

BT-4/M-21

44005

DIGITAL ELECTRONICS (NEW)

Paper–ECE-204E

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit.


 UNIT-I

1. (a) Convert the following into binary, BCD and excess three codes : 24, 356, 71. 5
- (b) Implement the Boolean expression of X-OR and AND gate using NOR gates. 5
- (c) Perform the following operation : (a) 45-28 using 2's compliment (b) 15-36 using 1's compliment. 5
- (d) Prove the following using Boolean algebraic theorems :

$$\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC = AB + BC + CA$$

$$(A + B)(C + D) = \overline{\overline{(A + B)} + \overline{(C + D)}}. \quad 5$$

2. (a) Minimize the following expression using K-Map and realize the obtained expression using NAND gates only :

$$F(A,B,C,D) = \Sigma m(1,3,5,6,7,13,14,15) + d(0,2,8,9) \quad 10$$

- (b) Use Q-M method to minimize  $f(A,B,C,D,E) = \Sigma m(0,1,2,5,7,11,15,16,19,21,23,26,28,31)$ . 10

## UNIT-II

3. (a) What is a multiplexer? Explain the logic diagram and working of 4 : 1 Multiplexer in detail. 6
- (b) Explain designing and working of 4 bit BCD adder. 8
- (c) Design 8 : 3 encoder. 6
4. (a) Design a three bit synchronous counter. 8
- (b) What are flip-flops? Explain race around condition of JK flip-flop. Also describe how it is removed by master slave flip-flop? 8
- (c) Explain working of register as ring counter. 4

## UNIT-III

5. (a) Write brief note on characteristics of digital logic gates. 10
- (b) Explain the working of CMOS NAND and CMOS OR gate. 10
6. (a) Describe working of TTL NAND gate. Explain tri state condition of TTL. 12
- (b) Explain how TTL logic gates can be interfaced with CMOS logic gates. 8

## UNIT-IV

7. (a) Write down the specification of A/D converters. Explain. 8
- (b) Explain the working of R-2R D/A converter. Mention its limitations. 12
8. Explain the working of (i) counting ADC (ii) Dual slope ADC. 20
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