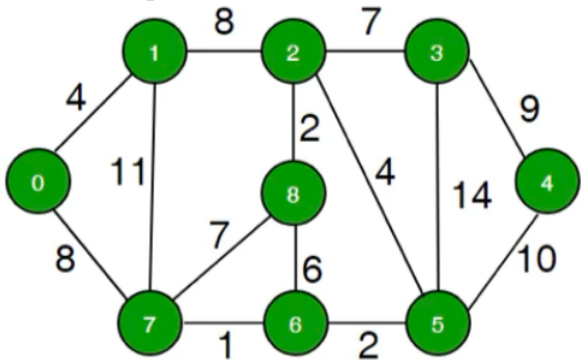
Name : Enrolment No. :	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2024

Program Name : MCA — Semester : I
Course Name : Data Structures and Algorithms — Time : 3 hours
Course Code : CSEG 7023 — Max. Marks: 100
No. of Page(s) : 2
Instructions : Attempt all sections.

SECTION-A(5Qx4M=20Marks)

S. No.	Questions	Marks	CO
Q.1	Discuss Binary Heap and its types with examples.	4	CO1
Q.2	Differentiate between Stack and Queue and list their respective operations.	4	CO1
Q.3	Discuss Row Major Order and Column Major order in two-dimensional arrays. Consider an array ARR[-5...15, 10...20] stores elements in Row Major Order with each element requiring 2 bytes of storage. Find the address of ARR[10][15] when the base address is 2500.	4	CO4
Q.4	Develop pseudo Code to find the sum of digits of a number.	4	CO4
Q.5	List out the different types of hashing functions.	4	CO1
	SECTION-B(4Qx10M= 40 Marks)		
Q.6	Define collision in hashing. Explain different methods to handle it.	10	CO2
Q.7	Discuss with examples different types of traversing a Binary Tree.	10	CO3
Q.8	Discuss Bubble Sort Algorithm for sorting an array with pseudo Code and example. Analyze its complexity.	10	CO3
Q.9	Discuss in detail Red-Black Trees, their properties, and operations with examples. OR Discuss in detail B Trees, their properties, and operations with examples.	10	CO2
	SECTION-C(2Qx20M= 40 Marks)		

Q.10	Define a minimum spanning tree (MST). Explain Prim's and Kruskal's algorithms for finding the MST. Construct the MST using Kruskal's algorithm for the following weighted graph and show all steps:  	20	CO4
Q.11	Explain Quick Sort Algorithm in brief with Pseudo Code and an example demonstrating step-by-step iterations. OR Explain Merge Sort Algorithm in brief with Pseudo Code and an example demonstrating step-by-step iterations.	20	CO3