RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. FIRST SEMESTER (July – December), 2012

Mid-Semester Examination, September 2012

Date : 11/09/2012

Time : 11 am – 12 noon

COMPUTER SCIENCE (General)

Paper : I

Full Marks : 25

Answer *Question No. 1* and *any two* from rest of the questions

1. Answer *any two* questions: $2\frac{1}{2} \times 2$

   a) Convert the following decimal numbers to the indicated bases:
   - i) 1938.257 to hexadecimal. 1
   - ii) 175.175 to binary. 1½

   b) Simplify the Boolean function using K-map in sum of product:
   $F(w,x,y,z)=\Sigma(0,1,2,3,7,8,10)$.
   $+ d(w,x,y,z)=\Sigma(5,6,11,15)$.

   c) What kind of coding technique is used in K-Map? Why is it used?

   d) Design EOR function with minimum number of NAND Gate.

2. a) Prove the DeMorgan's theorem (i.e. $(x+y)'=x'y'$ and $(xy)'=x'+y'$). 3

   b) Simplify the following Boolean expressions to a minimum number of literals (using basic theorems): 3
   - i) $x'+xy+xz'+xy'z'$.
   - ii) $x'y+y'x+xy+x'y'$.

   c) Simplify the Boolean function using K-map in product of sum:
   $F(w,x,y,z)= \Sigma(0,2,5,6,7,8,10)$. 2

   d) Find the 9's complement of the decimal number 12349876 2

3. Design a combinational circuit that has four inputs and one output. The inputs are represented in gray code and output is represented in binary which is equal to one when i) *all inputs are equal to one* or ii) *none of the inputs are equal to one* or iii) *number of ones in input combination are more than number of zeros.* 10

4. a) What do you mean by Full-Subtractor? Show how a Full-Adder can be converted to a Full-Subtractor circuit. 1 + 4

   b) What do you mean by Universal Gate? Prove that NAND gate is a Universal Gate. 2 + 3