D 90243 (Pages : 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2015

CS/PTCS 09 702—DESIGN AND ANALYSIS OF ALGORITHMS

Time : Three Hours Maximum : 70 Marks

Part A

Short answer questions (one **or** *two sentences)*
All *questions are compulsory.*

1. (a) Write the difference between Greedy method and Dynamic Programming.

   (b) Show the intermediate steps when the numbers 123, 23, 1, 43, 54, 36, 75, 34 are sorted using merge sort.

   (c) State the uses of randomized selection and sorting algorithms.

   (d) Define and solve the graph colouring problem.

   (e) Define the basic principles of back tracking.

(5 × 2 = 10 marks)

Part B

Analytical/problem solving questions.

Answer any **four** *questions.*

II. (a) Write an algorithm for linear search and analyze the algorithm for its time complexity.

   (b) Write short notes on NP-hard and NP-completeness.

   (c) Write the container loading greedy algorithm and explain. Prove that this algorithm is optimal.

   (d) How is dynamic programming applied to solve the travelling salesperson problem ? Explain in detail with an example.

   (e) Explain divide and conquer method with merge sort algorithm. Give an example.

   (f) Explain about the Pseudo random number generation methods in detail.

(4 × 5 = 20 marks)

Part C

Descriptive Analytical/problem solving questions.

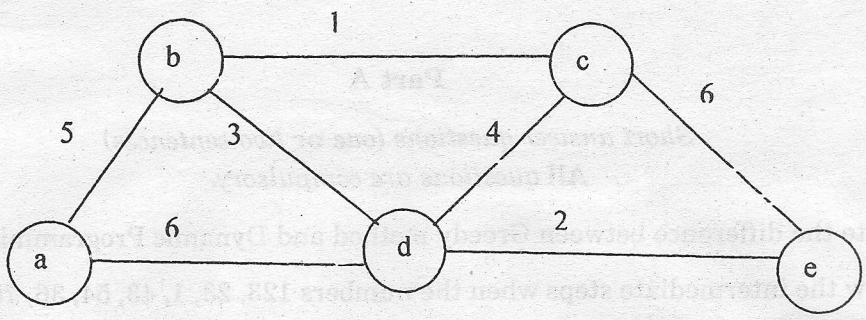
III. (a) Write an algorithm to perform binary search on a sorted list of elements. Analyze the algorithm for the best case, average case and worst case.

Or

Turn over

(b) Explain in detail about the Red-Black Trees.

IV. (a) Write the Kurskal's algorithm apply it to find a minimum spanning tree for the following graph :



Or

(b) Using backtracking, find the optimal solution to a knapsack problem for the knapsack instance n = 8, m = 110, (pl, p2, ...p7) = (11, 21, 31, 33, 43, 53, 55, 65) and

(w1, w2 ....w7) = (1, 11, 21, 33, 43, 53, 55, 65).

V. (a) Let W = {5, 7, 10, 12, 15, 18, 20} and m = 35. Find all possible subset of W whose sum is equivalent to m. Draw the portion of state space tree for this problem.

Or

(b) Explain the algorithm for finding all m-colourings of a graph.

VI. (a) Write an algorithm for N QUEENS Problem and Trace it for n = 6.

Or

(b) Discuss in detail about the Dixon's integer factorization algorithm.

(4 × 10 = 40 marks)