

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
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