Roll No. : _____   Total Printed Pages : | 4 |

3E2075

B. Tech. (Sem. III) (Main & Back) Examination, January - 2013
Computer Engg. & Information Tech.
3IT5 & 3CS5 Digital Electronics

Time : **3** Hours]

[Total Marks : **80**
[Min. Passing Marks : **24**

*Attempt any **five questions**, selecting **one question** from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1._____Nil_____   2._____Nil_____

UNIT - I

1 (a) Prove the following :

(i) $A \oplus B = \bar{A} \oplus \bar{B}$

(ii) $\overline{A \oplus B} = A \oplus \bar{B} = \bar{A} \oplus B$

(iii) $B \oplus (B \oplus A \cdot C) = A \cdot C$

2×3=6

(b) Convert the following numbers from given base to the other base indicated :

(i) $(102.25)_{10} = ($? $)_2$

(ii) $(101.001)_2 = ($? $)_{10}$

(iii) $(736)_8 = ($? $)_2$

(iv) $(2F9A)_{16} = ($? $)_8$

(v) $(247.36)_8 = ($? $)_{16}$

5×2=10

OR

3E2075]   1   [Contd...

1 (a) Convert the given code to other code :

   (i) $(327.89)_{10}$ = (BCD) code

   (ii) $(4096)_{10}$ = (Excess - 3) code

   (iii) $(0100\ 0111)_{BCD}$ = (?   ) gray code

                                                    3×2=6

   (b) Explain the following with one example :

   (i)   Hamming distance

   (ii) Alphanumeric code.

                                                    2×2=4

   (c) Perform the following Addition/Substraction :

   (i) $(54)_{16} - (2A)_{16}$

   (ii) $(123)_8 + (001)_8 + (203)_8$

                                                    2×3=6

UNIT - II

2 (a) Draw the circuit diagram of 3-input NAND gate using TTL logic and find the expression for fan out.

                                                    8

   (b) Draw circuit for 2-input NOR using CMOS and explain its working. Also compare the advantage and disadvantages of CMOS logic with other.

                                                    8

OR

2 (a) Define the following and give one example for each :

   (i)   Propagation delay

   (ii) Wired logic

   (iii) Schottky diode clamping

   (iv) RTL logic.

                                                    4×2=8

(b) What is difference between Saturation logic and Active logic. Explain these with one example and show their speed capability.

8

UNIT - III

3   (a) Minimise the four variable logic function using K-map :

(i) $f(A, B, C, D) = \sum m(1, 2, 3, 5, 7, 8, 9, 11, 14)$

(ii) $f(A, B, C, D) = \Pi m(4, 6, 10, 12, 13, 15)$

4×2=8

(b) Simplify the following logic expression using K-map and implement them using NAND gate : rtuonline.com

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

(ii) $Y = AB\bar{C}D + \bar{A}BCD + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{D} + \bar{B}$.

4×2=8

OR

3   (a) Minimise the following expression with don't care conditions using K-map :

(i) $Y = \sum m(1, 3, 7, 15) + d(0, 2, 5)$

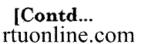(ii) $Y = \Pi m(4, 5, 6, 7, 8, 12) + d(0, 1, 2, 9, 11, 14)$.

6×2=12

(b) Explain the Quinn-Mcklusky minimization technique with one example.

4

UNIT - IV

4   (a) Design a Gray-to binary code converter logic circuit.

8

(b) Implement the following logic expression using multiplexer :

(i) $Y = \sum m\,(1, 2, 3, 5, 6)$

(ii) $Y = \Pi\, m\,(0, 1, 2, 5, 7)$.

4×2=8

OR

4 (a) Design a BCD to Excess-3 encoder.

8

(b) Realise the following :

(i) $Y = \sum m\,(0, 1, 2, 3, 11, 12, 14, 15)$ using 16 : 1 multiplexer.

(ii) $Y = \Pi\, m\,(0, 1, 3, 7, 9, 10, 11, 13, 14, 15)$ using 4 to 16 line decoder.

4×2=8

UNIT - V

5 (a) Convert the following :
   (i)   J-K FF to S - R FF
   (ii) D FF to J-K FF.

4×2=8

(b) Draw the logic circuit for Asynchronous modulo-10 counter and draw its waveform :

8

OR

5 (a) Draw the state diagram of :
   (i)   JK FF
   (ii) 4 bit binary counter.

4×2=8

(b) Design a sequence detector to detect a serial input sequence 1010. Draw its state diagram, state table, state assignment table and final implemented circuit.

8

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