

2056
B.E., Second Semester
EC-203: Digital Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

1. (a) Find the 10's complement of $(928)_{10}$.
(b) Perform following subtractions using 1's complement and 2's complement methods:
 - i. $1010010 - 1100101$
 - ii. $1001 - 101100$(c) Describe the working of Schmitt Trigger.
(d) What is race around condition? How can it be avoided?
(e) Determine the resolution of a 11-bit A/D converter having a full-scale analog input voltage of 5.5 V. (5×2)

Section-A

2. (a) Simplify and implement the Boolean expression: (5)
$$F(A, B, C, D, E) = \sum m(0, 3, 5, 8, 11, 13, 16, 19, 21, 24, 25, 26, 27, 30, 31)$$

(b) Construct a 5-to-32-line decoder with four 3-to-8-line decoders with enable inputs and a 2-to-4-line decoder. Use block diagrams for the components. (5)
3. (a) Design a synchronous counter which goes through the states: 1, 2, 4, 6. Make sure to avoid lock-out condition in counter. (5)
(b) Convert a SR flip-flop to JK flip-flop using excitation table. (5)
4. (a) Design and implement a 4-bit code comparator. (5)
(b) Minimize the logic function using Quine-McCluskey method: (5)

$$F(A, B, C, D) = \sum m(1, 3, 5, 8, 9, 11, 15) + d(2, 13)$$

P.T.O.

(2)

Section-B

5. (a) Tabulate the PLA programming table and draw the PLA circuit to implement the four Boolean functions listed below. Minimize the number of product terms. (5)

$$A(x, y, z) = \sum (0, 1, 4, 7)$$

$$B(x, y, z) = \sum (2, 4, 6, 7)$$

$$C(x, y, z) = \sum (0, 1, 3, 6)$$

$$D(x, y, z) = \sum (2, 5, 7)$$

- (b) Describe binary-ladder type digital to analog converter. (5)
6. (a) Describe the working of totem-pole TTL with the help of circuit diagram. Discuss applications of this circuit. (5)
- (b) Describe the working of monostable multivibrator with the help of circuit diagram and waveforms. (5)
7. (a) A 12-bit Hamming code word containing 8 bits of data and 4 parity bits is read from memory. What was the original 8-bit data word that was written into memory if the 12-bit word read out is 000011101010. (5)
- (b) Describe the meaning & significance of characteristics of logic families: Fan-out, noise margin, propagation delay, and power dissipation. Compare different families based on these characteristics. (5)

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