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Reg. No. : | | | | | | | | | | |

Question Paper Code: 54203

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Fourth Semester

Computer Science and Engineering

15UCS403- DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. What is the best time complexity of Bubble sort? CO1- R

   (a) N^2 (b) N log N (c) N (d) N $(\log N)^2$

2. Floyd – Warshall algorithm utilizes _____ to solve the all pairs shortest paths problem on a directed graph in _____ time. CO2- R

   (a) Greedy algorithm, $\theta(V^3)$ (b) Greedy algorithm, $\theta(V^2 \lg n)$

   (c) Dynamic programming, $\theta(V^3)$ (d) Dynamic programming, $\theta(V^2 \lg n)$

3. _____ is simply a brute-force approach to combinatorial problems. CO3- R

   (a) Exhaustive search (b) Permutations

   (c) Hamiltonian circuit (d) None of the above

4. The best-known algorithm for the single-source shortest-paths problem, called CO4-R

   (a) Dijkstra's algorithm (b) Prims Algorithm

   (c) Kruskal's algorithm (d) None of the above

5. Let X be a problem that belongs to the class NP. Then which one of the following is TRUE? CO5- R

   (a) There is no polynomial time algorithm for X.

   (b) If X can be solved deterministically in polynomial time, then P=NP.

   (c) If X is NP-hard, then it is NP-Complete

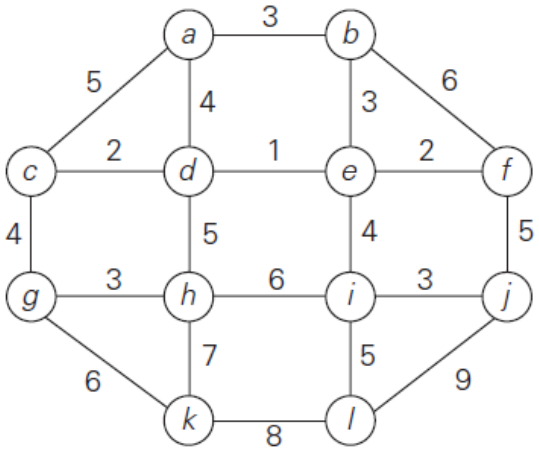
   (d) X may be undecidable

PART – B (5 x 3= 15 Marks)

6.	Discuss the principle of Optimality.	CO1- R	
7.	What is the complexity bubble sort.	CO1- U	
8.	Illustrate the general characteristics of Greedy algorithm	CO3- U	
9.	What is maximum flow problem?	CO4- R	
10.	Summarize the advantages and applications of Backtracking.	CO5- U	

PART – C (5 x 16= 80 Marks)

11.	(a)	Describe briefly the Time complexity estimation, Space complexity estimation and tradeoff between Time and Space complexity	CO1- App	(16)
		Or		
	(b)	Prove that for any two functions f(n) and g(n), we have f(n)=Ø(g(n)) if and only if f(n)=O(g(n)) and f(n) = ω(g(n)).	CO1- App	(16)
12.	(a)	Write an algorithm to perform binary search on a sorted list of elements. Analyze the algorithm for the best case, average case and worst case.	CO2- U	(16)
		Or		
	(b)	Explain the various algorithms for generating combinational objects.	CO2- U	(16)
13.	(a)	Explain the algorithm for computing Binomial Coefficient.	CO3- Ana	(16)
		Or		
	(b)	Apply Kruskal's algorithm to find a minimum spanning tree of the following graph	CO3- Ana	(16)



14. (a) Consider the following linear programming with two variables. CO4 U (16)

-x+y<=12,

x+y>=30,

2x+y<=90. Calculate the maximum value of z=4x+6y, where x>=0 and y>=0.

Or

(b) Explain how linear programming is solved by simplex method. CO4- Ana (16)

15. (a) Apply Backtracking technique to solve the following instance of subset sum problem: S ={1,3,4,5} and d=11 CO5- U (16)

Or

(b) Solve the following instance of knapsack problem by Branch and Bound algorithm. CO5- U (16)

Item	**Weight**	**Profit**	
1	5	$40	
2	7	$35	
3	2	$18	w = 15
4	4	$4	
5	5	$10	
6	1	$2	