



KAKATIYA UNIVERSITY
MCA (2-Year) COURSE UNDER CBCS
WITH EFFECT FROM 2020-21
I Year: I - Semester

MCA111	C AND DATA STRUCTURES		CDS
WORK LOAD: 4 PPW	Credits:4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

UNIT-I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Algorithms, Pseudo code, flow charts, **Introduction to C Language:** Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, operators.

Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to

UNIT-II

Designing Structured Programs: Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, recursion- recursive functions, Pre-processor commands

Arrays and Strings: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, C Strings, String Input / Output functions, arrays of strings, string manipulation functions.

Pointers: Introduction to Pointers, Pointers for inter function communication, pointers to pointers, memory allocation functions, array of pointers, command –line arguments.

Derived Types: Structures – Declaration, definition and initialization of structures, accessing structures, and nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, and enumerated types.

UNIT-III

Input and Output: Concept of a file, streams, input / output functions, text files and binary files, file input / output operations.

Sorting and Searching: selection sort, bubble sort, insertion sort, linear and binary search methods.

Data Structures: Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications,

UNIT-IV

Queues-operations, array and linked representations, Introduction to Trees: Binary Trees – Binary Tree Traversals – Expression Trees – General Trees, Binary Search Tree-traversals Algorithms, Graphs : Graph Storage Structures – Graph Traversals.

TEXTBOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Cengage Learning.
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:

1. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
2. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
4. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 5th Edition, Pearson Education



KAKATIYA UNIVERSITY
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MCA112	OPERATING SYSTEMS		OS
WORK LOAD: 4 PPW	Credits: 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

UNIT -I

Introduction: Operating System Structure- Layered structure, system components, operating system functions, Classification of Operating Systems- Batch, Time-sharing, Real-Time Systems, Multiuser Systems, Multi-Processor System, Distributed Systems , Operating System services, System Boot, System Calls, Kernels, Virtualization

Process Management: Process concepts, Process State, Process Control Block (PCB), Cooperating Processes, and Inter Process Communication: Shared Memory, Message Passing, and Multithreaded Programming.

System call interface for process management: fork, exit, wait, waitpid, exec

UNIT- II

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, **Process**

Synchronization: Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Peterson's solution, Semaphores, Classical Problem in Concurrency- Bounded-Buffer Problem, Readers-Writers Problem, Dining Philosopher Problem, Sleeping Barber Problem **Deadlock:** System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock

UNIT -III

Memory Management: Swapping, Multiprogramming with fixed partitions, dynamic partitions, Paging, Segmentation, Virtual Memory Concepts, Demand Paging, Page fault, Page Replacement Algorithms, Thrashing. Cache memory organization, Locality of reference

UNIT- IV

Storage Management: File System: File attributes File operations, Access Methods, Directory Implementation, Allocation Methods, Free-Space Management, and Recovery

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID

TEXTBOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R.Stevens, Pearson education.

REFERENCES:

1. SibsankarHalder and Alex A Arvind, "Operating Systems", Pearson Education.
2. Harvey M Dietel, "An Introduction to Operating System", Pearson Education.
3. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson Education.
4. Harris, Schaum's Outline Of Operating Systems, McGraw Hill
5. Operating Systems – Internals and Design Principles Stallings, 5th Edition–2005, Pearson Education/PHI
6. Operating System A Design Approach-Crowley, TMH.
7. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
8. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
9. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.



KAKATIYA UNIVERSITY
MCA (2-Year) COURSE UNDER CBCS
WITH EFFECT FROM 2020-21
I Year: I - Semester

MCA113	JAVA PROGRAMMING			JPM
WORK LOAD: 4 PPW	Credits: 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

UNIT –I

Object-Oriented Programming: Object Oriented Paradigm – Features of Object Oriented Programming Class Fundamentals, How Objects Are Created, Reference Variables and Assignment, Methods, Returning from a Method, Constructors, Parameterized Constructors, Adding a Constructor to the Vehicle Class, The new Operator Revisited, Garbage Collection and Finalizers, The finalize() Method, The this Keyword.

