Code No: 155EV **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2024
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science and Engineering – Artificial Intelligence and Machine Learning)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is Theta notation?	[2]
b)	Differentiate between Pseudocode and an algorithm.	[3]
c)	What is the importance of Sum of Subsets?	[2]
d)	Write the differences between Backtracking and recursion.	[3]
e)	What is Dominance rule?	[2]
f)	What is the importance of Reliability design?	[3]
g)	What is feasible solution?	[2]
h)	What are the advantages and disadvantages of Greedy method?	[3]
i)	What is the purpose of Branch and Bound?	[2]
j)	Write a non deterministic algorithm to search an element in an array.	[3]

PART – B

(50 Marks)

2.a) Write an algorithm of Linear search and analyze the time complexity of the same.
b) Derive the time complexity of Quick sort in worst case. [5+5]

OR

3.a) Derive the time complexity of Strassen's matrix multiplication.
b) Sort the following list of elements using Quick sort and mention the output at each pass and iteration [5+5]

30, 67, 23, 18, 55, 79, 80, 15, 12

4.a) Explain about Graph coloring with an example.
b) Write an algorithm of n-Queen's problem and also analyze the time complexity of the same. [5+5]

OR

5.a) Explain the Disjoint set operations with an example.
b) Discuss the general method for backtracking. [5+5]

6. Construct the OBST of the following data:
n = 4 and (q_1, q_2, q_3, q_4) = (do, if, int, while). The values for p's and q's are given as p (1:4) = (3,3,1,1) and q(0:4) = (2,3,1,1,1). [10]

OR

7.a) Explain the all pairs shortest path problem with an example.
b) Write an algorithm of 0/1 Knapsack problem using Dynamic Programming. [5+5]

8.a) Write an algorithm of Kruskal's minimum cost spanning tree.
b) Explain the Greedy Knapsack problem with an example. [5+5]

OR

9.a) Solve the Job Sequencing with deadline problem using greedy method for the given data N = 7, Profits are P= {3,5,20,18,1,6,30} and Deadlines D = { 1,3,4,3,5,1,2} respectively.
b) Explain the applications of Greedy method. [6+4]

10.a) Prove that CNF satisfiability α clique decision problem.
b) Explain the classes of NP- Hard and NP-Complete. [5+5]

OR

11. Draw the portion of the state space tree generated by LCBB for the following:
knapsack instances: n=5, (P_1 , P_2, P_3 , P_4, P_5) = (10, 15, 6, 8, 4)
(W_1 , W_2, W_3 , W_4 , W_5) = (4, 6, 3, 4, 2) and m = 12 [10]

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