RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FIRST SEMESTER EXAMINATION, DECEMBER 2011

FIRST YEAR

Date : 21/12/2011 **COMPUTER SCIENCE (General)**

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

Answer **any five** out of the following questions

1. a) Find the 10's complement of $(935)_{11}$. Given a weighted code in which weights are considered as 4 4 3 –2 for the decimal digits. Is this code a self-complementary code? Justify with an example. 3+2
   b) Compare and contrast between One's complement and Two's complement arithmetic. Perform subtraction for the following using 1's complement: 10010 – 10011. 2+2
   c) Express the following function in a product of maxterms: $F(x, y, z) = 1$. 1

2. a) If $(A3)_B = (123)_5$, then find the value of A and B, what is the binary and octal equivalent of the hexadecimal number 2AC5.D? 2½+½
   b) Design a circuit that compares two 2 bits numbers, A and B, to check if they are equal. The circuit has one output x, so that $x = 1$ if $A = B$ and 0, otherwise. 6
   c) What do you mean by propagation delay of a logic gate? 1

3. a) "Multiplexer is called functionally complete block" — Justify.
   Design a Full Adder circuit using 4x1 Multiplexer. 2+4
   b) Construct a 5x32 decoder using suitable numbers of 3x8 decoder / demultiplexers and 2x4 decoders. 4

4. a) What do you mean by Flip-flop in a sequential circuit? State the significance of "Debouncer Circuit" in sequential logic design. 1+2
   b) Illustrate the designing procedure of a Delay Flip-flop using Set-Reset Flip-flop. 7

5. a) Why Exclusive OR function is said to be a Odd function? Design a circuit to implement Exclusive OR function using minimum number of NAND gates. 2+3
   b) State generalized Demorgan's Law. Using this law prove that complement of an odd function is an even one. 2+1
   c) Design a 4 bit Full Adder using suitable numbers of 1 bit Full Adder. 2

6. a) Simplify the Boolean function in SOP form using K-map:
   $$F = w'xz + w'yz + x'yz' + wxy'z$$
   $$d = wyz$$
   b) A combinational circuit has four inputs and one output. The output is equal to 1 when
   (i) all inputs are equal to 1 or (ii) none of the inputs are equal to 1 or (iii) an odd number of inputs are equal to 1. Design the logic circuit for this using a 8x1 multiplexer. 4+6

7. Write notes on:
   a) BCD Adder
   b) (i) Duality Principle, (ii) Priority Encoder 5+(2+3)

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