RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2018

FIRST YEAR (BATCH 2018-21)

Date : 19/12/2018 **COMPUTER SCIENCE (General)**

Time : 11.00 am – 1.00 pm Paper : I Full Marks : 50

[Use a separate Answer Book for <u>each Group</u>]

<u>Group – A</u>

Answer <u>any one</u> question from <u>Question Nos. 1 & 2</u> **:** [1×5]

1. a) Apply K-map method to obtain the minimal form for the function: [3]

$$F(A,B,C,D) = \sum(0,4,5,7,8,9,13,15)$$

   b) What do you mean by positional number system? [2]

2. a) State absorption law. [1]
   b) What is prime implicant? [1]
   c) Convert the followings: [1.5+1.5]

   i) $(1762.46)_8 = (X)_{16}$ ii) $(BC70.0E)_{16} = (X)_8$

Answer <u>any two</u> questions from <u>Question Nos. 3 to 6</u> : [2×10]

3. a) A 12-bit Hamming Code word containing 8-bits of data. What is the original 8-bit word if the 12-bit read out is as follows? [3]

   0011 0110 0101.

   b) Expand $A(\bar{A}+B)(\bar{A}+B+\bar{C})$ to maxterms and minterms. [2+2]

   c) Draw the logic diagram using NOR gate to implement the following expression: [3]

$$F(A,B,C,D) = A(\bar{B}+\bar{C}D)+B\bar{C}$$

4. a) Apply De Morgan's theorem to the following expression: [3]

$$\overline{\overline{(\overline{A+B})(\overline{C+D})}\ \overline{(\overline{E+F})(\overline{G+H})}}$$

   b) Prove that if A+B=A+C and $\bar{A}+B=\bar{A}+C$, then B=C [2]
   c) What do you mean by ASCII? [2]
   d) Define Reflective code. [2]
   e) What is natural BCD code? [1]

5. a) Define positively and negatively weighted codes. [1.5+1.5]
   b) Subtract using 2's complement (8-bit): $(31)_{10} - (67)_{10}$ [2]
   c) Add (27.125) to (–79.625) using the 12-bit 2's complement arithmetic. [2]
   d) Express (–73.75) in 12-bit 2's complement form. [2]
   e) Define sign-magnitude form. [1]

6. a) Divide $(33)_{10}$ by $(5)_{10}$ in binary using the computer method. [4]
   b) Multiply $(1010)_2$ by $(1001)_2$ using the computer method. [4]
   c) Define parity bit. [2]

Group – B

Answer <u>any one</u> question from <u>Question Nos. 7 & 8</u> : [1×5]

7. a) Differentiate between SRAM and DRAM. [2]
   b) Explain the term 'temporal locality of reference' with example. [3]

8. Realize a SR flip-flop using D flip-flop. [5]

Answer <u>any two</u> questions from <u>Question Nos. 9 to 12</u> : [2×10]

9. a) Differentiate between CISC and RISC. [3]
   b) Write down the function of instruction register. [2]
   c) Design and implement a 2-bit magnitude comparator circuit. [5]

10. a) Design an AND gate using MUX. [5]
    b) Design a 2-bit asynchronous up counter using positive edge triggered T flip-flop and explain its operation. [5]

11. a) Implement the following function using a 4:1 MUX: [3]
    $$F(A,B,C) = AB + \bar{B}C$$
    b) Explain indirect addressing mode with example. [3]
    c) Design a 3-bit PISO shift left register and explain its operation. [4]

12. a) Write down the working principle of an encoder. [2]
    b) Explain 'write back protocol' of cache memory. [2.5]
    c) What are the differences between latch and flip-flop? [3]
    d) How can a D flip-flop be operated in toggle mode? [2.5]

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