# Digital Electronics & Fundamentals of Microprocessor

P. Pages : 2

NIR/KW/18/3330

Time : Three Hours

*1744*

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Perform the following.    6
   i) $(ABCD \cdot EF)_H = (?)_8$
   ii) $(1010111)_B = (?)_G$
   iii) $(139.57)_{10} = (?)_{BCD}$

   b) Simplify the Boolean equations using Boolean algebra.    8
   i) $F(A, B, C) = (A+B)\overline{\left[\overline{A}\left(\overline{B}+\overline{C}\right)\right]} + \overline{A}\overline{B} + \overline{A}\overline{C}$
   ii) $F(X, Y, Z) = \overline{\overline{XYZ + \overline{X}\overline{Y}} + YZ}$

**OR**

2. a) Design 4 bit binary to gray code converter.    8

   b) Realize EXOR and EXNOR gate using NAND gate.    6

3. a) Simplify the following function using K-map.    7
   i) $F(A,B,C,D) = \Sigma m(0,1,2,3,5,7,8,9,10,12,13)$
   ii) $f(A,B,C,D) = \pi M(0,4,7,13,15) + d(1,5,11)$

   b) Express the given function in standard SOP form.    6
   $f(W,X,Y,Z) = \overline{W}\overline{X}Z + WX\overline{Y}Z + WY\overline{Z}$.

**OR**

4. a) Explain Min & Max term of a function express the given function in forms of min & max terms.    6
   $Y(A,B,C,D) = \overline{A}\overline{B}\overline{C}\overline{D} + AB\overline{C}\overline{D} + \overline{A}B\overline{C}D + A\overline{B}\overline{C}D + \overline{A}BCD + ABCD$

   b) Simplify the following expression using K-map & realize the minimum expression using logic gates.    7
   $F(A,B,C,D) = \Sigma m(1,3,5,8,9,11,15) + d(2,13)$

| 5. | a) | Implement the given function using 8:1 MUX $f(W, X, Y, Z) = \pi M(0, 4, 7, 11, 12, 15)$. | 7 |
|----|----|-----|----|
| | b) | Design full subtractor circuit using logic Gates. | 6 |

**OR**

| 6. | a) | Design a 4-line to 2-line priority encoder with D3 as has the highest priority. | 6 |
|----|----|-----|----|
| | b) | Design BCD to EXCESS-3 Code converter circuit & explain it. | 7 |

| 7. | a) | Convert the following.<br>i)   SR flip flop to JK flip flop<br>ii)   D flip flop to SR flip flop | 8 |
|----|----|-----|----|
| | b) | Draw & explain working of JK flip flop. What is race around condition? Explain. | 6 |

**OR**

| 8. | a) | Design a synchronous counter for the following sequence. | 7 |
|----|----|-----|----|

$$4 \longrightarrow 6 \longrightarrow 7 \longrightarrow 3 \longrightarrow 1$$
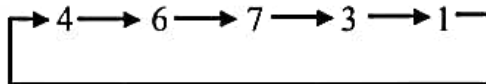
Avoid lockout condition. Use JK flip flop for design.

| | b) | Explain the working of Twisted Ring counter with suitable block diagram. | 7 |
|----|----|-----|----|

| 9. | a) | Draw & explain the architecture of 8085 microprocessor. | 8 |
|----|----|-----|----|
| | b) | Explain the usage of RIM and SIM instructions in detail. | 5 |

**OR**

| 10. | a) | Explain addressing modes in µp 8085 with examples. | 7 |
|----|----|-----|----|
| | b) | Explain the following pins in 8085 µp.<br>i)   HLDA.<br>ii)   TRAP.<br>iii)   READY. | 6 |

| 11. | a) | Explain Interrupt structure of microprocessor 8085 with example. | 7 |
|----|----|-----|----|
| | b) | Write a program to arrange 10 bytes of data in ascending order. | 6 |

**OR**

| 12. | a) | Write a program to add two 16 bit data present in memory from location 2010H and place the result starting at 2014 H. | 7 |
|----|----|-----|----|
| | b) | Draw and explain timing diagram of LHLD 0A22H. | 6 |

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