Total No. of Questions : 12]

SEAT No. :

**P3427**

[Total No. of Pages : 3

# [4959]-202

## B.E. (Computer Engineering)

## DESIGN & ANALYSIS OF ALGORITHMS

## (2008 Course) (Semester - I) (410441)

*Time : 3 Hours]* *[Max. Marks : 100*

***Instructions to the candidates:***

1) ***Answer 3 questions from Section - I and 3 questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

## SECTION - I

***Q1)*** a) What is divide and conquer strategy? Explain an algorithm for quick sort. State its time complexity. **[8]**

b) Prove by contradiction that "there are infinitely many prime numbers". **[6]**

c) Explain the Greedy Kruskal's minimum spanning tree. **[4]**

OR

***Q2)*** a) Define the following: **[4]**

i) Big "oh".

ii) Theta

b) Solve the following job sequencing with deadlines problem using greedy method. **[8]**

Number of jobs (N) = 4

Profits associated with jobs $(P_1, P_2, P_3, P_4) = (100, 10, 15, 27)$.

Deadlines associated with jobs $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$.

c) Explain Dijkstra's algorithm for a directed graph. **[6]**

***P.T.O.***

***Q3)*** a) Solve the instance of 0/1 knapsack problem using dynamic programming: **[8]**

$n = 4, m = 25$

$(P_1, P_2, P_3, P_4) = (10, 12, 14, 16)$

$(W_1, W_2, W_3, W_4) = (9, 8, 12, 14)$

b) Explain Optimal Binary Search Tree problem. How it is solved using dynamic programming? **[8]**

OR

***Q4)*** a) What is the flow shop scheduling problem? Explain how principle of optimality holds for this problem. How it is solved using dynamic programming approach? **[8]**

b) Explain how dynamic programming can be used for solving k-stage graph problem. **[8]**

***Q5)*** a) Explain backtracking strategy and write general recursive and iterative backtracking algorithms. **[8]**

b) Explain the difference between FIFO and LC Branch and Bound solution to 0/1 knapsack. **[8]**

OR

***Q6)*** a) Write recursive backtracking schema for m coloring of the graph. Determine the time complexity of the same. **[8]**

b) Explain branch and bound strategy. What are its disadvantages? **[8]**

## SECTION - II

***Q7)*** a) What is satisfiability problem? Explain in detail. **[6]**

b) Prove that vertex cover problem is NP-complete. **[8]**

c) Explain classes NP-Hard and NP-complete. **[4]**

OR

***Q8)*** a) Prove that CNF-satisfiability reduces to clique decision problem. **[6]**

b) Explain node cover decision problem. **[6]**

c) Explain NP-Hard scheduling problem. **[6]**

***Q9)*** a) Write an algorithm for prefix computation. Determine its time complexity. **[8]**

b) How Quicksort algorithm can be implemented on multiprocessor system? Explain with example. **[8]**

OR

***Q10)***a) Explain parallel computational models. **[8]**

b) Explain how graph problems can be solved using parallel processors. **[8]**

***Q11)***a) What is Convex Hull? Explain Quick Hull and Graham's Scan algorithm. **[8]**

b) Explain a deadlock detection and avoidance algorithm. **[8]**

OR

***Q12)***a) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. **[8]**

b) Explain Huffman coding theory algorithms. **[8]**