A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass Objects to Methods, Returning Objects, Method Overloading, Overloading Constructors, Recursion, understanding static, Introducing Nested and Inner Classes, Varargs: Variable-Length Arguments

Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass Constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, Superclass References and Subclass Objects, Method Overriding, Overridden Methods Support Polymorphism, Using Abstract Classes & final. (*Chapter 4, Chapter 6, Chapter 7*)

UNIT –II

Packages and Interfaces: Packages, Packages and Member Access, Understanding Protected Members, Importing Packages, Implementing Interfaces, Using Interface, References, Variables in Interfaces, Interfaces Can Be Extended.

Exception Handling: The Exception Hierarchy, Exception Handling, Fundamentals, The Consequences of an Uncaught Exception, Using Multiple catch Statements, Catching Subclass Exceptions, Nested Try Blocks, Throwing an Exception, Using finally, Using throws, New Exception Features Added by JDK 7, Java's Built-in Exceptions, Creating Exception Subclasses.

Multithreaded Programming: Multithreading Fundamentals, The Thread Class and Runnable Interface, Creating Multiple Threads, Thread Priorities, Synchronization, The synchronized Statement, Thread Communication Using notify(), wait(), and notifyAll(), Suspending, Resuming, and Stopping Threads. (*Chapter 8, Chapter 9, Chapter 11*)

UNIT - III

Enumerations, Autoboxing, Static Import, and Annotations: Java Enumerations, The values()&value Of() Methods, Instance Variables and Enumerations, Auto boxing, Type Wrappers, Auto boxing and Methods, Autoboxing / Unboxing Occurs in Expressions, Static Import, Annotations.

Using I/O: Java's I/O Is Built upon Streams, Byte Streams and Character, Streams, The Byte Stream Classes, The Character Stream Classes, The Predefined Streams, Reading and Writing Files Using Byte Streams, Automatically Closing a File, Reading and Writing Binary Data. Random-Access Files, File I/O Using Character Streams, Using Java's Type Wrappers to Convert Numeric Strings.

Generics: Generics Fundamentals, Bounded Types, Using Wildcard Arguments, Bounded Wildcards, Generic Methods, Generic Constructors, Generic Interfaces, Raw Types and Legacy Code, Type Inference with the Diamond Operator, Erasure, Ambiguity Errors, Some Generic Restrictions, Continuing Your Study of Generics. (*Chapter 12, Chapter 10, Chapter 13*)

UNIT – IV

Applets, Events, and Miscellaneous Topics: Applet Basics, Applet Organization and Essential Elements, The Applet Architecture, A Complete Applet Skeleton, Applet Initialization and Termination, Requesting Repainting, Using the Status Window, Passing Parameters to Applets, The Applet Class, Event Handling, The Delegation Event Model, Events, Using the Delegation Event Model, More Java Keywords.

Introducing Swing: The Origins and Design Philosophy of Swing, Components and Containers, Layout Managers, a First Simple Swing Program, Use JButton , Work with JTextField, Create a JCheckBox, Work with JList, and Use Anonymous Inner Classes to Handle Events, Create a Swing Applet. (*Chapter 14, Chapter 15*)

Text Book:

1. Java, A Beginner's Guide, 5th Edition, by Herbert Schildt, 2011, Oracle Press, Tata McGRAW-HILL

References:

1. Beginning Java, Java 7th Edition, Ivor Horton's, Wiley India Edition. Java,
2. A Beginner's Guide, 8th Edition, by Herbert Schildt, 2018, Oracle Press
3. Java the Complete Reference 8th Edition, Herbert Schildt, Tata McGrawHill Edition.



KAKATIYA UNIVERSITY
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MCA114	COMPUTER NETWORKS			CN
WORK LOAD: 4 PPW	Credits:4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

UNIT - I

Computer Networks and the Internet: What is the Internet? What is a Protocol? The Network Edge, The Network Core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models, A Brief History of Computer Networking and the Internet.

