Paper / Subject Code: 42104 / Elective- II 1) Advance Algorithms

B. E. (Computer) (Sem -VII) (CBSGS) (R-2012

(3 Hours) [Total Marks: 80]

N.B.: (1) Question No.1 is **compulsory**.
(2) Attempt **any three** questions from the remaining **five** questions.
(3) Make **suitable** assumptions wherever **necessary** but **justify your assumptions**.

1 a) Define the asymptotic notations used for best case, average case, and worst case [05] analysis of algorithm.

b) Solve the following recurrence relations using master's method [05]
   i. $T(n) = T(n/2) + 2^n$
   ii. $T(n) = 4T(n/2) + n/\log n$

c) Explain the properties of red-black trees. [05]

d) Explain the Line Segment properties. [05]

2 a) Explain insertion and deletion algorithms in Red-Black trees with examples. [10]

b) Find an optimal parenthesization of a matrix chain product whose sequence of [10] dimension is {4, 1, 1, 4, 1, 1, 3}.

3 a) What is Binomial Heap? Explain the operations that can be carried out on Binomial [10] Heap with example.

b) Explain maximum bipartite matching algorithm with an example. [10]

4 a) Explain the relabel to front algorithm for finding maximum flow with an example. [10]

b) Find the shortest path from node 1 to all other nodes using Dijkstra's algorithm. [10]
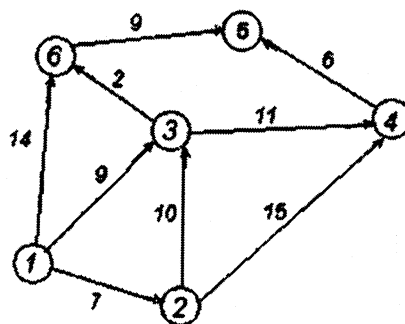
5 a) Use Simplex method to solve the following objective function [10]
   Max Z =3x1-x2,
      Subject to
         2x1+x2 ≥ 2
         x1+3x2 ≤ 3
         x2 ≤ 4
      where   x1,x2,x3 ≥ 0

b) Explain insertion and deletion in B-tree with an example. [10]

6 a) Discuss the Jarvis March algorithm for finding the convex hull. [10]

b) Explain the Closest Pair of Points using divide and conquer. [10]

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