BANGALORE UNIVERSITY

SCHEME AND SYLLABUS

For the course

BSc WITH ONE OF THE OPTIONS AS COMPUTER SCIENCE

NEP2021 Scheme

Revised w.e.f.

Academic Year 2021-22 and onwards

Department of Computer Science and Applications
BANGALORE UNIVESITY, BANGALORE

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15	Dr. Rajesh B, Dr. B.R. Ambedkar School of Economics, Bangalore	Member

BANGALORE UNIVERSITY
PROPOSED BSc Computer Science MAJOR SYLLABUS (NEP)
[Based on IIA Model of Karnataka State Higher Education Council]

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
I	CS-C1T	Problem Solving Techniques	4	OE1: Open Elective	3	25
	CS-C2P	Problem Solving Lab using C HLL	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC I :	2	
				Physical Education	1	
				Health & Wellness	1	
II	CS-C3T	Data Structure	4	OE2: Open Elective	3	25
	CS-C4P	Data Structures Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	Environmental studies	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
III	CS-C5T	Object Oriented Programming using Java	4	OE3: Open Elective	3	25
	CS-C6P	Java Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC II :	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
IV	CS-C7T	Operating Systems	4	OE4: Open Elective	3	25
	CS-C8P	Linux Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	The Constitution of India	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
V	CS-C9T	Database Management System	3	Vocation Course I : Other Option (Major)	3	22
	CS-C10T	Artificial Intelligence	2	SEC III :	2	
	CS-C11P	Database Management System Lab	3	Physical Education	1	
	CS-C12P	Artificial Intelligence Lab	2	NCC/NSS/CL/R&R	1	
	XX	Other Option (Minor) LAB	3			
	XX	Other Option (Minor) LAB	2			

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
VI	CS-C13T	Python Programming	3	Vocation Course I : Technical Writing	3	24
	CS-C14T	Computer Networks	3	Internship	2	
	CS-C15P	Python Programming Lab	2	SEC III :	2	
	CS-C16P	Computer Networks Lab	2	Physical Education	1	
	XX	Other Option (Minor) Theory	3	NCC/NSS/CL/R&R	1	
	XX	Other Option (Minor) LAB	2			
VII	CS-C17T	Internet Technologies	3	Elective I: (Internet of Things, Cloud Computing, Data Mining, Image Processing, Discrete Structures, Modeling and Simulation)	3	22
	CS-C18T	Data Analytics	3	Elective II : (Internet of Things, Cloud Computing, Data Mining, Image Processing, Discrete Structures, Modeling and Simulation)	3	
	CS-C19T	Design and Analysis of Algorithm	3	Research Methodology	3	
	CS-C20P	Internet Technologies Lab	2			
	CS-C21P	Data Analytics Lab	2			
VIII	CA-C22T	Machine Learning	3	Elective III : (Block Chain Technologies, Operations Research, Human Computer Interface, Parallel Algorithms)	3	20
	CA-C23T	Theory of Computation	3	Research Project	6	
	CA-C24T	System Security	3			
	CA-C24P	Machine Learning Lab	2			

BANGALORE UNIVERSITY
PROPOSED B.Sc Syllabus - Computer Science as a MINOR Subject
(NEP, 2020)

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
I	CS-C1T	Problem Solving Techniques	4	OE1: Open Elective	3	25
	CS-C2P	Problem Solving Lab using C HLL	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC I :	2	
				Physical Education	1	
				Health & Wellness	1	
II	CS-C3T	Data Structure	4	OE2: Open Elective	3	25
	CS-C4P	Data Structures Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	Environmental studies	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
III	CS-C5T	Object Oriented Programming using Java	4	OE3: Open Elective	3	25
	CS-C6P	Java Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC II :	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
IV	CS-C7T	Operating Systems	4	OE4: Open Elective	3	25
	CS-C8P	UNIX Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	The Constitution of India	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
V	CS-C9T	Database Management System	3	Vocation Course I : Computer Animation	3	22
	xx	Other Option (Major) Theory	3	SEC III :	2	
	xx	Other Option (Major) Theory	3	Physical Education	1	
	CS-C10P	Database Management System Lab	2	NCC/NSS/CL/R&R	1	
	XX	Other Option (Major) Practicals	2			
	XX	Other Option (Major) Practicals	2			

