

Roll No. 6160130025Total No. of Questions : 9] [Total No. of Printed Pages : 3  
(1047)**BCA (CBCS) RUSA IInd Semester  
Examination****3759****DIGITAL ELECTRONICS****Paper : BCA-203****Time : 3 Hours]****[Maximum Marks : 70**

**Note :-** Attempt *five* questions in all. Select *one* question from each Units I, II, III and IV. Question No. 9 (Unit-V) is compulsory.

**Unit-I**

1. (a) Differentiate between conductor, insulator and semiconductor on the basis of energy gap. 7
- (b) Explain depletion region. How is it formed in forward and reverse biasing ? 7
2. (a) Discuss the working of diode as switch. 7
- (b) Explain different types of transistor configurations. 7

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**Turn Over**

## Unit-II

3. (a) Prove the following using Boolean Algebra :

(i)  $A + \bar{A}B + A\bar{B} = A + B$  8

(ii)  $\bar{X}\bar{Y}\bar{Z} + \bar{X}Y\bar{Z} + X\bar{Y}\bar{Z} + XY\bar{Z} = \bar{Z}$  8

(b) Give the logic symbol and truth tables for NAND and NOR gates. 6

4. (a) Explain the basic laws of Boolean Algebra with suitable examples. 8

(b) Apply Demorgan's theorem to the following expressions :

(i)  $\overline{(A+B)(\bar{C}+D)}$

(ii)  $\overline{(A+B)C}$

(iii)  $\overline{(\bar{A}+\bar{B}+\bar{C})}$  6

## Unit-III

(a) Obtain the minimal POS expression for  $f(ABCD)$   
 $= \pi M (0, 1, 2, 4, 5, 6, 9, 11, 12, 13, 14, 15)$   
 and implement it using NOR gates. 9

(b) Give the Venn diagram for  $\bar{B}+A$ . 5

(a) Explain Don't-Care conditions in K-map using suitable example. 7

- (b) Explain SOP and POS expressions with suitable examples. 7

#### Unit-IV

- ~~7(a)~~ Give the logic diagram and truth table for a full Adder. 8

- (b) What is race-around condition in JK flip flops ? How it can be avoided ? 6

8. (a) Design a  $16 \times 1$  MUX using four  $4 \times 1$  multiplexers. 8

- ~~8(b)~~ What is a shift register ? Explain their types. 6

#### Unit-V

#### (Compulsory Question)

9. Explain the following :

- (a) Bipolar Junction transistor
- (b) Integrated circuits
- (c) NAND gate as universal gate
- (d) Karnaugh map
- (e) Encoder
- (f) Master-Slave flip flop
- (g) BCD adder

$$7 \times 2 = 14$$