

Roll No. ....

Total Pages : 03

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  $4 \times 1$  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  $1 \times 4$  demultiplexer circuit. 8
- (b) Design a circuit to convert 8421 BCD code into excess-3 BCD code. 8