Application Layer: Principles of Application Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS - The Internet's Directory Service, Socket Programming with TCP and UDP

UNIT - II

Transport Layer: Transport-Layer Services and Principles, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control.

UNIT - III

Network Layer And Routing: Network-Layer Services and Principles, Introduction and Network Service Models, Routing Principles and Routing Algorithms, Hierarchical Routing, Inter Protocol (IP) - IPv4 Addressing, Datagram Format, IPv6 Addressing and Format, Routing in the Internet, What's Inside a Router?

UNIT - IV

Link Layer And Local Area Networks: Data Link-Layer Services and Principles, Introduction, Error-Detection and Correction Techniques, Multiple Access Protocols, LAN Addresses and ARP, Ethernet, Hubs, Bridges, Switches, wireless Links: IEEE 802.11, Bluetooth, PPP: The Point-to-Point Protocol, Asynchronous Transfer Mode (ATM), X.25 and Frame Relay.

Text Book:

1. Computer Networking A Top-Down Approach Featuring The Internet By –James F. Kurose And Keith W. Ross (Pearson)
2. Computer Networks By- Andrew S. Tanenbaum (Prentice Hall India)

Reference books:

1. Business Data Communication & Networks By - Fitz Gerald (John Wiley)
2. Data & Computer Communications - W Stallings (Pearson, Phi)
3. Computer Communications & Networking Topologies-Magallo, V.M.Hancock (Thomson)
4. Data Communication & Computer Networks - R. Agarwal, Bb Tiwari (Vikas)
5. Computer Networks - As Tanenbaum (Phi)
6. Computer Networks - Black (Phi)
7. Under Standing Communications & Networks - Wa Shay (Thomson)



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MCA115	PROBABILITY AND STATISTICAL METHODS		PSM
WORK LOAD: 4 PPW	Credits : 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

UNIT - I

Introduction to Statistics: Data Collection and Tabulation, Graphical Representation of Data Measures of Central Tendency and Dispersion, Moments, Skewness and Kurtosis.

Probability: Basic concepts and Basic terms of probability, Addition, Multiplication and Baye's theorem, Random variables, Definition of Mathematical Expectation and moment generating function.

Probability Distributions : Statement, mean, variance and applications of Binomial, Poisson and Normal distributions.

UNIT - II

Correlation and Regression: Concept of correlation, computation of Karl-Pearson correlation coefficient, Spearman's rank correlation coefficient, multiple correlations and partial correlation with simple applications. Simple linear regression, regression coefficient, lines of regression with simple applications.

UNIT - III

Testing of Statistical Hypothesis: Concepts of Population, Sample, Parameter, Statistic, Null and Alternative hypotheses, Critical region, two types of errors, Level of significance. Chi-Square (χ^2) tests for single variance, goodness of fit and independent of two attributes, t-test for single mean, difference of two sample means (independent and paired samples) F- test for difference of two independent sample variances.

UNIT - IV

Analysis of Variance: Analysis of variance one way and two way classified data with one observation per cell.

Text Books

1. Fundamental of Mathematical Statistics-S.C.Gupta and V.K.Kapoor
2. Fundamentals of Applied Statistics -S.C.Gupta and V.K.Kapoor

Reference books

1. Statistical Methods-S.P.Gupta.
2. Fundamental of mathematical statistics by - v k Kapoor and guptasc
3. Statistics (phi) by - freud
4. Proability statistics and random process by - r veerarajan (tmh)
5. Introduction to probability & statistics by - j.s. Milton &jcarnold (tmh)
6. Miller &ferunds probability & statistics froenginner by - johnson (pearson)
7. Probability & statistics fro engineers &statisticsts by - walpose (pearson)