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
VI	CS-C11T	Computer Networks	3	Vocation Course I : Other Option (Major)	3	24
	CS-C12P	Computer Networks Lab	2	Internship	2	
	XX	Other Option (Major) Theory	3	SEC III :	2	
	XX	Other Option (Major) Theory	3	Physical Education	1	
	XX	Other Option (Major) LAB	2	NCC/NSS/CL/R&R	1	
	XX	Other Option (Major) LAB	2			
VII	XX	Other Option (Major) Theory	3	Elective I: Other Option (Major)	3	22
	XX	Other Option (Major) Theory	3	Elective II : Other Option (Major)	3	
	XX	Other Option (Major) Theory	3	Research Methodology	3	
	XX	Other Option (Major) LAB	2			
	XX	Other Option (Major) LAB	2			
VIII	XX	Other Option (Major) Theory	3	Elective III : Other Option (Major)	3	20
	XX	Other Option (Major) Theory	3	Research Project	6	
	XX	Other Option (Major) Theory	3			
	XX	Other Option (Major) LAB	2			

CS-C1T - PROBLEM SOLVING TECHNIQUES

Total Teaching Hours: 64   No. of Hours / Week: 04

UNIT - I   [16 Hours]
Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Analyzing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Base Conversion, Character to number conversion.

UNIT - II   [16 Hours]
C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output, formatted output- printf, variable length argument list, formatted input-scanf. Control Flow: Statements and Blocks, If-else, else-if, switch, loops: while loop, for loop, do while, break and continue, goto and labels. Pointers and Arrays: pointers and address, pointers and function arguments, multidimensional array, initialization of pointer arrays, command line arguments.

UNIT - III   [16 Hours]
Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power, computing the nth Fibonacci Number. Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest element, multiplication of two matrices.

UNIT - IV   [16 Hours]
Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search. Text processing and Pattern searching: text line length adjustment, left and right justification of text, keyword searching in text, text line editing, linear pattern search, sublinear pattern search.

Text Books:
1. R.G.Dromey, "How to Solve it by Computer", Pearson Education India, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2009.

3. Brain M. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd edition, Princeton Hall Software Series, 2012.

Reference Books:
1. Steven S. Skiena, "The Algorithm Design Module", 2nd Edition, Springer-Verlag London Limited, 2008.
2. Donald E. Knuth, The Art of Computer Programming", Volume 1: Fundamental Algorithms, 3rd Edition, Addison Wesley Longman, 1997.
3. Donald E. Knuth, The Art of Computer Programming", Volume 2: Seminumerical Algorithms, 3rd Edition, Addison Wesley Longman, 1998.
4. Greg Perry and Dean Miller, "C programming Absolute Beginner's Guide", 3rd edition, Pearson Education, Inc, 2014.

Web Resources:
1. http://algorithmsforinterviews.com "Algorithms for Interviews"

CS-C2P: Problem Solving Using C HLL

Write, and execute C program for the following:

1. to read radius of a circle and to find area and circumference
2. to read three numbers and find the biggest of three
3. to check whether the number is prime or not
4. to read a number, find the sum of the digits, reverse the number and check it for palindrome
5. to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. to read percentage of marks and to display appropriate message (Demonstration of else-if ladder
7. to find the roots of quadratic equation
8. to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
9. to remove Duplicate Element in a single dimensional Array
10. to perform addition and subtraction of Matrices
11. to find factorial of a number
12. to generate fibonacci series
13. to remove Duplicate Element in a single dimensional Array
14. to find the length of a string without using built in function
15. to demonstrate string functions
16. to read, display and add two m x n matrices using functions
17. to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
18. to Swap Two Numbers using Pointers
19. to demonstrate student structure to read & display records of n students
20. to demonstrate the difference between structure & union.

CS-C3T - DATA STRUCTURES

Total Teaching Hours: 64   No. of Hours / Week: 04

UNIT-I   [16 Hours]
Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. String Processing: Definition, Storing Strings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.

UNIT-II   [16 Hours]
Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,
Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matrices and Sparse matrices. Linked list: Definition, Representation of Singly Linked List in memory, Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list. Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues: Definition, Array representation of queue, Linked list representation of queues. Types of queue: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT-III   [16 Hours]
Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps,Lexicographic Search Trees: Tries, External Searching: B-Trees, Applications of Trees.Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, TopologicalSorting, Greedy Algorithm, Graphs as Data Structure.

UNIT-IV   [16 Hours]
Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, DivideAnd Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: SparseTables, Choosing a Hash function, Collision Resolution with Open Addressing, CollisionResolution by Chaining.

