Roll No. 000600 8748 Total Pages : 03

BCA/D-17 1230

LOGICAL ORGANIZATION OF COMPUTER-I

BCA-114

Time : Three Hours] [Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. (a) How many control signals are needed for 8:1 and 16:1 MUX ? **2**

   (b) Prove that NAND is universal gate. **2**

   (c) State and prove DeMorgan's laws. **4**

   (d) Make TT for cyclic code and excess-3 code from 0 to 9. **4**

   (e) Solve using Boolean Algebra :

   (i) $a + a.b = a$

   (ii) $a+\overline{a}.b=(a+b)$. **4**

Unit I

2. (a) Perform conversions :

   (i) $(13.625)_{10} \rightarrow (\ )_2$ **2**

   $\rightarrow (\ )_{16}$

(ii) $(X)_4 = (1234)_4$ 2

(iii) $(101111001101)_2 \rightarrow (\ )_{16}$ 2

(iv) $(3A37) \rightarrow (\ )_2$

$\rightarrow (\ )_8$ 2

(b) What is Error Detection and correction coding scheme ? 4

(c) Write abbreviation for ASCII, EBCDIC, BCD, DRAM. 4

3. (a) Perform using 2's compliment : 6

–9	+32	–6
–10	–17	–7

(b) Explain concept of floating point representation using condition of overflow and underflow. 10

Unit II

4. (a) Define Boolean Algebra and write its postulates. 8

(b) Solve using boolean algebra : 8

$$XY + \bar{X}Z + YZ = XY + \bar{X}Z$$

$$(X + Y)\ (Z)\ \left(\overline{\bar{Y} + XZ}\right) = \bar{X}YZ$$

5. (a) Draw and label 4 var K-Map. 4

(b) Make Venn diagram for OR and AND Gates. 4

(c) Solve using K-map :

$$Z = \Sigma 0, 2, 8, 10, 12 + \sum_{\phi} 4, 6, 14, 15$$

$$Z = \Sigma 0, 1, 4, 10, 15 + \sum_{\phi} 5, 11, 14$$ **8**

Unit III

6. (a) Define and explain the following gates : **6**
NOR, XOR, NOT.

(b) Define and explain the following gates using 3-variables TT :
AND, NAND, OR. **6**

(c) Make circuit : **4**

$$\left(X\overline{Y} + \overline{X}Y\right)CD + \left(\overline{X}\overline{Y} + XY\right)\overline{CD}$$

7. Explain combinational logic, its characteristics and design procedures. **16**

Unit IV

8. (a) Make 4 : 1 MUX.

(b) Draw code convertor from 8421 to 2421. **16**

9. (a) Make full-adder using K-map.

(b) Draw 4 to 10 line decoder. **16**