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EEC-302

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 131322

Roll No.

B. Tech.

(SEM. III) THEORY EXAMINATION, 2015-16

DIGITAL ELECTRONICS

[Time : 3 hours]

[Total Marks : 100]

SECTION-A

1. Attempt all sections . All sections carry equal marks. Write answer of each section in short. (2×10=20)
 - (a) Explain Self-Complementing codes with an example.
 - (b) What is the basic difference between Latch and Flip Flop?
 - (c) Perform subtraction using 2s complement: 80-65
 - (d) What are don't care conditions ? Explain with example.
 - (e) Construct 4 to 16 line decoder with five 2 to 4 line decoders with enable.

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- (f) What is the difference between conventional flow-chart and ASM chart ?
- (g) What is the difference between Combinational and Sequential circuits ?
- (h) Convert the following SOP Boolean expression into POS from: $ABC + A'B'C$
- (i) Implement a two-bit Magnitude Comparator.
- (j) Design a Full adder using two Half adders.

SECTION - B

Attempt any five questions from this section. (10×5=50)

- Explain J-K flip flop. What is Race-Around condition in J-K flip flop and what is its remedy ?
- Define an encoder. Also describe an 8×3 Priority encoder.
- Explain Carry-Look Ahead Generator. Also draw the logic diagram of a BCD Adder.
- What are Shift Register Counters ? Explain in detail.
- With the help of neat diagram, explain the operations of a Universal Shift Register.

7. What is a multiplexer ? Implement the given function with:

- (a) 8:1 MUX
(b) 4:1 MUX
(c) 2:1 MUX

$$F(A,B,C,D) = \sum(0,1,2,3,4,7,8,9,11,14,15)$$

8. Find the minimal sum of products for a 5-variable function using Quine Mc-Cluskey (or, Tabulation) method. $F = \sum m(0, 1, 2, 9, 11, 12, 13, 27, 28, 29)$

9. A sequential circuit has two JK flip-flops A and B, two inputs, x and y and one output, z. The flip-flop input equations are:

$$J_A = Bx + B'y'$$

$$K_A = B'xy'$$

$$J_B = A'x$$

$$K_B = A + xy'$$

$$Z = Axy + Bx'y'$$

Obtain the logic diagram, state table, state diagram and state equations.

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SECTION - C

Attempt **any two** questions form this section. (15×2=30)

10. What is the difference between Synchronous and Asynchronous Counters? Explain in detail Design a 4-bit Synchronous UP/DOWN Counter.

- 11 (a) An asynchronous sequential circuit has two internal states and one output. The two excitation functions and one output function describing the circuit are respectively given by:

$$Y_1 = x_1x_2 + x_1y_2' + x_2'y_1$$

$$Y_2 = x_2 + x_1y_1'y_2 + x_1'y_1$$

$$z = x_2 + y_1$$

- (i) Draw the logic diagram of the circuit.
 - (ii) Derive the transition table and output map.
 - (iii) Obtain a flow table.
- (b) What are Static and Dynamic Hazards?

12. Give the classification of Semiconductor Memories. Implement the following functions with PLA and PAL:

$$F_1 = AB' + AC + A'BC'$$

$$F_2 = (AC + BC)'$$

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