

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

COMPUTER SCIENCE (Honours)

Paper : I

Full Marks : 50

Date : 10/09/2012

Time : 11 am – 1 pm

Group - A

Answer any two questions from the following questions:-

10 × 2

1. a) Describe the Hamming code technique on a 8 bits data word for single bit error detection and correction 7
b) "Self Complementary code can be both weighted and non-weighted" – Justify. 3
2. a) Show that dual of the EOR function is equivalent to its complement. 2
b) Suppose a number 110110111 is represented in gray code. What is the equivalent binary representation for that number. 2
c) Prove that for n-variables there must be 2^{2^n} number of Boolean function. 2
d) Minimize the following Boolean function using Boolean algebra:
 $AB' + A(B+C)' + B(B+C)'$ 3
e) What do you mean by noise margin of a gate? 1
3. a) What do you mean by Tautology? Is the expression $[(p \rightarrow q) \wedge p] \rightarrow p$ a Tautology? $1\frac{1}{2} + 2$
b) Write the following sentence in predicate calculus:
"Anyone who loves everyone loves himself" $2\frac{1}{2}$
c) Define Well Formed Formulae in Predicate Calculus. When two predicates are said to be equivalent? $2 + 2$

Group-B

Answer any six questions from the following questions:-

5 × 6

4. a) Deduce working principal of a Carry Look ahead Adder. 3
b) Implement Boolean function $F(A,B,C) = \sum (1,3,5,7)$ using a 4 x 1 multiplexer. 2
5. a) What is difference between combinational and sequential circuit? 2
b) What is Race Condition in RS flip flop? 3
6. a) Deduce a flowchart for addition and subtraction operation for signed integers. 3
b) What are positive and negative logic systems in digital computers? 2
7. a) Write short note on Von Neumann and Harvard architecture. 4
b) What is Control and Status registers? 1
8. a) What are Register Addressing and Direct Addressing Modes? 4
b) What are the major components of an instruction format? 1
9. a) Perform 7/2 using Booth's restoring division algorithm. 4
b) What is the difference between arithmetic shift and logical shift? 1
10. a) State differences between RISC and CISC architecture. 2
b) Draw and explain state diagram of a clocked JK flip flop. 3