Roll No. .....

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# GSE/D-22 1164

# LOGICAL ORGANIZATION OF COMPUTER–I

## BCA-114

Time : Three Hours] [Maximum Marks : 80

**Note :** Attempt *Five* questions in all. Q. No. 1 is compulsory. Attempt *four* more questions, selecting *one* question from each Unit. All questions carry equal marks.

1. Answer the following questions in brief :

   (a) What is Radix ? What are digits of hexadecimal number system ? 2

   (b) Represent 'A' in ASCII and EBCDIC codes. 2

   (c) What is principle of duality ? Explain. 2

   (d) State DeMorgan's laws. 2

   (e) What is XOR gate ? Draw truth table and symbol. 2

   (f) What is AND gate ? Draw truth table and symbol. 2

   (g) What is Multiplexer ? Draw the diagram for 4 ×1 multiplexer and explain its working. 4

## Unit I

2. (a) Convert $(37.23)_{10}$ into binary and hexadecimal number systems. 8

(b) Add $(9)_{10}$ and $(-14)_{10}$ in two's complement form. 8

3. (a) What are BCD codes ? Write self-complementing and cyclic BCD codes. 8

(b) What are error detecting and correcting code ? Explain with an example. 8

## Unit II

4. (a) State the postulates of Boolean algebra. 8

(b) Prove the following Boolean theorems using Boolean postulates : 8

(i) $X + X.Y = X$

(ii) $X + 1 = 1$.

5. (a) What are canonical representation of Boolean functions ? Explain POS and SOP form of representation with examples. 8

(b) Simplify the following Boolean function using K-map :

$F(a, b, c, d) = \Sigma (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$. 8

## Unit III

6. (a) What are NAND and NOR gates ? Why are these called as universal gates ? Explain. 8

(b) Implement F = A.B + C.D + E using NAND logic only. 8

7. (a) What is combinational logic ? What are characteristics of combinational circuits ? Also discuss design procedure of combinational circuits. 8

(b) What is analysis procedure ? Explain with an example. 8

## Unit IV

8. (a) What is full adder ? Design full adder circuit. 8

(b) What is comparator circuit ? Design 3-bit comparator circuit. 8

9. (a) What is demultiplexer ? Design 1 × 4 demultiplexer circuit. 8

(b) Design a circuit to convert 8421 BCD code into excess-3 BCD code. 8