

Register No. :

Course Code: 20EC11T

## I Semester Diploma Examinations MAY-2024

### DIGITAL ELECTRONICS

Time : 3 Hours ]

[ Max. Marks : 100

**Instructions:** (i) Answer any **one** full question from each section.  
(ii) One full question carries **20** marks

#### SECTION-I

1. a) i) Differentiate between Analog and Digital Signals 5  
ii) Convert decimal number  $(37)_{10}$  to binary. 3  
iii) Convert the octal number  $(1234)_8$  into binary. 2
- b) i) Mention the features of ASCII code. 5  
ii) Add  $(98A)_{16}$  and  $(1CB)_{16}$ . 3  
iii) Subtract  $(1011)_2$  from  $(1101)_2$ . 2
2. a) i) Subtract  $(1101)_2$  from  $(1110)_2$  by using 2's complement method. 5  
ii) Explain the procedure for Binary to Gray code conversion with an example. 5
- b) i) Mention any five laws of Boolean algebra. 5  
ii) State and prove any one Demorgan's theorem 5

#### SECTION-II

3. a) Explain AND, OR, NOT, NAND and NOR gates along with symbol, expression, and Truth table. 10
- b) i) Realize AND, OR, and NOT gates using NAND gates only. 5  
ii) Define K-map? What is the need of K-map. 5
4. a) Simplify the following Boolean expressions using laws of Boolean algebra & realize using logic gates. 10
- i)  $Y = (A' + B') \cdot (A + B') \cdot (A' + B)$
- (ii)  $Y = A'B'C' + A'B'C + A'BC' + A'BC + ABC' + ABC$

- b) i) Illustrate the following conversion: 5
- a) SOP to POS,  $F(A, B, C) = \Sigma(1, 3, 5, 6)$
- b) POS to SOP,  $F(A, B, C) = \pi(0, 1, 2, 4)$
- ii) Simplify the following Boolean expression by using K-map and draw the logic diagram. 5

### SECTION-III

5. a) i) Explain half adder with truth table. 5
- ii) List any five differences between serial and parallel adder. 5
- b) Explain the working of full subtractor with logic diagram and truth table. 10
6. a) Explain the working of a 3-bit parallel adder with neat circuit diagram. 10
- b) Explain the 2-bit magnitude comparator with gate level circuit. 10

### SECTION-IV

7. a) i) Define multiplexer. Mention the applications of multiplexer. 5
- ii) Explain 2:1 MUX with truth table and logic diagram. 5
- b) Design 4:1 Multiplexer using 2:1 MUX and explain its working. 10
8. a) Write truth table, equations, and logic diagram for 1:4 DEMUX and explain its working 10
- b) Realize AND, OR, NOT, NAND and NOR gates using MUX. 10

### SECTION-V

9. a) Sketch and explain logic circuit of BCD to decimal decoder. 10
- b) i) Mention any five applications of encoder. 5
- ii) Explain the operation of 4:2 Priority Encoder with truth table. 5
10. a) i) List the advantages and disadvantages of IC's 5
- ii) Classify ICs based on scale of integration. 5
- b) i) Mention the types of logic families. 5
- ii) Describe the interfacing between TTL and CMOS. 5