QP Code: RA23BTECH128 | Reg. No | | | | | | | | | | | AY 23

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B. Tech (Fourth Semester - Regular) Examinations, April – 2025

23BCSPC24003– Design and Analysis of Algorithms

(CSE/CSE-AIML/CSE-DS)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

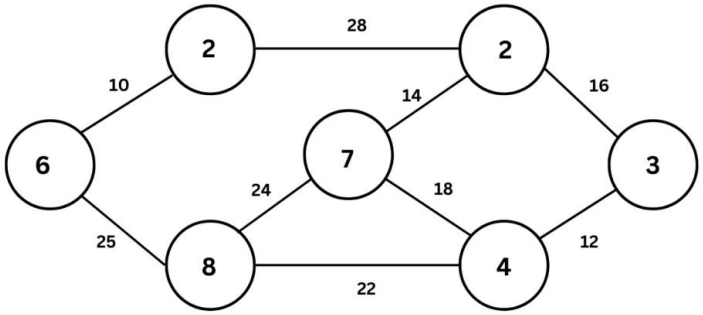
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

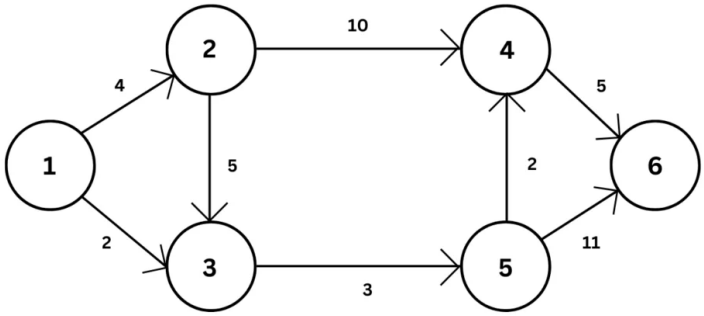
Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Define Priority queue.	CO1	K1
b.	What would be the complexity of 'Naïve string matching' algorithm, if the text T is of length 'n' and the pattern P is of length 'm'?	CO2	K2
c.	Define Hamiltonian path and Hamiltonian cycle.	CO3	K1
d.	Differentiate between dynamic programming and greedy approach.	CO4	K3
e.	Define 3SAT.	CO4	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Solve the following recurrence relation $T(n) = 4T(n/2) + n^2$, where n>1 (b). $T(n) = 4T(n/4) + n^2$, where n>1	5	CO1	K3
b.	What is asymptotic notation? Why asymptotic notation is used? Explain different asymptotic notations briefly	5	CO1	K1
	(OR)			
c.	Prove that any comparison sorting algorithm require Ω(nlogn) time in worst case.	5	CO1	K2
d.	Solve the following recurrence relation using recursive tree method. T(n) = T(n-1)+n. Here T(1) = 1	5	CO1	K3
3.a.	Write the Merge sort algorithm and analyse the best case and worst case time complexity	5	CO2	K1
b.	Find the Longest Common Subsequence of given two strings S1 = "ABCBDAB" and S2 = "BDCABA".	5	CO2	K3
	(OR)			
c.	Write the algorithm for Heap sort and analyse it.	5	CO2	K1
d.	A thief is trying to steal items from a store. He can carry items in a knapsack with a maximum weight capacity of 7 kg. He has the following 4 items to choose from: w=(1,3,4,5) and v=(1,4,5,7) find the optimal profit using dynamic approach.	5	CO2	K3
4.a.	Explain how the Depth-First Search (DFS) algorithm works on a graph. What data structure is typically used to implement DFS.	5	CO3	K2
b.	Write Kruskal's algorithm to compute the Minimum-cost Spanning Tree for the Graph.	5	CO3	K1
	(OR)			
c.	Compute the Minimum-cost Spanning Tree for the Graph given below using Prim's Algorithm	5	CO3	K3



d. Write Dijkstra's Algorithm to find the shortest path from vertex 1 in the following graph. 5 CO3 K2



5.a. Write the algorithm and Explain about the graph colouring problem. Find the no of minimum colors required for coloring triangle, rectangle, pentagon and Hexagon. What is the time complexity of graph coloring problem using backtracking? 5 CO4 K2

b. Write algorithm for KMP-Matcher computes the prefix function. Find the Pi table for the following strings: 5 CO4 K1

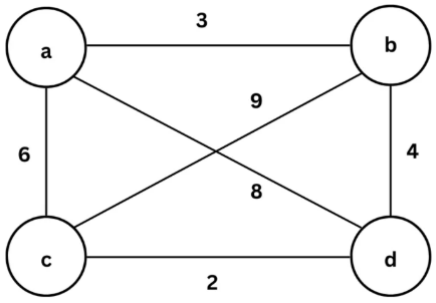
i) ABABAABAB ii) ABCDEAB iii) ABCDEBCA

(OR)

c. Write and explain Rabin Karp Pattern matching algorithms with a suitable example. What is spurious hit in this process. 5 CO4 K1

d. Given a set S = {5, 6, 10, 11, 12, 13, 15} and Sum=30, find the subset sum using backtracking approach. 5 CO4 K3

6.a. Apply Branch and Bound algorithm to solve the travelling salesman problem for 5 CO5 K2



b. Discuss in detail about the class P, NP, NP-hard and NP-complete problems. Give examples for each class. 5 CO5 K1

(OR)

c. Describe Travelling Salesperson Problem (TSP) using approximation algorithm with an example. 5 CO5 K1

d. Consider the following cost matrix for assigning 3 persons (P1, P2, P3) to 3 jobs (J1, J2, J3). The entry at row i and column j represents the cost of assigning person i to job j. 5 CO5 K3

	Job-1	Job-2	Job-3
Person 1	9	2	7
Person 2	6	4	3
Person 3	5	8	1

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