Total No. of Questions : 12]

SEAT No. :

P2789

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[5154]-171

B.E. (Computer Engineering)

DESIGN & ANALYSIS OF ALGORITHMS

(2008 Pattern) (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) Prove if $f(n)=a_m n^m+.....+a_1+a_0$ Then $f(n) = O(n^m)$ **[8]**

b) Write control abstraction for divide and conquer strategy. Explain quick sort algorithm. State its time complexity. **[10]**

OR

Q2) a) Define asymptotic notations. Explain their significance in analyzing algorithms. **[6]**

b) Write and explain Dijkstra's algorithm for a directed graph. **[6]**

c) What is Mathematical Induction? How it can be used to prove that an algorithm is correct? **[6]**

Q3) a) Solve the instance of 0/1 Knapsack problem using dynamic programming: n=4, m=25

$(P_1,P_2,P_3,P_4)=(10,12,14,16)$

$(W_1,W_2,W_3,W_4)=(9,8,12,14)$ **[8]**

b) What is the Flow Shop Scheduling problem? Explain how principle of optimality holds for this problem. Also explain how it is solved using dynamic programming. **[8]**

OR

P.T.O.

Q4) a) State and explain the principle of Dynamic Programming. Name the elements of Dynamic Programming and Compare Dynamic Programming with Greedy method. **[8]**

b) What is the optimal binary search tree problem? Explain how it is solved using dynamic programming. **[8]**

Q5) a) Explain backtracking strategy and write general recursive and iterative backtracking algorithms. **[8]**

b) Explain the solution to N-Queen's problem using branch and bound method. **[8]**

OR

Q6) a) Compare the Backtracking method with a depth first search technique. Explain backtracking algorithm for Hamiltonian Cycles problem. **[8]**

b) Explain the difference between FIFO and LC Branch and Bound solution to the 0/1 Knapsack problem. **[8]**

SECTION - II

Q7) a) Prove that Satisfiability reduces to Chromatic Number Decision Problem (CNDP). **[6]**

b) Prove that vertex cover problem is NP-complete. **[8]**

c) Differentiate between NP-hard and NP-complete algorithms. **[4]**

OR

Q8) a) Show that the partition problem reduces to minimum finish time non-preemptive schedule. **[6]**

b) Explain NP hard code generation problem. **[6]**

c) State and Explain Cook's Theorem **[6]**

Q9) a) Explain with example parallel evaluation of expression. **[8]**

b) Prove that "the maximum of n keys can be found in O(log log n) time using n common CRCW PRAM processors". **[8]**

OR

Q10)a) Explain how graph problems can be solved on parallel processors. **[8]**

b) Explain pointer doubling problem with algorithm. What is time complexity of the algorithm? **[8]**

Q11)a) What is Convex Hull? Explain Quick Hull and Graham's Scan algorithm. **[8]**

b) Explain any two image edge detection algorithms. **[8]**

OR

Q12)a) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm.a [8]**[8]**

b) What is deadlock? Explain how resource allocation can be done to avoid deadlock. Write resource allocation algorithm. **[8]**

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