

(Following Paper ID and Numbers to be filled in your Answer books)

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Roll No:

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B.Tech

EXAMINATION, 2015-16

Subject: Switching Theory & Logic Design

Code: NEC304

[Time: 3 Hours]

[Total Marks: 100]

SECTION-A

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2 x 10=20)

- Find 9's & 10's complement of the following decimal numbers: 24,681,234 & 63,32,5600.
- Explain 8421 codes and Self-Complementing codes.
- What are signed binary numbers? Explain.
- What do you mean by Don't Care conditions in digital circuits?
- What is the difference between a De-multiplexer and a Decoder?
- What do you mean by Sequential Circuits?
- What is the difference between SRAM and DRAM?
- What are Gray codes?
- What is the difference between Static-0 and Static-1 Hazards?
- Convert the following to the other canonical form: $F(x,y,z) = \sum m(2,4,6,7)$

SECTION-B

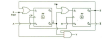
Note: Attempt any 5 questions from this section. (10 x 5=50)

- Q.2 Simplify the following logic function using Quine McClusky minimization technique and realize the simplified expression using universal gate

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

- Q.3 What is the difference between Ring and Johnson Counters? Explain with example.

Q.4



Derive the state table and state diagram for the sequential circuit shown below:

Q.5 An asynchronous circuit is described by excitation function: $Y = x_1x_2' + (x_1 + x_2')y$

and output function: $z=y$

- i. Derive the transition table and output map;
- ii. Implement the circuit with a NOR latch.

Q.6 Design a 3-bit Odd Parity Generator. Also design a 2-bit Magnitude Comparator.

Q.7 Design a Decimal Adder using binary parallel adders.

Q.8 What is the difference between Synchronous and Asynchronous counters? Design a MOD-16 Asynchronous UP/DOWN counter.

Q.9 Implement the following three Boolean functions with a PLA and PAL:

$$F_1(A,B,C) = ? (0,1,2,4)$$

$$F_2(A,B,C) = ? (0,5,6,7)$$

$$F_3(A,B,C) = ? (0,3,5,7)$$

SECTION-C

Note: Attempt any 2 questions from this section. (15 x 2=30)

Q.10 (i) Draw the logic diagram of the following product of sum expression:

$$Y = (x_1+x_2')(x_2+x_3)$$

Show that there is a static -0 hazard when x_1 and x_3 are equal to 0 and x_2 goes from 0 to 1. Find a way to remove the hazard.

(ii) Explain Races in asynchronous sequential circuits. What is the difference between Critical and Non-Critical Races?

Q.11 (i) Implement Full Adder using two 4x1 MUX.

(ii) Tabulate the truth table for an 8x4 ROM that implements the following four Boolean functions:

$$A(x,y,z) = ?m(1,2,4,6)$$

$$B(x,y,z) = \sum m(0,1,6,7)$$

$$C(x,y,z) = \sum m(2,6)$$

$$D(x,y,z) = \sum m(1,2,3,5,7)$$

Q.12 (i) Explain Universal Shift Register in detail.

(ii) Convert D Flip-Flop into JK Flip-Flop.