Jabalpur Engineering College,Jabalpur

(Declared Autonomous by MP Govt.,Affiliated to RGPV,Bhopal)

Master of Computer Application (MCA) I Semester

S.No.	Subject Code	Category Code	Subject Name	Periods Per Week			Total Credits	Maximum Marks					
								Theory Slot			Practical Slot		
				L	T	P		End. Sem	Test (Two)	Assignment/ Quiz	End. Sem. Practical / Viva	Practical Record/ Quiz/Assignment/ Presentation	Total Marks
1	MCA101		Programming in C and Data Structure	3	1	–	4	70	20	10	–	–	100
2	MCA102		Statistical Mathematics	3	1	–	4	70	20	10	–	–	100
3	MCA103		Operating System and Architecture	3	1	–	4	70	20	10	–	–	100
4	MCA104		Information Technology	3	1	–	4	70	20	10	–	–	100
5	MCA105		Communication Skills	3	1	–	4	70	20	10	–	–	100
4	MCA106		C and DS Lab	–	–	8	8	–	–	–	120	80	200
5	MCA107		Operating System Lab	–	–	2	2	–	–	–	30	20	50
Total				**15**	**5**	**10**	**30**	**350**	**100**	**50**	**150**	**100**	**750**

L : Lecture **T : Tutorial** **P : Practical**

(MLambert) (Satyadhyan).

JABALPUR ENGINEERING COLLEGE, JABALPUR (M.P.)

MCA, First -Semester

MCA 101 Programming in C with Data Structure

UNIT I

Fundamentals of C Programming : Structure of a C Program, Data types, Identifiers and keywords, Operators & expressions, Preprocessor directive, Input output, Casting, Precedence, Scope of variables Control Constructs and Iteration Constructs Functions: Defining and accessing: passing arguments, Function prototypes, Recursion, Storage classes

UNIT II

Arrays: Defining and processing, passing arrays to a function, Multi-dimensional arrays. Strings, operations on strings.

Pointers : Pointer expression, pointer arithmetic Arrays of pointers, Function returning pointers, Pointer to function, malloc(), calloc(), free(), Structures, Unions. File handling and related functions

UNIT III

Overview of Data Structure: Need for Data Structure, Execution Time, Algorithm Analysis, Algorithm Complexity , Space Complexity , Time Complexity , Asymptotic Analysis, Asymptotic Notations

Stack and Queue: Contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack, evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback, circular queue, Enqueue Operation , Dequeue Operation, linked implementation of stack and queue, isfull(), isempty()

UNIT IV

General List: list and it's contiguous implementation, it's drawback, singly linked list-operations on it, doubly linked list-operations, circular linked list; linked list using arrays.

UNIT V

Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees-various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non-recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

BOOKS

1. Kerninghan & Ritchie "The C programming language", PHI
2. Schildt "C:The Complete reference" 4th ed TMH
3. Kruse R.L. Data Structures and Program Design in C; PHI

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MCA 102 Statistical Mathematics

UNIT I MATRICES AND EIGENVALUE PROBLEMS

Matrices - Rank of a Matrix - Consistently of a system of linear equations - Solution of the matrix equation $Ax=b$ - Row - reduced Echelon Form - Eigenvalues and Eigenvectors - Properties - Cayley - Hamilton Theorem - Inverse of a matrix.

UNIT II CALCULUS

Functions of a single variable, limit, continuity, differentiability, Mean value theorems, indeterminate forms, L'Hospital's rule, Maxima and minima, Product and chain rule, Beta and gamma functions, Functions of multiple variables, limit, continuity, partial derivatives

UNIT III TESTING OF HYPOTHESIS

Sampling distributions - Tests based on small and large samples - Normal, Student's t, Chi-square and F distributions for testing of mean, variance and proportion and testing of difference of means variances and proportions - Tests for independence of attributes and goodness of fit.

UNIT IV PROBABILITY AND PROBABILTY DISTRIBUTION

Probability - Axioms of Probability - Conditional Probability - Addition and multiplication laws of Probability, Probability mass function and Probability density functions Properties - Binomial, Poisson, Normal distributions and their properties.

UNIT V Discrete Math

Sets, subsets, power sets, Counting functions, countability,
Basic proof techniques: induction, proof by contradiction, Basics of inductive,
deductive, and propositional logic, Basic data structures: stacks, queues, graphs,
arrays, hash tables, trees,Graph properties: connected components, degree,
maximum flow/minimum cut concepts, graph coloring

REFERENCE BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, New Delhi, 2015.
2. James Stewart ,calculus,7th edition
3. Miller and M. Miller, Mathematical Statistics, Pearson Education Inc., Asia 7th Edition,New Delhi,
4.Richard Johnson, Miller and Freund's Probability and Statistics for Engineer, Prentice Hall of India Private Ltd., 8th Edition, New Delhi, 2011..
5. D.C.Agarwal ,Discrete Structure, 5thedition,Bhopal

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MCA 103 Operating system and Architecture

UNIT I

Register Transfer Language and Micro-operations: Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory. Design of simple Arithmetic & Logic Unit & Control Unit, arithmetic and logical operations Along with register transfer, timing in register transfer.

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple, I/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks. Pin Diagram of 8086, Architecture of 8086.

