SVKM'S NMIMS

MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT& ENGINEERING

Academic Year: 2022-2023

Program: B.Tech Integrated | Stream; Computer | Year: III Semester: V

Subject: Basic Data Structures | Time: 3 hrs (11:00am to 2:00pm)

Date: 15/06/23. | No. of Pages:4

Marks: 100

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Special Re-Examination

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-3 ; BL-2	a.	State two applications of linked lists and compare them with the array data structure, highlighting their respective advantages and disadvantages.	
CO-2 ; BL-1	b.	State a problem that can be solved using recursion and explain the recursive approach to solving it step-by-step. with example.	
CO-3;	c.	Explain dequeue operation on circular queue.	

BL-2			
CO-4; BL-3	d.	Consider a scenario where you need to store information about books in a library. Each book has attributes such as title, author, publication year, and ISBN. State which data structure will be used for the above condition and why?	
Q2 CO-3 BL-3 CO-2 BL-3		A) Write a program to push and pop an element from the stack. B) Write a program in C/C++ that takes an array of integers as input and finds the maximum and minimum values in the array.	[20]
Q3 CO-3; BL-4 CO-3; BL-6		A. Convert the given infix expression in to postfix using stack and show the details of stack at each step of conversion: Expression: A*(B*C+D*E)+F B. Develop a program for ADT of a Linear Queue.	[20]
Q4 CO-3; BL-6		A) Develop a C/C++ program to insert a new node in the given linked list considering all cases of insertion	[20]

CO-4; BL-4		B) Write a C/C++ program to show Selection sort, also explain its working with the help of one example.	
Q5 CO-3;BL-2 CO-3; BL-6		A) Explain doubly linked list in detail with the help of diagram. B) Write a program to implement a stack using a linked list.	[20]
Q6 CO-2;BL-4 CO-3; BL-3		A) i) Consider a two-dimensional array named "B" declared as follows: B: array[7][12] of int; Assuming that each integer takes one memory location, the array is stored in column-major order, and the first element of the array is stored at location 500. What is the address of the element B[4][9]? Show the calculation. ii) Discuss the advantages and disadvantages of using pointers in programming. B) Explain the concept of a node in a linked list. What information does a node contain, and how are nodes connected to form a linked list?	[20]

		Write a C/C++ code to insert a new node at the beginning of a singly linked list.	
Q7 CO-3; BL-3 CO-4; BL-3		A) Develop a C/C++ program to implement queue using linked list. B) Describe the key requirements for performing a binary search on a sorted list. Given a sorted array: 2, 5, 7, 9, 11, 14, 17, 21, 25, 28, 30, 33, 36, 40, 42, 45, 48, 51, 54, 56. Apply the binary search algorithm to find the index of the element 36 in the array.	[20]