POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2024
Programme: BCA | Full Marks : 100
Course: Data Structure and Algorithms (New) | Pass Marks : 45
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What is data structure? Explain the types of data structure with examples. 8

   b) What do mean by algorithm analysis? Suppose the given algorithm and compute its total time T (n) for worst case and average case. 7

Algorithm	Cost
for i = 1 to n	C1
for j = 1 to n-1	C2
printf("Pokhara University")	C3

OR

What do you mean by complexity of algorithms? Why do we need asymptotic notation? Describe about Big oh notation with example.

2. a) What is a stack? How is it used in recursion? Explain with the example of determining the factorial of a number. 7

   b) Define priority queue. Explain the implementation of circular queue with example. 8

3. a) Define Doubly Linked-list. Write a complete function in C or Java to insert a node at the beginning of singly linked list. 8

   b) What is the advantage of a linked stack? Write an algorithm to implement a stack using a linked list. 7

4. a) Write an algorithm to implement a binary search tree (BST). What is the time complexity to search in the BST? 8

OR

How do you construct a Huffman tree? Explain with an example.

b) Why do you need to balance the binary tree? Construct an AVL tree for following data: 7

25, 46, 54, 58, 55, 34, 21, 39, 35, 10, 15

5. a) Write an algorithm/function to sort the below array using selection sort: 12, 8, 9, 3, 11, 5, 4 7

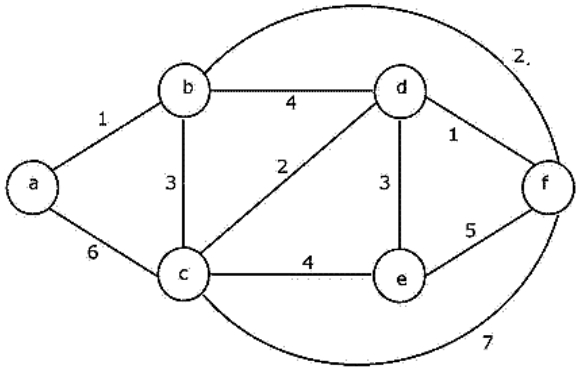
b) Define external and internal sorting. Perform a quicksort algorithm on the following array of numbers: 68, 34, 21, 43, 7, 18, 8, 56, 28, 17 8

6. a) Given input {1, 16, 49, 36, 25, 64, 0, 81, 4, 9} and a hash function h(x) = x mod 10. Show the resulting: 8

i. hash table using linear probing

ii. hash table using separate chaining

b) What do you mean by spanning tree of graph? Find the minimal spanning tree of the following graph. 7



7. Write short notes on: (**Any two**) 2×5

a) Divide and conquer

b) B Tree

c) Binary Search