Reg. No. | | | | | | | | | | | | |

Question Paper Code : 51379

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fourth Semester

Computer Science and Engineering

CS 2251/CS 41/CS 1251/080230013/10144 CS 402 – DESIGN AND ANALYSIS OF ALGORITHMS

(Regulations 2008/2010)

(Common to PRCS 2251/10144 CS 402 – Design and Analysis of Algorithms for B.E. (Part-Time) Third Semester – Computer Science and Engineering – Regulations 2009/2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is average case analysis ?
2. Define program proving and program verification.
3. What is the draw back of greedy algorithm ?
4. What is the time complexity of binary search ?
5. State Principle of optimality.
6. What is 0/1 knapsack problem ?
7. Differentiate live and dead nodes.
8. What is a Hamiltonian cycle ?
9. Distinguish between BFS and DFS.
10. An NP - hard problem can be solved in deterministic polynomial time, how ?

PART – B (5 × 16 = 80 marks)

11. (a) Explain the Towers of Hanoi problem and solve it using recursion.

OR

(b) (i) Solve the given recurrence relation.

$$T(n) = \begin{cases} 2T(n/2) + 2 & n > 2 \\ 1 & n = 2 \\ 0 & n = 1 \end{cases}$$

(ii) Describe best, worst and average case analysis of linear search algorithm.

12. (a) (i) Trace maximum and minimum (using divide conquer) algorithm for the following set of numbers.

20, 35, 18, 8, 14, 41, 3, 39, –20.

(ii) Write a pseudo code using divide and conquer technique for finding the position of the largest element in an array of N numbers.

OR

(b) (i) Sort the following set of elements using merge sort : 12, 24, 8, 71, 4, 23, 6, 89, 56.

(ii) Solve the given knapsack problem using greedy technique.

n = 3, m = 20 , (p1, p2, p3) = (25, 24, 15), (w1, w2, w3) = (18, 15, 10).

13. (a) (i) Explain the multistage graphs with an example. **(8)**

(ii) Write notes on optimal binary search trees. **(8)**

OR

(b) Consider the Travelling Salesperson instance defined by the following cost matrix.

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

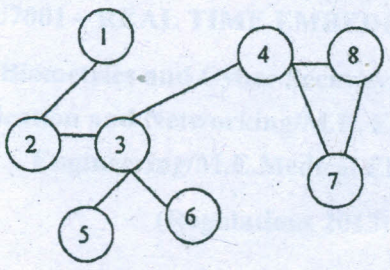
Draw the state space tree and show the reduced matrices corresponding to each of the node. **(16)**

14. (a) Explain the algorithm for finding all m-colorings of a graph.

OR

(b) Write down and explain the procedure for tackling the 8-queens problem using a backtracking approach.

15. (a) For the following graph identify and explain the articulation points and draw the bi-connected components. **(16)**



OR

(b) Write a complete LC branch-and-bound algorithm for the job sequencing with deadlines problem. Use the fixed tuple size formulation. **(16)**
