SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT& ENGINEERING/

SCHOOL OF TECHNOLOGY MANAGEMENT

Academic Year: 2023-2024

Program/s: B Tech INTG

Year: III Semester: V

Stream/s :Computer Engineering/Data Science

Subject: Basic Data Structures

Time: 3 hrs (10 am to 1 pm)

Date: 27 / 11 / 2023

No. of Pages:3

Marks: 100

Final Examination(2023-24)/Re Exam(2022-23)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. 1 is compulsory.
2) Out of remaining questions, attempt any 4 questions.
3) **In all 5 questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume Suitable data if necessary.**

Q1		Answer briefly:	[20]
CO-1 ; BL-1	a.	How do you implement dynamic memory allocation in C/C++? Give a suitable example to illustrate your answer.	[5]

CO-2 ; BL-3	b.	Demonstrate how you would analyze and predict the output of the following code snippet:
		#include <iostream>
		using namespace std;
		int main ()
		{
		int find[5];
		int * p;
		p = find; *p = 1;
		p++; *p = 2;
		p = &find[2]; *p = 3;
		p = find + 3; *p = 4;
		p = find; *(p + 4) = 5;
		for (int n = 0; n < 5; n++)
		cout<< find[n] << ",";
		return 0;
		}
			[5]

CO-3 ; BL-1	c.	State the concept of a Priority Queue. Analyze what sets it apart from other traditional queue data structures? Explain different types of priority queue with real-world examples where Priority Queues can be applied to solve problems effectively.	[5]
CO-4 ; BL-3	d.	How does searching and sorting play a crucial role in databases and information retrieval systems? Provide examples of real-world applications where sorting algorithms are used extensively.	[5]
Q2 CO-3; BL-6	a	Write a functional code to calculate the factorial of a given number using Stack. (Note: make use of recursion)	[10]
Q2 CO-2; BL-6	b	Write a C++ program to create an array of structures to store information about books, including title, author, and category. Implement functions to add new books to the catalog, search for books by title or author, and display the entire catalog.	[10]
Q3 CO-3;BL-3	a	Write Algorithm for Evaluation of Postfix Expression. Evaluate the given expression using STACK and show the details of stack at each step: 9 3 4 * 8 + 4 / –	[10]
Q3 CO-3; BL-6	b	At a router packets are coming from various sources. Router dispatches the packet on a 1st come 1st serve basis. Write a program for the router to dispatch the packets.	[10]
Q4 CO-3; BL-6	a	Design a program to manage a personal calendar using a linked list data structure. The program should allow users to add events, remove past events, and display upcoming events. Implement this calendar program using a linked list.	[10]
Q4 CO-4; BL-5	b	Explain Insertion sort with example and develop a program to implement the same.	[10]
Q5 CO-3;	a	Write a C/C++ program to implement below functionalities for singly linked list:	[10]

BL-6		• Deletion from the beginning • Insertion at the specific position • Display	
Q5 CO-3; BL-4	b	Develop a functional code to implement Pop and Peek operation of Stack.	[10]
Q6 CO-2; BL-4	a	Explain the concept of passing pointer to a function .Write a Program (passing pointer to a function) to find the sum of all elements in an array.	[10]
Q6 CO-3; BL-3,4	b	Examine the implementation of QUEUE using a linked list and its advantages. Develop a program to implement a QUEUE using a linked list.	[10]
Q7 CO-3; BL-6	a	Write a functional code to perform following operations on a Linear queue. Give following 2 choices to the user: 1. Enqueue 2. Display	[10]
Q7 CO-4; BL-2,3	b	Compare Iterative and Recursive approach for Binary Search algorithm. Apply binary search to find the index of the string "apple" in a sorted array of strings: "apple," "banana," "cherry," "date," "fig," "grape," "kiwi," "lemon," "mango," "orange," "papaya".	[10]