

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, MARCH 2022

FIRST YEAR [BATCH 2021-24]

COMPUTER SCIENCE (GENERAL)

Date : 12/03/2022

Time : 11 am – 1 pm

Paper : I

Full Marks : 50

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

[5×10]

1. a) Convert the followings:

i) $(2573.17)_8 = (X)_{16}$

ii) $(AE0F.7C)_{16} = (X)_8$

b) Differentiate between the followings: i) EPROM and EEPROM ii) Cache memory and Main memory. [(2+2)+(3+3)]

2. a) Find out the relationship between numbers of redundant bits (r) required to correct d data bits with respect to Hamming Code. Add (27.125) to (−79.625) using the 12-bit 2's complement arithmetic.

b) 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? 1010 1100 1011. [(3+2)+5]

3. a) Define positively and negatively weighted codes. Subtract using 2's complement (8-bit): $(31)_{10} - (67)_{10}$

b) Express (−73.75) in 12-bit 2's complement form. Define sign-magnitude form. [(3+2)+(2+3)]

4. a) Obtain simplified expression in sum of products for the Boolean function using Karnaugh map:

$$F(A,B,C,D) = \sum(2,3,12,13,14,15) .$$

b) Simplify the following Boolean expression $zx + z\bar{x}y$ to a minimum number of literals.

c) What is the role of 'don't care' terms in Karnaugh map simplification? [4+4+2]

5. a) Design a full-adder using basic gates only.

b) Define binary parallel adder.

c) Show how a full-adder can be converted to a full-subtractor with the addition of one NOT gate. [4+2+4]

6. a) Implement the following Boolean functions using a decoder and necessary OR gates:

$$F_1(w, x, y, z) = \sum(5,7,11,13) .$$

$$F_2(w, x, y, z) = \sum(2,6,11,14) .$$

b) Draw the logic diagram and function table for an 8×1 multiplexer.

c) Why is the decoder called 'minterm generator'? [4+4+2]

7. a) Design a BCD to Excess-3 code converter.

b) Explain the difference between combinational logic and sequential logic.

c) What do you mean by race condition? [5+3+2]

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