KAKATIYA UNIVERSITY
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MCA116	C and Data Structures Lab	
WORK LOAD: 4 PPW	Credits : 2	EXTERNAL MARKS: 50

1. Write a c-program to find the Reverse of a given number.
2. Write a C program to find the sum of individual digits of a positive integer.
3. Write a C-program to find the Fibonacci Series.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
 - i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
 - i) To insert a sub-string in to a given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not.
13. Write a C program to count the lines, words and characters in a given text.
14. Write a C program to generate Pascal's triangle.
15. Write a C program that uses functions to perform the following operations:
 - i) Reading a complex number
 - ii) Writing a complex number
 - iii) Addition of two complex numbers
16. Write a C program which copies one file to another.
17. i) Write a C program to display the contents of a file.
ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
18. Write a C program that uses functions to perform the following operations on singly linked list.
 - i) Creation
 - ii) Insertion
 - iii) Deletion
 - iv) Traversal
19. Write C programs that implement stack
20. Write C programs that implement Queue
21. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
 - i) Bubble sort
 - ii) Selection sort
 - iii) Insertion sort
22. Write C programs for Linear search and Binary search
23. Write C-program for binary search Tree implementation and Traversals
24. Write C-programs on to implement the Graph and Traversal of a Graph

Note:

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs
- External Viva-voce is compulsory.



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MCA117	Operating System Lab	
WORK LOAD: 4 PPW	Credits : 2	EXTERNAL MARKS: 50

1. Use vi editor to create a file with some text and save the file.
2. Add and Delete content to the file created above.
3. Write programs that use the following processing utilities.
 - i. wc, od, cmp, comm, diff, head, tail, cut, paste, sort, grep, uniq
 - ii. Disk backup utilities
 - iii. du, df, tar, cpio, ps, who
4. Write a shell script to generate a multiplication table.
5. Write a shell script that copies multiple files to a directory.
6. Write a shell script which counts the number of lines and words present in a given file.
7. Write a shell script which displays the list of all files in the given directory.
8. Write a shell script (of small calculator) that adds, subtracts, multiplies and divides the given two integers.
9. Write a C program that counts the number of blanks in a text file.
 - i. Using standard I/O
 - ii. Using system calls.
10. Write a C program that illustrates how to execute two commands concurrently with a command pipe.
11. Write a C program that illustrates file locking using semaphores.
12. Write a C program that implements a producer-consumer system with two processes. (using semaphores)
13. Write a C program that illustrates inter process communication using shared memory system calls.
14. Write a C program that illustrates the following.
 - i. Creating a message queue
 - ii. Writing to a message queue.
 - iii. Reading from a message queue.
15. Write C programs to implement the various CPU Scheduling Algorithms
 - a. FCFS
 - b. SJF
 - c. Priority
 - d. Round Robin
16. Banker's Algorithm for Deadlock Avoidance
17. Implementation of Deadlock Detection Algorithm
18. Implementation of the following Memory Allocation Methods for fixed partition
 - a. First Fit
 - b. Worst Fit
 - c. Best Fit
19. Implementation of the following Page Replacement Algorithms
 - a. FIFO
 - b. LRU
 - c. LFU
20. Implementation of the following File Allocation Strategies
 - a. Sequential
 - b. Indexed
 - c. Linked

NOTE:

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- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.



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MCA118	Java Programming Lab	
WORK LOAD: 4 PPW	Credits : 2	EXTERNAL MARKS: 50

Case study exercises:

- Creating a Help Class
- Demonstrate Garbage Collection and Finalization
- Improving the Queue Class
- Overloading the Queue Constructor
- The Quicksort
- Extending the Vehicle Class
- Creating a Queue Interface
- Adding Exceptions to the Queue Class
- Extending Thread
- Using the Main Thread
- A Computer-Controlled Traffic Light
- A File Comparison Utility
- Creating a Disk-Based Help System
- Create a Generic Queue
- A Simple Banner Applet
- A Swing-Based File Comparison Utility

NOTE:

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- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.