Total No. of Questions :12]

SEAT No. :

P2466

[Total No. of Pages :4

[5153] - 100
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) ***Draw neat diagrams wherever necessary.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

SECTION -I

Q1) a) Find out the time complexity for the recurrence equation as follows: **[8]**

i) $T(n) = T(n/2)+1$

ii) $T(n) = 2T(n/2) +n$

Also explain whether above equations belong to Searching or Sorting.

b) Prove by contradiction - "there are infinitely many prime numbers". **[8]**

OR

Q2) a) Suppose you have algorithms with running time listed below. How much faster will they get if input size is reduced by half. **[8]**

i) $100n^2$

ii) $n \log n$

iii) 2^n

iv) n^2

b) Write an algorithm to search an element in an array of size n. Calculate complexity of this algorithm. **[8]**

P.T.O.

Q3) a) What is divide and conquer strategy? Explain Master's theorem. **[8]**

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

OR

Q4) a) Which algorithm uses the principle of decrease-by-half? Why is it called so? **[8]**

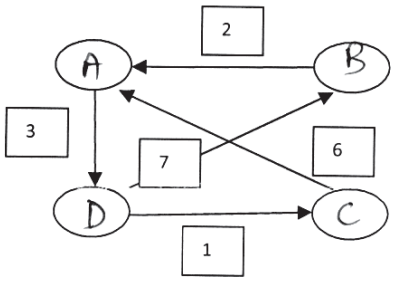
b) Write Kruskal's algorithm. Comment on its complexity. **[8]**

Q5) a) What is memory function? Explain why it is advantageous to use memory functions. **[9]**

b) Explain with suitable example Warshall's algorithm. **[9]**

OR

Q6) Find all-pairs shortest path using Floyd's algorithm for the following weighted graph. **[18]**



SECTION -II

Q7) a) Explain the following terms: **[8]**

Live nodes, expanding nodes, bounding funciton and solution space.

b) What are planar graphs? Explain graph coloring with suitable examples. **[8]**

OR

Q8) What is backtracking? What kind of problems does it solve? Solve the following knapsack problem using backtracking. **[16]**

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

For n=3 and m=20.

Q9) a) Explain the terms: **[9]**

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

b) Differentiate between Backtracking and Branch and Bound. **[9]**

OR

Q10) 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. pi has burst time t_i. We want to have minimum penalty.

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

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

OR

Q12)a) Waht is satisfiability problem? Explain DNF and CNF. **[8]**

b) Explain NP-Complete and NP-Hard. Give examples. Are all NP-Complete problems NP-Head or vice versa? Justify. **[8]**

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