

T.E. (IT)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Pattern) (314455)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

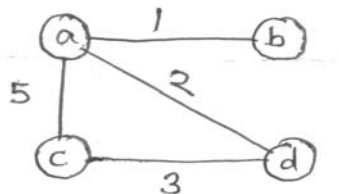
- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define algorithm. Name two types of algorithmic complexities based on computer resources. [6]
- b) Write an algorithm for searching an element in an array of size n . Calculate complexity of this algorithm. [10]

OR

- Q2)** a) Define best-case, worst-case and average-case efficiency. Is average-case efficiency, an average of best-case and worst-case efficiencies? [6]
- b) Write an algorithm to find MaxElement from unsorted array of size n . Calculate complexity of this algorithm. [10]
- Q3)** a) Find MST using Prim's algorithm. [6]



- b) Comment on the complexity of Prim's algorithm. Analyse complexity of Prim's algorithm using Greedy approach. [12]

OR

P.T.O.

Q4) a) What is divide and conquer (D & C) strategy? Write Master's theorem. [6]

b) A binary search splits array into two parts. If it splits array into three parts, write down recurrence relation and complexity. [12]

Q5) Using Warshall's algorithm, find transitive closure for

$$\begin{matrix} & a & b & c & d \\ \begin{matrix} a \\ b \\ c \\ d \end{matrix} & \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix} \end{matrix}$$

State its complexity. Which algorithm design technique does it use? State its advantages. [16]

OR

Q6) a) What is memory function? Explain why it is advantageous to use memory functions. [8]

b) What is BST? What is OBST? [8]

SECTION - II

Q7) a) Current configuration is (7, 5, 3,1) for 8-queens problem. Find answer tuple. [10]

b) Explain implicit and explicit constraints. [6]

OR

Q8) a) Solve the following knapsack problem using backtracking [10]

i	p_i	w_i
1	24	15
2	15	10
3	25	18

for $n = 3$ and $m = 20$.

b) What are planar graphs? Explain graph coloring. [6]

Q9) Solve the following job scheduling problem using LCBB.

[18]

Job	p_i	d_i	t_i
1	5	1	1
2	10	3	2
3	6	2	1
4	3	1	1

Where p_i : indicates penalty if i^{th} job is not completed by deadline d_i . p_i has burst time t_i .

We want to have minimum penalty.

OR

Q10)a) Explain dynamic reduction with all steps with respect to Travelling Salesperson problem. **[6]**

b) Explain for Branch and Bound- **[12]**

i) LIFO search

ii) FIFO search

iii) LC search

Q11)a) What is a deterministic and non-deterministic algorithm? Write a non-deterministic algorithm for searching element. **[8]**

b) Prove that : A clique problem is NP-complete. **[8]**

OR

Q12)a) Write a note on Satisfiability problem. **[8]**

b) Explain : NP-complete, NP-Hard, Decision Problem and Polynomial Time Algorithm. **[8]**

