

Total No. of Questions : 12]

SEAT No. :

**P3427**

**[4959]-202**

[Total No. of Pages : 3

**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]

