

Total No. of Questions : 12]

SEAT No. :

P4284

[4758] -108

[Total No. of Pages :3

T.E. (I.T.)

DESIGN AND ANALYSIS OF ALGORITHMS

(2008 Course) (Semester -II) (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 whenever necessary.
- 4) Figures to the right indicates full marks.
- 5) Assume suitable data, if necessary.

**SECTION - I**

**Q1)** a) Prove by induction  $1 + 2 + 3 + \dots + n = n(n + 1)/2$ . [8]

b) Write an algorithm for searching an element in an array of size  $n$ . Calculate complexity of this algorithm. [8]

OR

**Q2)** a) Explain  $O$ ,  $\Theta$  and  $\Omega$  notations. Give examples. [8]

b) Prove by contraposition-if  $x$  is odd,  $x+8$  is odd. [8]

**Q3)** a) Explain convex hull problem with example. [8]

b) What is MST? Distinguish between prim's and Kruskal's algorithm. [10]

OR

**Q4)** a) Explain Masters theorem. [8]

b) Why Huffman code is called prefix free code? Construct a Huffman tree for the following data: [10]

Character	A	B	C	D	'-'
Probability	0.35	0.1	0.2	0.2	0.15

Find codes of A,B, C, D and '-'.

P.T.O.

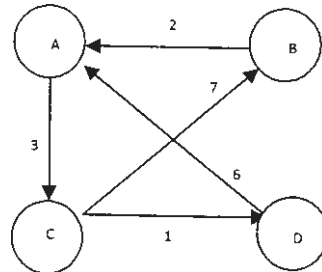
**Q5)** Explain Warshall's algorithm with example.

[16]

OR

**Q6)** Solve using Floyd's algorithm for all pairs shortest paths.

[16]

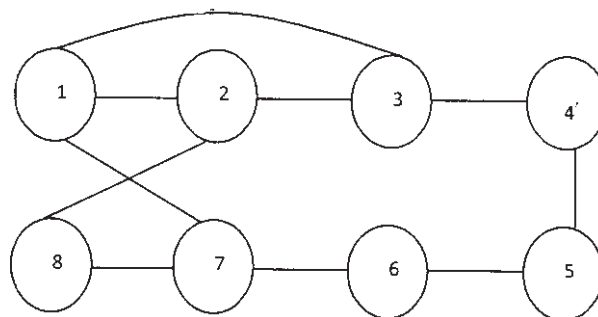


### SECTION - II

**Q7) a)** What is backtracking technique? Find one solution for 4-Queen's problem. Show all the steps and explain why you need to backtrack.[8]

b) Find Hamiltonian Cycle for

[10]



OR

**Q8) a)** A Solve the following knapsack problem using backtracking

[10]

i	pi	wi
1	24	15
2	15	10
3	25	18

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

b) Explain the following terms: Live nodes, expanding nodes, bounding function and solution space. [8]

**Q9) a)** Explain the terms: [8]

Branch and Bound, LC, LIFO and Bounding function. How are LIFO and LC techniques different?

b) Explain for Branch and Bound- [8]

i) LIFO search

ii) FIFO search

iii) LC Search

OR

**Q10)** Solve the following TSP using LCBB. Find total cost and sequence of nodes travelled. [16]

Nodes	1	2	3	4	5
1	Inf	20	30	10	11
2	15	inf	16	4	2
3	3	5	inf	2	4
4	19	6	18	inf	3
5	16	4	7	16	inf

**Q11)a)** Explain deterministic and non-deterministic algorithms. Illustrate with an example. [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]