UNIT II

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems, Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems. Processes: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above

UNIT III

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

UNIT IV

Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages. Deadlocks: Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm

UNIT V

File System: File systems, directories, file system implementation, security protection mechanisms. Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software. Disks: Disk hardware, Disk scheduling

algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks. Clocks: Clock hardware, memory-mapped terminals, I/O software.

BOOKS:

1. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International EditionComputer Science series 1992.
2. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company, 1989. 4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.
3. William Stallings "Operating Systems" , Prentice Hall of India Pvt. Ltd.
4. M. Morris Mano, "Computer System Architecture", PHI, 3rd edition, 1993
5. Liu and Gibson, "8086/8088 Micro processor Assembly Language"

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MCA 104 Information Technology

UNIT I

Introduction and basic concept of modern communication and technology: CDMA, WLL, GSM, VOIP, Bluetooth, WI-Fi, Communication Technology: 2G, 3G, 4G, And 5G. Communication over radio, microwave systems, Communication satellite, radar, fiber optics, ISDN-their properties, Geographic Information System (GIS), Components of a GIS- H/W,S/W, Data, people, methods, working and application of GIS.

UNIT II

Information Security: Introduction, malicious programs, cryptography, digital signature, Firewall, Users Identification and Authentication, Security awareness and policies, Application areas requiring security. Mobile Commerce: Introduction, Growth, Success Stories of Mobile commerce, Technologies for mobile commerce, M-commerce in India, Digital Marketing.

UNIT III

Artificial Intelligence: Concept of Artificial Intelligence, Introduction to branches of Artificial Intelligence: Machine Learning, Neural Network, Robotics, Natural Language Processing, Expert System, and Fuzzy Logic. Applications of all the branches of AI, General application of AI.

UNIT IV

Introduction to IoT: Characteristics of IoT, physical design of IoT, Logical design of IoT, Functional blocks of IoT, home Automation, Industry applications, Surveillance and other IoT applications. Introduction to Virtual Reality (VR): Defintion, Application of VR, Smart Systems, Embedded Systems.

UNIT V

Computing and Cloud Computing: History of Centralized and Distributed Computing, Overview of Distributed Computing, Cluster computing, Grid computing. Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage.

Text Books

1. Fundamental of Information Technology by Alex Leon & M.Leon, Vikas Publications, New Delhi
2. Security in Computing (Third Edition) by C.P. Pfleeger, S.L. Pfleeger,D.N. Shah, S. Ware, Prentice Hall 2002.
3. Recent Magazines of Computers and Communication.
4. Cloud Computing PHI by Rao M.N.
5. Internet of Things, McGrawHill by Raj Kamal

Reference Books

1. Introduction to Information Technology - ITL Education Solutions Ltd.,Seventh Impression, Pearson Education 2008.
2. Concepts in Computing-Kenneth Hoganson, First Indian Edition, Jones & Bartlett Publishers, Inc. 2010
3. Computer Networks - Andrew S. Tanenbaum, 4th Edition, Pearson Education.

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MCA 105 Communication Skills

UNIT I

Listening: Barriers of Listening skill-Approaches to Listening -How to improve Listening exercises. Speaking: Paralanguage: Sounds, stress, intonation- Art of conversation – Presentation skills – Public speaking- Expressing Techniques

UNIT II

Reading: Kinds of Reading – Causes of reading difficulties – Reading strategies – exercises. Writing: Effective writing – Paragraph ,Essay, Reports, Letters, Articles, Notices, Agenda & Minutes.

UNIT III

Communication: Modes of Communication- Barriers – Interpersonal skills , Negotiation skills Non- Verbal communication – Etiquettes

UNIT IV

Group Dynamic skills: Group Discussion – Team building & Team work – Be a manager or leader – Decision making – creativity – Time & Stress management skills.

UNIT V

Interview skills: Types of Interviews – Preparing for interview – Preparing a CV – Structuring the interview , Mock Interview _ Quick Tips.

Reference Books:

1. Sanghi, Seema, Improve your communication skills. 2nd edition.
2. Burnard, Philip. Interpersonal skills Training: A source book of activities. 2005.
3. Ashley, Roderic. How to enhance your employability. 1998.
4. Dr. Alex, K. Soft sill: know yourself & Know the world. 2010.
5. Cornerstone. Developing softskills. 4th edition 2005.
6. Jones, Daniel. An outline of English phonetics.
7. Aggarwal, Rohini. Business communication and Organization & Management.
8. Grath. E.H. Basic Managerial skills for all.
9. Maxwell, John C. Developing the leader within you.
10. Sunitha, V. Personality Development & communicative English

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MCA 106 C and DS Lab

1. Program using control structure (if else.. Switch..)
2. Program using iterative structure (for… While…)
3. Array Manipulation Program
4. String manipulation programs
5. Program using structures
6. Program for Stack
7. Implement Stack using Linked lists use it to convert infix expression to postfix expression.
8. Program for Queue using pointers
9. Linked List Using Arrays
10. Program for Linked list using pointers
11. Program using Dynamic allocation operator
12. File handling program
13. Program for Trees

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MCA 107 Operating System Lab

1. Program for CPU Scheduling Algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Program for File Allocation Strategies - a) Sequential b) Indexed c) Linked Memory
3. Program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
4. Program for any one of Deadlock Management Techniques
5. Program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN
6. Program for Page Replacement Algorithms a) FIFO b) LRU c) LFU
7. Program to simulate producer-consumer problem using semaphores
8. Program to simulate the concept of Dining-Philosophers problem.

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