Text Books:
1. Seymour Lipschutz, "Data Structures with C", Schaum's outLines, Tata Mc Graw Hill, 2011.
2. Robert Kruse, C.L.Tondo, Bruce Leung,Shashi Mogalla,"Data Structures and Program Design using C", Pearson Education, 2009.

ReferenceBooks:
1. Mark Allen Weiss," Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education,2013
2. Forouzan,"A Structured Programming Approach using C",2nd Edition, Cengage LearningIndia,2008.

CS-C4P: DATA STRUCTURES LAB PROGRAMS

NOTE: For all the programs write the output, flowchart and number of basic operations performed.

1. Given {4,7,3,2,1,7,9,0} find the location of 7 using Linear and Binary search and also display its first occurrence.

2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Bubble Sort Algorithm

3. Perform the Insertion and Selection Sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order.

4. Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.

5. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from the list. Display your list after each insertion and deletion.

6. Write a program to insert the elements {61,16,8,27} into circular queue and delete 4 elements from the list. Display your list after each insertion and deletion.

7. Write a program to insert the elements {61,16,8,27} into ordered singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.

8. Write a program to add $6x^3+10x^2+0x+5$ and $4x^2+2x+1$ using linked list.

9. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers.

10. Write a recursive program to find GCD of 4,6,8.

11. Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(using linked list implementation)..

12. Write a program to convert an infix expression x^y/(5*z)+2 to its postfix expression

13. Write a program to evaluate a postfix expression 5 3+8 2 - *.

14. Write a program to create a binary tree with the elements {18,15,40,50,30,17,41} after creation insert 45 and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation

15. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.

16. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}

17. Given S1={"Flowers"} ; S2={"are beautiful"} I. Find the length of S1 II. Concatenate S1 and S2 III. Extract the substring "low" from S1 IV. Find "are" in S2 and replace it with "is"

CS-C5T: OBJECT ORIENTED PROGRAMMING USING JAVA

Total Teaching Hours: 64   No. of Hours / Week: 04

UNIT-I   [16 Hours]
Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference

UNIT-II   [16 Hours]
Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

UNIT-III   [16 Hours]
Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism. I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

UNIT-IV   [16 Hours]
Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Textbooks:
1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2007

Reference Books:
1. Raj Kumar Buyya, Object Oriented Programming with JAVA, McGraw Hill, 2009
2. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Sixth Edition, Oracle Press, 2014
3. Ken Arnold, James Gosling, "The Java Programming Language, Fourth Edition, Addison Wisely, 2005
4. Herbert Schildt, 'The Complete Reference Java, 7th Edition, McGraw Hill, 2007

Web Resources
1. https://docs.oracle.com/javase/tutorial/
2. https://javabeginnertutorial.com/core-java-tutorial/

CS-C6T: JAVA PROGRAMMING LAB

1. Write a simple java application, to print the message, "Welcome to java"

2. Write a program to display the month of a year. Months of the year should be held in an array.

3. Write a program to demonstrate a division by zero exception

4. Write a program to create a user defined exception say Pay Out of Bounds. .

5. Write a java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.

6. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.

7. Write a program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.

8. Write a java program to create a student class with following attributes: Enrollment_id: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declaredas zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.

9. In a college first year class are having the following attributesName of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class

10. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class

11. Write a Java program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.

12. Create a package' student.Fulltime.BCA' in your current working directory
    a. Create a default class student in the above package with the following
    attributes: Name, age, sex. b. Have methods for storing as well as displaying

13. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.

14. Write a program to handle Null Pointer Exception and use the "finally" method to display a message to the user.

15. Write a program which create and displays a message on the window

16. Write a program to draw several shapes in the created window

17. Write a program to create an applet and draw grid lines

18. Write a program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear.

19. Create a frame which displays your personal details with respect to a button click
20. Create a simple applet which reveals the personal information of yours.
21. Write a program to move different shapes according to the arrow key pressed.
22. Write a java Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night
23. Demonstrate the various mouse handling events using suitable example.
24. Write a program to create menu bar and pull-down menus.

CS-C7T: OPERATING SYSTEMS

Total Teaching Hours: 64   No. of Hours / Week: 04

UNIT - I   [16 Hours]
Introduction: Computer System Organization, Architecture, Structure, Operations, Process Management, Memory Management, Storage Management, Kernel Data Structures, Computing Environments. Operating System Structures: Services, System Calls, Types, Operating System Structure, System Boot. Processes: Process Concept, Scheduling, Operations, Interprocess Communication. Multithreaded Programming: Multicore Programming, Multithreading Models.

