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

Question Paper Code : 31301

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Computer Science and Engineering

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

(Regulation 2008/2010)

(Common to PTCS 2251 – Design and Analysis of Algorithms for B.E. (Part-Time) Third Semester – Computer Science and Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the components of fixed and variable part in space complexity?

2. Define little Oh and Omega notations.

3. Give the control abstraction for divide and conquer technique.

4. Define feasible and optimal solution.

5. State Principle of optimality.

6. What is 0/1 knapsack problem?

7. What are explicit constraints and implicit constraints?

8. What is a Hamiltonian cycle?

9. State the property of NP-Complete problem.

10. What are the two methods of Branch and bound techniques?

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) Devise an algorithm to sort the following elements using Mergesort technique 286, 45, 278, 368, 475, 389, 656, 788, 503, 126.

Or

(b) Solve the following Knapsack problem using the Greedy technique.

$N = 6$, (P1, P2, P3, P4, P5, P6) = (W1, W2, W3, W4, W5, W6) = (100, 50, 20, 70, 7, 3) and m = 165.

13. (a) What is multistage graph? Write algorithm for the finding the minimum cost path using backward and forward approach.

Or

(b) Using OBST algorithm compute w_i, r_{ij}, c_{ij} where j = 0 to 4 for the identifier set ($a1$, $a2$, $a3$, $a4$) = (end, goto, print, stop) with

$P_1 = 1/20$, $P_2 = 1/5$, $P_3 = 1/10$, $P_4 = 1/20$

$q_0 = 1/5$, $q_1 = 1/10$, $q_2 = 1/5$, $q_3 = 1/20$, $q_4 = 1/20$

using r_{ij} construct the optimal binary search tree.

14. (a) (i) Draw and explain the dynamic state space tree for four–queens problem.

(ii) How do you estimate the efficiency of backtracking?

Or

(b) What is graph coloring? Explain the algorithm with suitable example. Mention some practical applications of graph coloring problem.

15. (a) (i) Explain Kruskal's algorithm for constructing minimum cost spanning tree.

(ii) Write notes on deterministic and non-deterministic algorithms.

Or

(b) Solve the following 6 city traveling salesperson problem using the Branch and Bound algorithm.

$$\begin{bmatrix} \alpha & 21 & 42 & 31 & 6 & 24 \\ 11 & \alpha & 17 & 7 & 35 & 18 \\ 25 & 5 & \alpha & 27 & 14 & 9 \\ 12 & 9 & 24 & \alpha & 30 & 12 \\ 14 & 7 & 21 & 15 & \alpha & 48 \\ 39 & 15 & 16 & 5 & 20 & \alpha \end{bmatrix}$$