Previous 2006 to 2011 Question Papers.

MCA –I I Year

Design and Analysis of Algorithms

PROF. G. RAM REDDY CENTER FOR DISTANCE EDUCATION

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Code No. 3859/CDE

FACULTY OF INFORMATICS

MCA II-Year (CDE) (Main) Examination, August/September, 2008

DESIGN AND ANALYSIS OF ALGORITHMS

Time : Three Hours] [Maximum Marks : 80

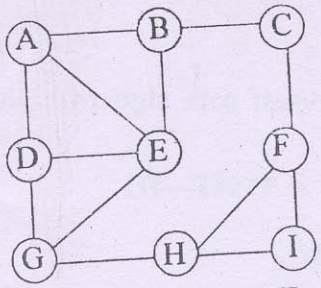
Answer **ONE** question from each unit.

All questions carry equal marks.

UNIT—I

1. (a) Give definitions of θ, Ω, O (Theta, Omega and Big Oho) notations. What is their significance ? 8

   (b) Write about the Breadth First and Depth First traversal of a GRAPH for the following diag. 8



OR

2. (a) Write the applications of STACKS. 2

   Why to convert a given infix expression to REVERSE POLISH/POLISH notation ? 2

   Convert the following INFIX expression to REVERSE POLISH notation and evaluate it using STACKS : 8

   (A + B) * D + E/(F + A * D) + C.

(Contd.)

(b) In a Binary tree prove that $n_0 = n_2 + 1$ where

n_0 is the number of nodes with degree ZERO

n_2 is the number of nodes with degree TWO. 4

UNIT—II

3. (a) Write a control abstraction for 'GREEDY METHOD'. 2

(b) Given the start and stop times of jobs as under, solve it using job sequencing with DEADLINES algorithm :

{(1, 3), (1, 4), (2, 5), (3, 7), (4, 7), (6, 9), (7, 8)}. 6

(c) Write an algorithm for PRIM's method of finding a MINIMUM SPANNING TREE. Analyze its time complexity. 8

OR

4. (a) Write an algorithm for SELECTION SORT. Analyze its BEST, AVERAGE and WORST case time complexity. 10

(b) Explain the single source shortest path algo with an example. 6

UNIT—III

5. Define the 'Principle of Optimality'. 2

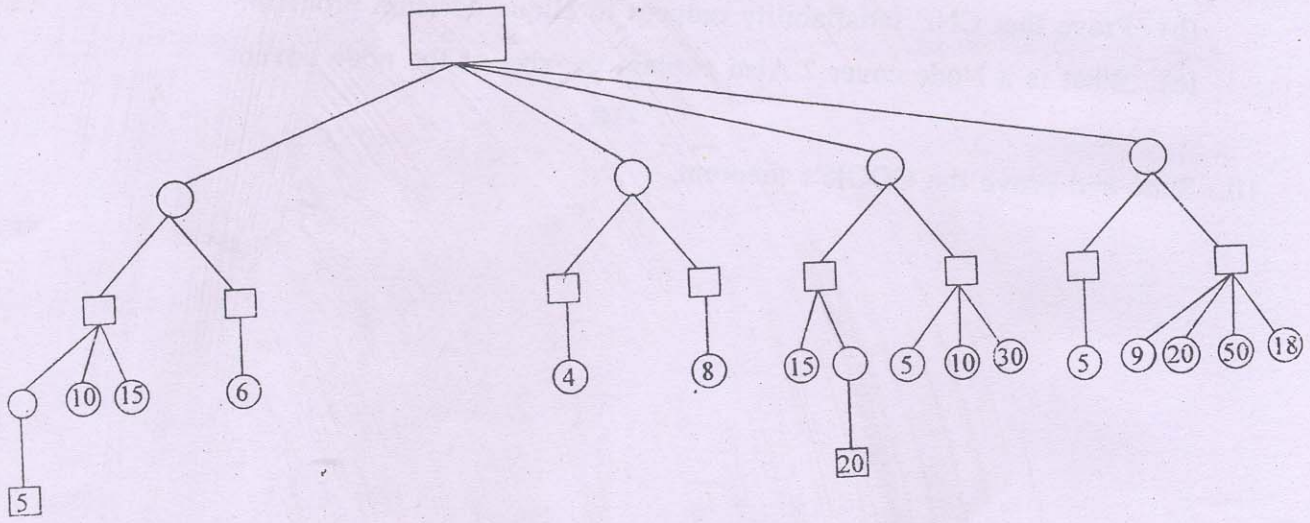
Construct the Optimal Binary Search Tree given n = 4; (a_1, a_2, a_3, a_4) = (do, if, read, while); P(1 : 4) = (3, 3, 1, 1) and Q(0 : 4) = (2, 3, 1, 1, 1). 12

Analyze its time complexity. 2

OR

6. (a) Write an Algorithm SWAPTREE(T) which takes a binary tree and swaps the left and right children of every node; where T is the pointer to the root node of the tree. Explain with an example. 6

(b) Define α, β cut-offs in a Game tree. What is their significance ? For the following hypothetical game tree :



(i) Obtain the value at the root node using min-max technique.

