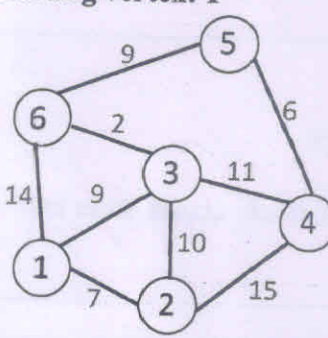




SOMAIYA
VIDYAVIHAR UNIVERSITY

Semester: January 2022 – May 2022			Duration: 3:00hrs
Maximum Marks: 100	Examination: ESE Examination		
Programme code: 75	Class: SY	Semester: III (SVU 2020)	
Programme: Minors in Computer Engg			
Name of the Constituent College: K. J. Somaiya College of Engineering		Name of the department: COMP	
Course Code: 116m75C301	Name of the Course: Data Structures and Algorithms		
Instructions: 1) Draw neat diagrams 2) Assume suitable data if necessary 3) All questions are compulsory.			

Question No.		Max. Marks
Q1	<p>Explain the concept of Abstract Data Type. Write ADT for Complex number $(a+ib)$ as the data type.</p> <p style="text-align: center;">OR</p> <p>Define data structure. Explain practical applications of stack, queue, trees and graphs.</p>	10
Q2 (a)	<p>Define linked list. Explain the following operations with their pre-status, post-effects, sequence of updating the node connections on a doubly linked list. You may support your explanations with the diagrams.</p> <p>a. Insert into Doubly Linked List b. Delete from Doubly Linked List</p> <p style="text-align: center;">OR</p> <p>Define circular linked list. Explain the following operations with their pre-status, post-effects, sequence of updating the node connections on a doubly linked list. You may support your explanations with the diagrams.</p> <p>a. Insert into circular Linked List b. Delete from circular Linked List</p>	10
Q2 (b)	<p>Convert the given infix expression into an equivalent postfix one using stack. Show output after processing every input character. Expression: power $((r+t*y+p)/a+b-c), z)$</p>	10
Q. 2 C	<p>State different types of queues. State and explain applications of each one of them in various domains.</p>	10

Q3 (a)	<p>a. Explain binary search tree and balanced binary search trees with a suitable example.</p> <p>b. Comment on significance of balanced binary search trees? Explain the test of checking if the BST is balanced.</p> <p>c. Create a balanced binary tree for the given input. You need not explain how the balancing was achieved. 30, 10, 5, 25, 75, 34</p>	2+3+5
Q3 (b)	<p>Create a unique binary tree using inorder and postorder traversal sequence given below. Show the output step by step-</p> <p>Inorder- B D C F E G A H Postorder- D F G E C B H A</p> <p>OR</p> <p>Apply depth first approach of graph traversal to the given graph. Show step by step output with contents of all data structures involved in the process. Starting vertex: 1</p> 	10
Q4 (a)	<p>Consider the problem of storing data of ordered pairs of <subject, subject_teacher> for a 25 year old educational institute. The data might be further retrieved to know which faculty members have taught a particular subject over the years, which all different subjects have been taught by a particular faculty member etc.</p> <p>Design a solution for this problem using DICTIONARY data structure.. Support your answer with sample examples of – data elements to be stored, how they are accessed-deleted, how different queries supported by the chosen data structure can be executed on the same, give sample output of those queries etc.</p>	10
Q4 (b)	<p>Hash the following numbers in a table of size 10. Resolve collisions if any, with linear and quadratic probing. State total number of collisions with each technique. 23, 55, 0, 73, 60, 20, 18, 100, 43, 50</p>	10
Q5 (a)	<p>Compare and contrast searching techniques viz Linear Search, Binary Search, Hashed List Search. Support your claims with suitable example.</p>	10
Q5 (b)	<p>Input : 42, 23, 74, 11, 65, 58, 94, 36, 99, 87</p> <p>Sort the given numbers using insertion sort. Show the output after every iteration/pass.</p> <p>OR</p> <p>Sort the given numbers using bubble sort. Show the output after every iteration/pass.</p>	10