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 (2.00pm to 5.00pm)

Date: 07 / 02 / 2024

No. of Pages:3

Marks: 100

Re-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.	Define ADT (Abstract Data Type), give its features.	[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()`
		`{`
		`  char lfc[20];`
		`  int i;`
		`  for(i = 0; i < 10; i++)`
		`  *(lfc + i) = 65 + i;`
		`  *(lfc + i) = ' ';`
		`  cout << lfc;`
		`  return(0);`
		`}`
			[5]

CO-3 ; BL-1	c.	State what a DeQue is and analyze how it differs from other linear data structures. Explain different types of DeQue and provide real-world examples where Deques can be effectively used.	[5]
CO-4 ; BL-3	d.	Imagine you are a librarian tasked with arranging a set of books on a shelf in alphabetical order by the authors' last names. Apply your knowledge of sorting techniques and explain which sorting technique is most suitable for this scenario and why. Then, provide a step-by-step process of applying this sorting technique to alphabetize the following list of book authors' names: Smith, Johnson, Davis, Wilson, Brown, Anderson, Lee, Martinez	[5]
Q2 CO-3; BL-6	a	Write a functional code to reverse string given by user using Stack.	[10]
Q2 CO-2; BL-6	b	Write a C++ program to create an array of structures to store information about employees, including name, employee ID, and salary. Provide options to add new employees and display the employee database.	[10]
Q3 CO-3;BL-3	a	Write Algorithm for converting Infix expression to postfix expression. Convert the given infix expression into postfix using STACK and show the details of stack at each step of conversion: (A + B) / (C + D) – (D * E)	[10]
Q3 CO-3; BL-6	b	At the dispensary patients are waiting for a doctor. Where, in the waiting area there are chairs arranged for patients. Doctor only attends 25 patients a day. Candidates come randomly and sit sequentially on chairs. Receptionists provide a token to the patients on the first come first serve basis. Write a program to use appropriate data structure to be used by the receptionist to send patients to the doctor's cabin.	[10]
Q4 CO-3; BL-6	a	You are tasked with creating a program to manage a to-do list. Each to-do item will have a description. Implement this to-do list using a linked list. Write a program that allows users to add new to-do items, remove completed items, and display the to-do list.	[10]

Q4 CO-4; BL-5	b	Using your comprehensive understanding of sorting algorithms, explain Selection Sort, discuss this algorithm in detail, providing a thorough explanation of its workings, advantages. Furthermore, develop a C++ program that implements Selection Sort.	[10]
Q5 CO-3; BL-6	a	Write a C/C++ program to perform below operations on a singly linked list • Delete from a specific position • Insert at the end • Display the third node, if the third node is not available give appropriate message to the user	[10]
Q5 CO-3; BL-4	b	Develop a functional code to implement Push and Peek operation of Stack.	[10]
Q6 CO-2; BL-4	a	Write difference between call by value and call by reference. Develop a C++ code to swap values of two variables using pointers.	[10]
Q6 CO-3; BL-3,4	b	Examine the implementation of STACK using a linked list and its advantages. Develop a program to implement a STACK using a linked list.	[10]
Q7 CO-3; BL-6	a	Write a functional code to perform following operations on a linear queue. Elements in the queue are 61, 22, 43, 66, 72, and 21. Give following 2 choices to the user: 1. Dequeue 2. Display	[10]
Q7 CO-4; BL-2,3	b	Explain the steps involved in performing an Iterative binary search on a sorted list. Then, apply the binary search algorithm to find the index of the element 17 in the following sorted array: 1, 3, 6, 9, 12, 15, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, and 56.	[10]