d) Solve the following instance of the Knapsack problem by the branch and bound algorithm.

Item	Weight	Value	Value/Weight
1	4	40	10
2	7	42	6
3	5	25	5
4	3	12	4

The Knapsack capacity W is 10.

OR

List out parallel algorithm and compare them with different factors.

Unit - V

5. a) How multiway search is different from binary search tree?

b) Explain the concept of height balanced trees with thin operations.

c) Construct a B-tree of order 3 for the following set of input data : 69, 19, 43, 16, 25, 40, 132, 100, 145, 7, 15, 18.

d) Write any two data structures that are suitable for representing a graph. Write an algorithm for depth first traversal of a graph using one of your two data structures.

OR

Write a short notes on the following (any three)

i) 2-3 tree

ii) NP Completeness problem

iii) Lower band theory

iv) Merge sort

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Roll No ....

CS/IT-404

B.E. IV Semester

Examination, December 2016

Analysis And Design of Algorithms

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What is the data structures used to perform recursion?

b) What is the purpose of Stressen's matrix multiplication?

c) Why do we use asymptotic notations in the study of algorithms? Briefly describe the commonly used asymptotic notation.

d) Apply quick sort algorithm for the following array and sort the element (Take first element of the list as the pivot element).

24, 56, 47, 35, 10, 90, 82, 31.

Also discuss complexity of Algorithm.

OR

Sort the following list using Heap sort

66, 33, 40, 20, 50, 88, 60, 11, 77, 30, 45, 65.

Also discuss the complexity of the Heap sort.

Unit - II

2. a) What is greedy techniques? Derive the equation for the optimal solutions.

   b) Tabulate the differences between Kruskal's and Prim's Algorithm.

   c) Solve the following instances of the single source shortest path problem with vertex 'a' as the source.
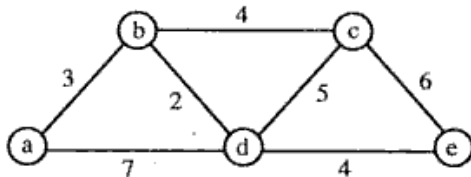
   d) Construct a Huffman code for the following data :

Character	A	B	C	D	E
Probability	0.4	0.1	0.2	0.15	0.15

   Decode the text whose ending 100010111001010 using the above Huffman code.

OR

   Write a greedy algorithm for sequencing unit time jobs with deadlines and profits. Using this algorithm, find the optimal solution when $n = 5$

Job	Profit	Deadline
P_1	20	2
P_2	15	2
P_3	10	1
P_4	5	3
P_5	1	3

Unit - III

3. a) Explain the concept of dynamic programming.

   b) Give a dynamic programming solution for a computing binomial coefficients.

   c) What is the concept of reliability design in dynamic programming.

   d) Using Floyd Warshall algorithm solve the all pair shortest path problem for the graph. Where weight matrix is given below :

$$\begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix}$$

OR

Solve the following instance of 0/1 Knapsack problem using dynamic algorithm.

Item	1	2	3	4
Weight	4	7	5	3
Value	$40	$42	$25	$12

The capacity of Knapsack W is 10.

Unit - IV

4. a) Define Hamiltonian cycle with example.

   b) Explain graph coloring problem with their complexity.

   c) What is backtracking? Find a solution to the 4-Queen problem using backtracking strategy.