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OBCA/M-15 **19004**

LOGICAL ORGANIZATION OF COMPUTERS

Paper–BCA-104

Time Allowed : 3 Hours] [Maximum Marks : 80

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) Find the complement of the Boolean function $F = X.\bar{Y} + \bar{X}.Z.(\bar{X} + Y)$.

   (b) Draw the logic diagram of D type Flip-Flop.

   (c) Differentiate between Primary memory and Secondary memory.

   (d) What is meant by Instruction cycle?

   (e) What is the function of IOP? 4,3,3,3,3

UNIT–I

2. (a) What are Self complementing codes? Give example.

   (b) What are Cyclic or Gray codes?

   (c) Explain the methods of detecting errors during data transmission. 4,5,7

3. (a) Prove following theorems using Boolean Algebra postulates :

(i) $a + a = 9$

(ii) $a - a = 9$

(iii) $a + 1 = 1$

(b) Simplify the Boolean function using K-map.

$F(A, B, C, D) = \Sigma(0, 2, 3, 7, 9) + \sum_{\phi}(1, 5, 11, 14)$.

9, 7

UNIT–II

4. (a) Design and Implement Full adder circuit.

(b) What is Multiplexer? Design a 4 × 1 multiplexer. 9, 7

5. Design and Implement BCD to Excess-3 code converter. 16

UNIT–III

6. (a) Draw the logic diagram of J–K Flip-Flop, its characteristic table and characteristic equation and explain its working.

(b) What is Race condition in J–K Flip-Flop? What are the methods of removing it? 10,6

7. (a) Draw the logic diagram of Parallel-In Serial-out Register and explain its working.

(b) Design a mod-5 counter. 8,8

UNIT–IV

8. Define Instruction Format? Explain the various Instruction formats giving example. 16

9. Explain the Program controlled and Interrupt controlled data transfer. 16