POKHARA UNIVERSITY

Level: Bachelor	Semester: Fall	Year:	2024
Programme: BE		Full Marks:	100
Course: Data Structures and Algorithms		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 are the advantages of using asymptotic analysis over empirical analysis of algorithms? Explain how Big oh notation us used to find upper bound of resource demand of an algorithm.

   OR

   Describe any two Algorithm Design techniques in detail. 8

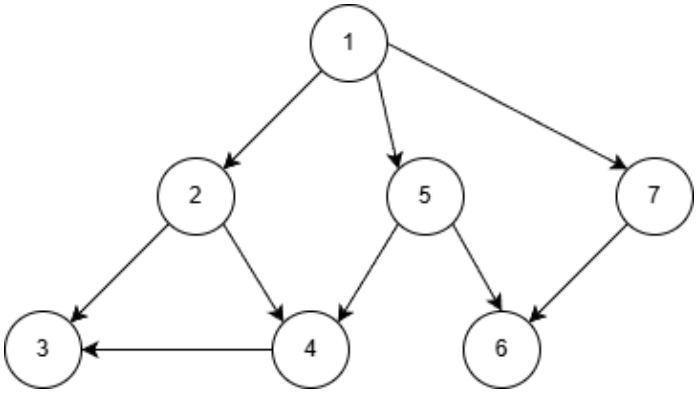
   b) What is the role of operator stack in conversion of infix to postfix expression? Explain by converting this A/B*C+(D-E)+F expression into post fix. 7
2. a) What is the purpose of base case in recursion? Explain with the example of calculating sum of natural numbers. 8

   b) Write the queue ADT using C++ class. Also implement the enqueue and dequeue operations for circular queue. 7
3. a) Write a node class to define a node of a doublely linked list. Write a function to insert a new node at the beginning of a singly linked list using C++ or C. 8

   b) Compare array data structure and linked list data structure. Explain the linked list implementation of stack in detail. 7
4. a) What is the reason behind to organize the data in a tree structure instead of organizing in linear fashion? Explain with suitable example. 7

   b) Define Balanced Binary Tree. Construct and AVL tree from the following data: 21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7. 8
5. a) What is a heap data structure? Explain how a max heap is used to sort the elements in an array. 8

   b) Explain an apply Depth First Seach (DFS) to traverse the following graph from vertex 1. 7



OR

What is transitive closure property of a graph? Explain Warshall's Algorithm with example.

6. a) Do you agree a hash system is a data structure? If so, what is the purpose of a hash system? Explain in detail. 5

   b) Implement the search operation in a hash system using linear probing in C or C++ language. 5

   c) Define the minimum spanning tree. Explain Kruskal's algorithm for finding the minimum spanning tree. 5

7. Write short notes on: (Any two) 2x5
   a) Rate of growth
   b) Radix Sort
   c) B-Tree