

ANURAG Engineering College
(An Autonomous Institution)

III B.Tech I Semester Regular Examinations, December – 2024
DESIGN AND ANALYSIS OF ALGORITHMS
(COMMON TO CSE, IT AND AI&ML)

Time: 3 Hours

Max. Marks: 60

Section – A (Short Answer type questions)**(10 Marks)****Answer All Questions**

1. Explain Big-Oh Notation.
2. In what way a time complexity differs from space complexity.
3. What is the description on greedy method.
4. Write an algorithm for simple Union Operation?
5. What you mean by dynamic programming.
6. Explain principle of optimality.
7. Write a note on LC-Search?
8. Write the applications of Backtracking.
9. What is meant by non-deterministic algorithm?
10. Specify the relationship between P & NP Problems.

Course Outcome	B.T Level	Marks
CO1	L1	1M
CO1	L1	1M
CO2	L1	1M
CO2	L2	1M
CO3	L1	1M
CO3	L1	1M
CO4	L1	1M
CO4	L1	1M
CO5	L1	1M
CO5	L2	1M

Section B (Essay Questions)**Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) What is time complexity of an algorithm. Describe the different asymptotic notations with suitable examples.

CO1 L2 10M

OR

- B) Explain Strassens matrix multiplication algorithm and multiply the following matrix using Strassens matrix multiplication.

CO1 L2 10M

$$B = \begin{pmatrix} 4 & 6 & 2 & 7 \\ 0 & 5 & 6 & 1 \\ 0 & 0 & 7 & 5 \\ 0 & 0 & 0 & 8 \end{pmatrix} \quad C = \begin{pmatrix} 4 & 0 & 0 & 0 \\ 5 & 5 & 0 & 0 \\ 7 & 4 & 7 & 0 \\ 3 & 3 & 8 & 8 \end{pmatrix}$$

12. A) i) Explain the Kruskal's algorithm with an example.
ii) Describe Union and Find algorithms.

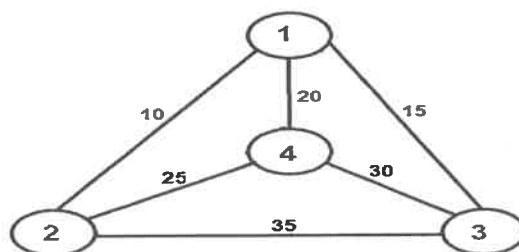
CO2 L2 5M
L3 5M**OR**

- B) Explain Greedy Method? Explain 0/1 Knapsack Problem? Solve 0/1 Knapsack problem Using Greedy Method for the instance $n=7$, $m=15$ (p_1, p_2, \dots, p_7) = (10, 5, 15, 7, 6, 18, 3) (w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1).

CO2 L3 10M

13. A) Solve the following travelling salesperson problem using Dynamic programming?

CO3 L3 10M

**OR**

- B) Solve 0/1 knapsack problem for the following instance using dynamic programming $n=4$, $(w_1, w_2, w_3, w_4) = (2, 3, 4, 5)$
 $(p_1, p_2, p_3, p_4) = (1, 2, 5, 6)$, $m=8$. CO3 L3 10M
14. A) i) Describe Backtracking technique to graph colouring problem?
 ii) Draw the state space tree for graph colouring. CO4 L2 5M
 L3 5M
- OR**
- B) Draw the portion of state space tree generated by LCBB for the following knapsack instances:
 $N=4$, $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$
 $(W_1, W_2, W_3, W_4, W_5) = (2, 4, 6, 9)$ and $m=15$ CO4 L3 10M
15. A) Explain P, NP, NP-Hard, NP-Complete Problems and specify the relationship among them? CO5 L2 10M
- OR**
- B) i) Briefly explain deterministic and Nondeterministic algorithms with example. CO5 L2 5M
 ii) Explain Node cover decision problem. 5M