

LOGICAL ORGANIZATION OF COMPUTER-I

Time : Three Hours]

[Maximum Marks : 80

**Note :** A candidate will be required to answer *five* questions in all, selecting *one* question from each unit in addition to compulsory question no. 1. All questions carry equal marks.

**Compulsory Question**

1. (a) Why do Digital Computer use Binary Number System?
- (b) Give Comparison between 1's and 2's Complement.
- (c) Differentiate between Boolean Algebra and Ordinary Algebra.
- (d) Explain Minterm and Maxterm.
- (e) Explain XOR Gate.
- (f) What are the characteristics of Logic gate ?
- (g) Differentiate between Encoder and Decoder ?
- (h) Explain 7-Segment Display. (8×2=16)

**UNIT-I**

2. Write the Binary Coding for the word BOY in :

- (a) BCD.
- (b) ASCII-7.

- (c) ASCII-8.
- (d) EBCDIC. 16
3. (a) Solve the following Complements Representation of Numbers by using Suitable Example :
- (i) True Complement.
- (ii) Radix-Minus-One Complement. 8
- (b) Solve the following :
- (A)  $(1101.1)_2 \times (111.01)_2 = (?)_2$ .
- (B)  $(1100)_2 - (11)_2 = (?)_2$ . 8

### UNIT-II

4. Examine the validity of the following Boolean Functions
- (a)  $(A + B + C)(A + B + \bar{C}) = A + B$ .
- (b)  $Z\bar{X} + ZXY = ZX$ . 16
5. What do you mean by K-Map ? Simplify the following Expression by K-Map :
- (a)  $\bar{A}\bar{B}\bar{C} + AB\bar{C} + A\bar{B}\bar{C}$ .
- (b)  $A\bar{B}C + AB\bar{C} + \bar{A}BC + ABC + A\bar{B}\bar{C} + \bar{A}\bar{B}\bar{C}$ . 16

### UNIT-III

6. Implement the following Boolean functions
- $F = (\bar{A} + B).(A + \bar{C}).(AB + D)$  using NAND gate.
- $F = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$ . 16

7. Design the circuit to realize the Boolean functions :

(a)  $Y = \bar{A}\bar{B} + \bar{A}C + AB.$

(b)  $F = ABCD + A\bar{B}CD + ABC\bar{D} + \bar{A}BC\bar{D} + A\bar{B}CD$   
 $+ A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D}.$  16

### UNIT-IV

8. (a) What is Code Convertor? Explain its Working. 8

(b) What do you mean by Combinational Circuit? Design the Half Adder using NAND Gate. 8

9. (a) Explain the working of Comparator. 8

(b) What is Decoder ? Explain and design BCD to Decimal Decoder. 8