(ii) Clearly show the α–β cut-offs. 10

UNIT—IV

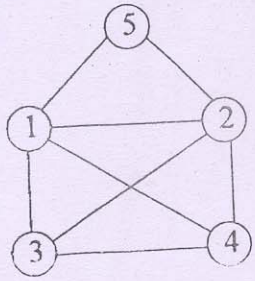
7. Draw the portion of the state space tree generated by LCKNAPP for the knapsack instances; given

$n = 5$, $(p_1, p_2, \ldots\ldots, p_5) = (10, 15, 6, 8, 4)$

$(w_1, w_2, \ldots\ldots, w_5) = (4, 6, 3, 4, 2)$ and $M = 12$. 16

OR

8. Write an Algorithm to find all the Hamiltonian cycles in a given graph. What is its time complexity ? Trace your algorithm for the following graph : 16



(Contd.)

UNIT—V

9. (a) Define NP HARD and NP COMPLETE problems. 4

(b) Prove that CNF satisfiability reduces to clique decision problem 8

(c) What is a Node cover ? Also explain the size of the node cover. 4

OR

10. State and prove the COOK's theorem. 16

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FACULTY OF INFORMATICS

M.C.A. II Year CDE (Main) Examination, August/September 2007

DESIGN AND ANALYSIS OF ALGORITHMS

Time : 3 Hours] [Max. Marks : 80

Answer **one** *question from each* **Unit.**

All questions carry equal marks.

Unit – I

4 × 4

1. Explain the following:

   (a) Stack (b) Theta-notation

   (c) Heap (d) Hashing.

Or

2. (a) Write algorithms for the following operations in Stack. 8

   (i) Add (ii) Delete

   (b) Discuss about 'Heap Sort'. Give an example. 8

Unit – II

3. (a) Sort the following set of numbers using 'merge sort' technique. 8

   310 285 179 652 351

   423 861 254 450 520

   (b) Explain how to find Kth smallest element using 'SELECT' algorithm. 8

Or

4. (a) Write the Greedy algorithm for sequencing unit time jobs with deadlines and profits. 10

   (b) Briefly explain about 'Single Source Shortest Paths'. 6

Unit – III

5. (a) Discuss the features of 'Multistage Graphs'. 10

   (b) Explain about 'Travelling Salesperson Problem'. 6

Or

6. (a) Differentiate between BFS and DFS Spanning Trees. 10

   (b) Briefly explain about 'Articulation Point'. 6

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Unit – IV

7. (a) Explain about general backtracking method, using 4-queens problem. 10
   (b) What is the purpose of 'Hamiltonian Cycle' ? 6

Or

8. (a) Explain how to solve the '15-puzzle problem' using branch-and-bound technique. 10
   (b) Briefly describe about '0/1 knapsack problem'. 6

Unit – V

9. Explain the following : 6 + 10
   (a) Non-deterministic sorting
   (b) NP-complete problems

Or

10. (a) Write and explain Clique Decision Problem. 10
    (b) What is meant by 'Halting Problem'. 6

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FACULTY OF INFORMATICS

M.C.A. II Year Main Examination, August 2006

Subject: DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours. Max. Marks: 80

Note: Answer one question from each Unit. All questions carry equal marks.

UNIT – 1

1. Explain the following. 4 x 4

   a) Algorithm
   b) O-notation
   c) Full binary tree
   d) FIND algorithm

OR

2. a) Differentiate between 'stacks' and 'queues'. 8
   b) Discuss about 'linked representation for the binary trees'. 8

UNIT – 2

3. a) Write the 'Merge Sort' algorithm. Give an eample. 8
   b) Describe about 'Minimum Spanning Trees'. 8

OR

4. a) Explain the logic involved in 'Quick Sort'. 10
   b) Briefly explain about 'knapsack problem'. 6

UNIT – 3

5. a) Discuss the features of 'Optimal Binary Search Trees'. 10
   b) Explain about 'biconnected components'. 6

OR

6. a) Write short notes on 'Reliability Design'. 10
   b) Briefly explain about 'Depth First Search'. 6

UNIT – 4

7. a) Describe about '8-queens problem' using using backtracking concept. 10
   b) What is the purpose of 'Graph Coloring'. 6

OR

8. a) Describe in detail about 'LC-Search'. 10
   b) Briefly describe about '15-puzzle problem'. 6

UNIT – 5

9. Explain the following. 6 + 10

   a) Non-deterministic algorithm.
   b) NP-hard problems.

OR

10. a) Write and explain Cook's theorem. 10
    b) What is meant by 'CFN-satisfiability'. 6

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