

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [2015-18]

B.A./B.Sc. FIRST SEMESTER (July – December) 2015

Mid-Semester Examination, September 2015

Date : 15/09/2015

COMPUTER SCIENCE (General)

Time : 12 noon – 1 pm

Paper : I

Full Marks : 25

Group – A

1. Answer **any one** question : [2·5]

- “Gray code is unit distance reflective code” — Justify.
- Minimize the following expression using Boolean algebra (mention the laws).
 $a'bc + ab'c + abc' + abc$

Answer **any one** of the following questions : [1×10]

- Using 1's complement perform : $(101)_2 - (10)_2$ [1·5]
 - '8 4 – 2 – 1' code is self-complementing —Justify [2]
 - Determine : $(0·01)_2 = (?)_{10}$ [1·5]
 - Subtract $(111·111)_2$ from $(1010·01)_2$ [2]
 - Following is the received codeword in 7-bit hamming code using even parity scheme. Check whether the received codeword has error. If it has correct it. 1011010 [3]
- Simplify the following Boolean function by first finding the essential prime implicants.
 $F(A, B, C, D) = \Sigma(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$ [4]
 - Express the following Boolean function into the canonical P.O.S form $F = xy + x'z$. [3]
 - What do you mean by don't care condition? Explain with example. [3]

Group – B

4. Answer **any one** question : [2·5]

- Draw the circuit diagram of Half- Adder. Give truth table also.
- What are asynchronous inputs in flip-flop? Explain their operation.

Answer **any one** of the following questions : [1×10]

- What do you mean by Universal gate? Explain with example. [4]
 - How can you construct a 16×1 Multiplexer using two 8×1 multiplexer? [3]
 - Implement the following Boolean function $F(A, B, C, D) = \Sigma(0, 1, 2, 3, 4, 8, 9, 14, 15)$ Using one 8×1 multiplexer? [3]
- Differentiate between edge-triggered flip-flop and level-triggered flip-flop. [2]
 - Realize a flip-flop using J-K flip-flop. [3]
 - What is race around condition? How does master-slave flip-flop avoid it? Explain with proper diagram. [2+3]