RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. FIRST SEMESTER (July – December), 2011

Mid-Semester Examination, September, 2011

Date : 12/09/2011 **COMPUTER SCIENCE (Honours)**

Time : 11 am – 1 pm Paper : I Full Marks : 50

Answer <u>any five</u> questions : [5×10 = 50]

1. a) Design a 4 bit adder/subtractor (2's complemented) with a control line.
   b) Design a BCD to Decimal decoder. [5+5 = 10]

2. a) Prove that MUX is functionally complete block whereas decoder is not.
   b) What is gray Code? Why is it used in K-map? Design a binary to grey code converter. [5+5 = 10]

3. Define following terms with examples.
   Complete Graph, Regular Graph, Connected Graph, Adjacency Matrix [2·5×4 = 10]

4. a) Prove that number of odd degree vertex in a simple graph must be even.
   b) Prove that in a simple graph with n vertices and K components, the number of edges cannot be more than ½(n–K)(n–K+1) [4+6 = 10]

5. a) Describe Dijkstra's Algorithm with a suitable illustration.
   b) Write an algorithm and explain it with illustration for multiplying two matrices. Comment on the time complexity of your algorithm. [5+5 = 10]

6. What is minimal spanning tree? Is it unique for a graph? Make a comparative study of Prim's and Kruskal's algorithm for finding Minimal spanning tree. Illustrate any one of these two algorithm with an example. [2+1+2+5 = 10]