RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College under University of Calcutta)
B.A./B.SC. FIRST SEMESTER EXAMINATION, DECEMBER 2012
FIRST YEAR

Date : 21/12/2012

Time : 11 am – 1 pm

COMPUTER SCIENCE (General)

Paper : I

Full Marks : 50

Group - A
(Answer **question no. 1** and **any two** from question 2 to 4)

1. Answer **any two** from the following: 2½x2

   a) There are two representation of zeroin 1's complement"- comment on it with proper example. 2½

   b) Prove the Idempotent law in Boolean algebra. Write the Distributive law written for three variables. 1½+1

   c) i) Find the two number of l, in the binary representation of 8 x 1024+3 x 64+3. 1

   ii) Find the maxterm for the Boolean function F(x,y,z)=1. 1½

   d) Prove the following logical equation using Boolean algebra

   $$(A+B+C)(B+A\overline{C}) = BC + A\overline{C}$$ 2½

   Answer **any two** questions from the following:

2. a) Prove that if $xy=0$, then $x'y+xy'=x+y$. 2½

   b) Convert the following to other cannonical form

   $$F(A,B,C) = \sum(1,4,5,6,7)$$ 2½

   c) Simplify the Boolean function using k map procedure-

   (i) $F = \sum(1,3,7,11,15) + \sum_d(0,2,5)$

   (ii) $F(w,x,y,z) = \sum(0,1,2,4,5,6,8,9,12,13,14)$ 2½+2½=5

3. a) Compare and contrast between weighted code and nonweighted code. 2½

   b) List the Huntington postulates of Boolean algebra. 6

   c) Subtract $(1010100)_2-(1000100)_2$ using i's complement arithmetic. 1½

4. a) Represent the decimal number "25" in (a) BCD code   (b) Octal code   (c) Gray code 1½x3

   b) Solve the equation for x

   $$x_{16}=(1111111111111111)_2$$ 1½

   c) Apply DeMorgan's Theorem for the following expression $\overline{(A+B+C)D}$ 2½

   d) Find the 10's complement of $(935)_{11}$ 1½

Group - B
(Answer **any two** from the following)

5. a) "A decoder may be called a minterm generator"- Comment on statement. 2½

   b) Give the functional truth table of a 4:1 multiplexer and realize it using basic gates AND, OR and NOT. 4

   c) What is code converter? Draw the logic diagram of BCD to excess 3 code converter. 4

   d) What are the advantages of using multiplexer? 2

6. a) Design a full subtractor circuit using minimum number of 2-input NAND gates. Write the Boolean function.   5

b) Draw the truth table for a three input adder. Write down the truth table and Boolean expression for sum and carry.   5

c) What is meant by a priority Encoder? How it is different from Encoder?   2½

7. a) Design a combinational circuit where output is equation to 1 if the input variables have more 1's than 0's. The output is 0 otherwise.   4

b) Define excitation table? Derive the excitation table for R-S flip-flop.   1½+3

c) Convert a SR flip-flap to a D flip-flop.   4

8. a) What do you mean by Race around condition? In which flip-flop does it occur? Give two solutions so that Race-condition will never occur (with suitable illustration and figures).   2+½+7

b) Design an asynchronous sequential circuit to realize a mod-4 up counter.   3

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