA-252	CONM Lab			4	20	80	100
3	MCA-253	Java Lab			4	20	80	100
4	MCA-255	Communication & Soft Skill Lab			4	20	80	100
		Total				180	720	900
1	MCA-201	C++ and Algorithm and Data Structure	3	1		20	80	100

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, characteristics of object oriented language – objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading. Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, breaking control statements.

Defining function, types of functions, storage class specifiers, recursion, pre-processor, header files and standard functions, Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations.

Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation.

Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control

Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing.

DATA STRUCTURE: Basic data structures such as arrays, stack and queues and their applications, linked and sequential representation. Linked list, representation of linked list, multi linked structures.

Trees: definitions and basic concepts, linked tree representation, representations in contiguous storage, binary trees, binary tree traversal, searching insertion and deletion in binary trees, heap tree and heap sort algorithm, AVL trees.

Graphs and their application, sequential and linked representation of graph – adjacency matrix, operations on graph, traversing a graph, Dijkstra's algorithm for shortest distance, DFS and BFS, Hashing.

Searching and sorting, use of various data structures for searching and sorting, Linear and Binary search, Insertion sort, Selection sort, Merge sort, Radix sort, Bubble sort, Quick sort, Heap Sort.

Text/References:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G.Sorenson, TMH
2. Data Structures in C/C++, Tanenbaum, PHI
3. Data Structures in C/C++, Horowitz, Sawhney.
4. Practical C++ Programming, Steve Oualline, O'Reilly.
5. How to Program C++, Dietel, Pearson
6. Object Oriented Design & Modelling, Rambaugh, PHI.
7. A First Book of C++, Bronson, Thomson

2	MCA-202	Computer Oriented Numerical Methods	3	1		20	80	100
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Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation

Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence.

Interpolation and approximation: Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation, Approximation of function by Taylor's series and Chebyshev polynomial

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Weddle's Rule Euler- Maclaurin Formula.

Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

Curve fitting and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc.

(Emphasis must be given to algorithmic approach)

Text/References:

1. Numerical Methods and Computing, Cheney & Kincaid, 5th Ed., Thomson.
2. Applied Numerical Methods for Engineers, Schilling & Harries, Thomson.
3. Numerical Algorithms, Krishnamurthy & Sen, EWP.

3	MCA-203	Programming in Java	3	1		20	80	100
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Overview of Object Oriented Concepts in Java.

Introduction Java & internet, Java applets and its applications, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic.

Data types and control structures, operators, array, Java methods and classes.

Inheritance of procedures and Data, packages and interface, exception handling, multithreaded programming thread priorities, synchronization, messaging, creating and controlling of threads. I/O and applets. String handling and various string functions.

Java utilities like java.lang, java.util and their uses, java.io, basics of networking using Java.

Java applets and their use – Event Handling – AWT and working with Windows – Event Handling – Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes, Inner Class. AWT and working with windows – AWT Classes, Window fundamentals, frame windows, frame window in An Applet, Working with Graphics, color, fonts and text.

Java Beans – BDk, JAR files, Introspection, Developing simple bean using BDk, Bound Properties, BeanInfo, Interface, Constrained properties, Persistence, Customizers Servlets - Life cycle of servlet, use of tomcat for servlet, servlet API, Javax.Servlet package, servlet parameters, Javax.Servlet.http package, Handling HTTP requests and Responses, Cookies.

JDBC – JDBC API, JDBC Drivers, Products, JDBC Design considerations, Two Tier and Three Tier client server model, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.

Text/References:

1. Java How to Program, Dietel & Dietel, Pearson
2. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

4	MCA-204	Operating System	3	1	20	80	100
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Introduction: Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Swap-Space management, Disk reliability.

Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The

Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Case study : Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface.

Text/References:

1. Abraham Siberschatz and Peter Baer Galvin, “Operating System Concepts”, Fifth Edition, Addison-Wesley
2. Milan Milankovic, “Operating Systems, Concepts and Design”, McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley.
4. Tanenbaum: Modern Operating System, Prentice Hall.

5	MCA-205	Data Communications and Computer Networks	3	1	20	80	100
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Overview, evolution of computer networks, computer telephony.

Data communications – advantages of digital communication, transmission media, fundamentals of digital communications, transmission media, modulation techniques and modems.

The OSI seven layer network model, LAN technologies – protocols and standards, LAN hardware, TCP/IP and the Internet, Internet Architecture, Internet protocol and datagrams., Routing protocols, UDP, Internet standard services, DNS.

Networking Technologies, ISDN, Cable Modem System, DSL, SMDS, Frame relay, fast Ethernet, 100VG-anyLAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, SONET, DWDM

Switching and Virtual LAN, Non-ATM Virtual LANs, IEEE 802.1Q VLAN standard, Network Performance, Analytical approaches, simulation, traffic monitoring.

Network Management – SNMP, RMON and RMNv2, TMN, Directory services and network management.

Issues related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

Text/References:

1. Stalling, Data & Computer Communication, 8th Ed., Pearson.
2. Tanenbaum; Computer Network, 4th Ed., Pearson.
3. Kurose; Computer Networking, 3rd Ed., Pearson.
4. Peterson, Davie; Computer Networks, 3rd Ed., ELSEVIER
5. Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Press.