Total No. of Questions : 12]

SEAT No. :

P4284

[Total No. of Pages :3

[4758] -108
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 $1+ 2 +3 + ...+ n = n (n + 1)/2$. **[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, $\ominus$ and Ω 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

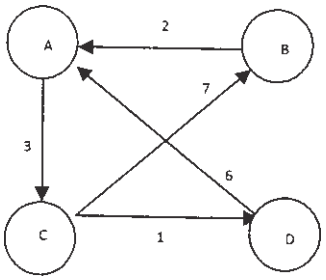
Find codes of A,B, C, D and '-'.

P.T.O.

Q5) Explain Warshall's algorithm with example. **[16]**

OR

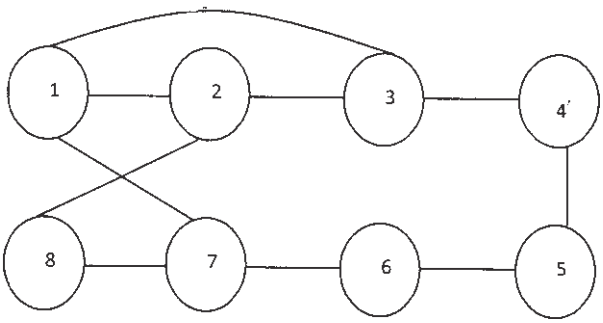
Q6) Solve using Floyd's algorithm for all pairs shortest paths. **[16]**



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 deteministic 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]**

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