Design & Analysis of Algorithms

Unit V

Part – A (Short Answer Questions)

S.No.	Questions	BT	CO	PO
1	Define Class P.	L4	CO1	PO1
2	Compare NP-Hard and NP-Complete Problems.	L4	CO2	PO2
3	Define NP-Hard Problem.	L4	CO3	PO1
4	Define NP-Complete Problem.	L4	CO1	PO1
5	Define Deterministic Problem.	L4	CO2	PO1
6	Define Non-Deterministic Problem.	L4	CO1	PO1
7	Define: (i) LC-Search (ii) Branch and Bound (BB) (iii) FIFO Branch and Bound.	L4	CO3	PO2
8	Explain Optimization Problem.	L1	CO2	PO2
9	Define Bounding Function.	L1	CO3	PO2
10	Define Cook's Theorem.	L1	CO1	PO1

Part – B (Long Answer Questions)

Q.No.	Question	BT	CO	PO
11(a)	Draw the portion of the state space tree generated by FIFO Branch and Bound for the Job Sequencing with Deadlines instance: $n = 5$, $(p_1, p_2, ..., p_5) = (6, 3, 4, 8, 5)$, $(t_1, t_2, ..., t_5) = (2, 1, 2, 1, 1)$, and $(d_1, d_2, ..., d_5) = (3, 1, 4, 2, 4)$. Determine the penalty corresponding to an optimal solution.	L2	CO2	PO3
11(b)	Explain Deterministic and Non-Deterministic Algorithms.	L1	CO3	PO2
12(a)	Write Non-Deterministic Algorithms for Sorting and Searching.	L4	CO1	PO3
12(b)	Write a Non-Deterministic Knapsack Algorithm.	L1	CO3	PO3
13(a)	Explain how P and NP problems are related.	L1	CO3	PO1
13(b)	Distinguish between NP-Hard and NP-Complete Problems.	L3	CO4	PO2
14(a)	Define Bounding Function. State the 0/1 Knapsack FIFO Branch and Bound problem and explain the procedure for the instance: $n = 4$, $m = 15$, $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$, $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$.	L1	CO2	PO3
14(b)	Distinguish between Backtracking and Branch-and-Bound Techniques.	L1	CO3	PO2
15(a)	Explain the strategy used to prove that a problem is NP-Hard.	L1	CO1	PO2
15(b)	Explain the Travelling Salesperson Problem using the LC Branch and Bound procedure. Draw the portion of the state space tree and find an optimal solution.	L1	CO3	PO3
16(a)	State and prove Cook's Theorem.	L2	CO1	PO2
16(b)	Draw the portion of the state space tree generated by LC Branch and Bound for the 0/1 Knapsack instance: $n = 5$, $(p_1, p_2,$	L4	CO2	PO3

	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. Find an optimal solution using the fixed-tuple-size approach.			