UNIT –II   **[**16 Hours]
Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples. Process Scheduling: Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Real-time CPU Scheduling.   Deadlocks: System model, Characterization, Methods for handling deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery from deadlock.

UNIT – III   [16 Hours]
Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory Management: Demand Paging; Copy-on-Write, Page Replacement; Allocation of Frames; Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, Protection. File-System Implementation: Structure, File-System and Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery. Mass-Storage Structure: Overview, Disk Scheduling, Disk Management.

UNIT - IV   [16 Hours]
Protection: Goals, Principles, Domain of Protection, Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of the Access Rights. Virtual Machines: Building Blocks, Types of VMs and their implementations. Distributed Systems: Advantages, Types of Network-based OS, Robustness, Design Issues, Distributed File Systems. Case Studies: The Linux System, Windows 10.

Text Books:
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Concepts, 9th Edition, 2016 India, Wiley.

Reference Books:
1. William Stallings, "Operating Systems-Internals and Design Principles", Pearson, 9th Edition, 2018
2. D M Dhamdhere: Operating Systems – A Concept Based Approach, 3rd Edition, Tata McGraw –Hill, 2015.
3. Harvey M Deitel, Paul J Deitel, Dr Choffnes, "Operating Systems", Pearson Education Limited, 3rd Edition, 2013.
4. J. Archer Harris, John Cordani, " Operating Systems", Schaum's Outline, Indian Edition, Mc Graw Hill Education (India), First Edition.
5. Gary Nutt, Nabendu Chaki, Sarmistha Neog, "Operating Systems" Pearson Education Limited, 3rd Edition, 2016.

CS-C8P: UNIX LAB
PART-A

1. Learn the use of basic UNIX commands –
   a. To access information using date, history, man, who, whoami, uptime, finger,cal.

   b. To display contents of files using cat, vi, more, head, tail, grep, cmp, wc

   c. To manage files using cat, cp, ls, mv,rm, chmod, find

   d. Process utilities using ps, pid, ppid, tty, time, kill, exit

   e. Directory handling utilities using cd, mkdir, rmdir, mv, pwd

2. Write a shell script that displays list of all the files in the current directory to which the user has read, write and execute permissions.

3. Write a shell script that accepts a list of file names as its arguments, count and reports the occurrence of each word that is present in the first argument file on other argument files.

4. Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.

5. Write grep commands to the following:
   a. To select the lines from a file that has exactly 2 characters.
   b. To select the lines from a file that has more2 than one blank spaces.

6. Write a shell script which accepts two file names as arguments. Compare the contents. If they are same, then delete the second file.

7. Write a shell script
   a. to count number of lines in a file that do not contain vowels.
   b. to count number of characters, words, lines in a given file.

8. Write a shell script to list all the files in a given directory.

9. Write a shell script to display list of users currently logged in.

10. Write a shell script to read three text files in the current directory and merge them into a single file and returns a file descriptor for the new file.

PART-B

1. Write a program to copy a file into another using system calls.

2. Write a program using system call: create, open, write, close, stat, fstat, lseek.

3. Write a program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

4. Write a program to create a Zombie process.

5. Write a program to implement inter process communication using pipes.

6. Simulate the following CPU scheduling algorithms
   a. Round Robin
   b. SJF

7. Write a program that illustrates file locking using semaphores.

8. Write a program that implements a producer-consumer system with two processes (using semaphores).

9. Write a program that illustrates inter process communication using shared memory system calls.

10. Write a program that illustrates the following:
    a. Creating message queue.
    b. Writing to a message queue
    c. Reading from a message queue

Reference Books:

1. Sumitabha Das: "UNIX Concepts and Applications", 4th Edition, Tata McGraw Hill, 2006.

2. Kenneth Roson et al ,"UNIX: The Complete Reference", McGraw-Hill Osborne Media

3. M G Venkateshmurthy,"UNIX and Shell Programming", Pearson Education Asia, 2005

4. Behrouz A. Forouzan, Richard F. Gilberg,"Unix and shell Programming.", Brooks/Cole-Thomson Learning, 2003

5. Uresh Vahalia, "UNIX Internals", Pearson Education, 2005.

6. Richard Stevens, Stephen Rago, "Advanced Programming in the UNIX Environment", Pearson Education, 2/e.