Dr. A.P.J. ABDUL KALAM UNIVERSITY, INDORE

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,Preprocessordirective,Inputoutput,Casting,Precedence, Scope of variables Control Constructs and Iteration Constructs Functions: Defining and accessing:passingarguments,Functionprototypes,Recursion, Storageclasses

UNIT II

Arrays: Defining and processing, passing arrays to a function, Multi -dimensional arrays. Strings, operations on strings.
Pointers:Pointerexpression,pointerarithmeticArraysofpointers,Functionreturningpointers, 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 CompleCity , Space Complexity , Time Complexity , Asymptotic Analysis, Asymptotic Notations
Stack and Queue: Contiguous implementations of stack, various operations on stack, various polishnotations-infix,prefix,postfix,conversionfromonetoanother-usingstack,evaluationof postandprefixexpressions.Contiguousimplementationofqueue:Linearqueue,itsdrawback, 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, single linked list - operations on it ,doubly linked list -operations, circular linked list ; linked list using arrays.

UNIT V

Trees:definitions-height,depth,order,degree,parentandchildrelationshipetc;BinaryTrees - varioustheorems,completebinarytree,almostcompletebinarytree;Treetraversals-preorder, in order and post order traversals, their recursive and non -recursive implementations; expressiontree-evaluation;linkedrepresentationofbinarytree-operations.Threadedbinary trees; forests, conversion of forest into tree. Heap-definition.

BOOKS

1. Kerninghan&Ritchie "TheC programming language", PHI
2. Schildt "C:The Complete reference" 4th edTMH
3. KruseR.L.DataStructuresandProgramDesigninC;PHI

MCA 102 Statistical Mathematics

UNIT I MATRICES AND EIGENVA LUEPROBLEMS

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

UNITII CALCULUS

Functions of a single variable, limit, continuity, differentiability, Mean value theorems, indeterminateforms,L'Hospital'srule,Maximaandminima,Productandchainrule,Betaand gammafunctions,Functionsofmultiplevariables,limit,continuity,partialderivatives

UNIT III TESTING OFHYPOTHESIS

Sampling distributions - Tests based on small and largesamples- Normal, Student's t, Chi-squareandFdistributionsfortestingofmean,varianceandproportionandtestingofdifference ofmeansvariancesandproportions-Testsforindependenceofattributesandgoodnessoffit.

UNIT IV PROBABILITY AND PROBABILTY DISTRIBUTION

Probability - Axioms of Probability - Conditional Probability - Addition and multiplication laws of Probability, Probability mass function and Probability density functionsProperties - Binomial, Poisson, Normal distributions and theirproperties.

UNITV DiscreteMath

Sets, subsets, powe r 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: co nnected components, degree,
maximum flow/ minimum cut concepts, graph coloring
Maximum flow / minimum cut concept, graph coloring

REFERENCE BOOKS:

1. B.S.Grewal,HigherEngineeringMathematics,KhannaPublishers,43rdEdition,NewDelhi, 2015.
2. James Stewart ,calculus,7 thedition
3. MillerandM.Miller,MathematicalStatistics,PearsonEducationInc.,Asia7thEdition,New Delhi,
4.RichardJohnson,MillerandFreund'sProbabilityandStatisticsforEngineer,PrenticeHallof IndiaPrivateLtd.,8thEdition,NewDelhi,2011..
5. D.C.Agarwal,DiscreteStructure, 5thedition,Bhopal

MCA 103 Operating system and Architecture

UNIT I

Register Transfer Language and Micro -operations: Concept of bus, data movement among registers,alanguagetorepresentconditional datatransfer, datamovementfrom/tom emory. Design of simple Arithmetic & Logic Unit & Control Unit, arithmetic and logical operations Alongwithregister transfer,timinginregistertransfer.
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, Inter rupt driven, DMA (Direct Memory Access). Implementation of processor using the buildingblocks.PinDiagramof8086,Architectureof8086.

