RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, MARCH 2021

SECOND YEAR [BATCH 2019-22]

Date : 20/03/2021 **COMPUTER SCIENCE [GENERAL]**

Time : 11.00 am – 1.00 pm **Paper : III** Full Marks : 50

Answer **any five** questions from the following : [5×10]

1. a) Perform the 2's complement subtraction of 11010-1101

   b) Using De'Morgans theorem, show that $\overline{(A+B)}\overline{(\bar{A}+\bar{B})} = 0$ [5+5]

2. a) Write the difference between primary memory and secondary memory?

   b) Write down the difference between SRAM and DRAM [5+5]

3. a) Discuss the Von Neuman architecture.

   b) Discuss the Cache memory organization. [5+5]

4. a) Briefly discuss the Hammimg code error detection and correction technique with an example.

   b) What do you mean by parity in context of error detection? [5+5]

5. a) Design a combinational circuit that compares two 4-bit numbers A and B to check if they are equal. The circuit has one output x, so that x = 1 if A = B and x = 0 if A ≠ B.

   b) A combinational circuit is defined by the following three Boolean functions. Design the circuit with a decoder and external gates.

   $F_1 = x'y'z' + xz$, $F_2 = xy'z' + x'y$, $F_3 = x'y'z + xy$ [5+5]

6. a) Simplify the following Boolean function using four-variable map:

   $F(A, B, C, D) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

   b) Implement Full-Adder using NOR gates.

   c) Define "prime implicant" and "essential prime implicant". [3+5+2]

7. a) How Race around condition or limitation of JK flip flop get eliminated?

   b) How do you convert a JK flip-flop to a T flip-flop? [5+5]

8. a) Design a binary up counter.

   b) What is counter? [5+5]

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