UNIT II

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogrammingand,Realtimeoperatingsystems,Differentviewsoftheoperatingsystem, System Programmer's view, User's view, Operating system concepts and structure, Layered OperatingSystems,MonolithicSystems.Processes:TheProcessconcept,Theprocesscontrol block, Systems programmer's view of processes, Operating system servicesfor process management, Scheduling algorithms, First come first serve, Round Robin,Shortestrun time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms statedabove

UNIT III

Memory Management : Memory management without swapping or paging, Concepts of swappingandpaging,Pagereplacementalgorithmsnamely,Leastrecentlyused,Optimalpage replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady'sanomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation

UNIT IV

Inter-processCommunicationandSynchronization:Theneedforinter-processsynchronization, Concept of mutual exclusion, binary and counting semaphores, hardwaresupport 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 regionandconditi onalcritical region, Monitors and messages. Deadlocks: Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker'sAlgorithm

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 memoryaccess.PrinciplesofI/Osoftware:Goalsinterrupthandlers,devicedrivers,anddevice independent I/Osoftware. Userspace I/OSoftware.Disks: Diskhardware,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 EditionComputerScience series1992.
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. WilliamStallings“OperatingSystems”,PrenticeHallofIndiaPvt.Ltd.
4. M.MorrisMano,“ComputerSystemArchitecture”,PHI,3rdedition,1993
5. Liu and Gibson, “8086/ 8088 Micro processor Assembly Language”

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, cryp tography, digital signature, Firewall,UsersIdentificationandAuthentication,Securityawarenessandpolicies,Application areas requiring security. Mobile Commerce: Introduction, Growth, Success Stories of Mobile commerce,Technologiesformobilecommerce,M-commerceinIndia,DigitalMarketing.

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, Industryapplications,Surve illanceand 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 Compu ting, Cluster computing, Grid computing. Introduction to CloudComputing-Cloudissuesandchallenges–Properties–Characteristics –Servicemodels, Deploymentmodels.Cloudresources:NetworkandAPI – Virtual and Physical computational resources –Data-storage.

Text Books

1. Fundamental of Information Technology by Alex Leon &M.Leon, VikasPublications, NewDelhi
2. SecurityinComputing(ThirdEdition)byC.P.Pfleeger,S.L.Pfleeger,D.N.Shah,S.Ware, Prentice Hall2002.
3. Recent Magazines of Computers andCommunication.
4. Cloud Computing PHI by RaoM.N.
5. InternetofThings,McGrawHillbyRajKamal

ReferenceBooks

1. IntroductiontoInformationTechnology– ITLEducationSolutionsLtd.,SeventhImpression, Pearson Education2008.
2. ConceptsinComputing-KennethHoganson,FirstIndianEdition,Jones&Bartlett Publishers, Inc.2010
3. Computer Networks – Andrew S. Tanenbaum, 4 thEdition, PearsonEducation.

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:Effectivewriting – Paragraph ,Essay, Reports, Letters, Articles, Notices, Agenda &Minutes.

UNITIII

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

UNIT IV

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

UNIT V

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

Reference Books:

1. Sanghi,Seema,Improveyourcommunicationskills.2ndedition.
2. Burnard,Philip.InterpersonalskillsTraining:Asourcebookofactivities.2005.
3. Ashley,Roderic.Howtoenhanceyouremployability.1998.
4. Dr.Alex,K.Softsill:knowyourself&Knowtheworld.2010.
5. Cornerstone. Developing softskills. 4th edition2005.
6. Jones,Daniel.AnoutlineofEnglishphonetics.
7. Aggarwal, Rohini. Business communication andOrganization &Management.
8. Grath. E.H. Basic Managerial skills forall.
9. Maxwell,JohnC.Developingtheleaderwithinyou.
10. Sunitha, V. Personality Development &communicativeEnglish

MCA 106 C and DS Lab

1. Program using control structure (if else..Switch..)
2. Programusingiterativestructure(for…While…)
3. Array ManipulationProgram
4. String manipulationprograms
5. Program usingstructures
6. Program forStack
7. ImplementStackusingLinkedlistsuseittoconvertinfixexpressiontopostfix expression.
8. Program for Queue usingpointers
9. Linked List UsingArrays
10. Program for Linked list usingpointers
11. Program using Dynamic allocationoperator
12. File handlingprogram
13. Program for Trees

MCA 107 Operating System Lab

1. ProgramforCPUSchedulingAlgorithmstofindturnaroundtimeandwaitingtime. a) FCFSb)SJFc)RoundRobin(pre-emptive)d)Priority
2. ProgramforFileAllocationStrategies-a)Sequentialb)Indexedc)LinkedMemory
3. Programtosimulatethefollowingcontiguousmemoryallocationtechniquesa) Worst-fitb)Best-fit c)First-fit
4. Program for any one of Deadlock ManagementTechniques
5. Programtosimulatediskschedulingalgorithmsa)FCFSb)SCANc)C-SCAN
6. Program forPage Replacement Algorithms a) FIFO b) LRU c) LFU
7. Programtosimulateproducer-consumerproblemusingsemaphores
8. Program to simulate the concept of Dining -Philosophersproblem.