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Printed Pages : 4

TEC302

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

PAPER ID : 3072

Roll No.

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B.Tech

(SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10
SWITCHING THEORY

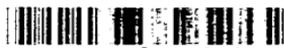
Time : 3 Hours]

[Total Marks : 100

- Note :**
- (i) All questions carry equal marks.
 - (ii) All questions are compulsory.

1 Attempt any four of the following : 5×4=20

- (a) What are Gray codes ? Give its advantages.
Convert 10111011 in binary into its equivalent gray code.
- (b) What is the range of 16 bit unsigned numbers, 16 bit signed magnitude numbers 16-bit signed two's complement numbers and 16-bit signed one's complement numbers. How many representations are possible for '0' decimal is one's complement and two's complement representation. Prove your answer.
- (c) Represent decimal number 8620 in
 - (i) Binary
 - (ii) BCD
 - (iii) Excess-3 and
 - (iv) 2421 codes.



- (d) What is the largest number that can be obtained with 16 bits ? What is its decimal equivalent ?
- (e) Find the sum of the following pairs of decimal numbers assuming 8-bit 1's complement representation of numbers
- (i) $+61 + (-23)$
- (ii) $-56 + (-55)$.
- (f) Convert the the binary number 1001110 into Hamming code.

2 Attempt any **four** of the following :

5×4=20

- (a) Simplify the following boolean function using K-map

$$f(w, x, y, z) = \sum(1, 3, 7, 11, 15)$$

and don't care condition is

$$d(w, x, y, z) = \sum(0, 2, 5)$$

Express the reduced form in SOP and POS forms.

- (b) Simplify the following boolean function by Tabulation method

$$f = \sum(0, 1, 2, 8, 10, 11, 14, 15)$$

- (c) Discuss the disadvantage of 4-bit binary parallel adder and design the logic and circuit of 4-bit full adder with look-ahead carry.
- (d) (i) Implement full subtractor using Demultiplexer.

- (ii) Design 5-to-32 decoder using one 2-to-4 and four 3-to-8 decoders.
- (e) Design the circuit for BCD to excess-3 code converter.
- (f) Give the comparison between PROM, PLA and PAL. Implement following boolean function using PLA

$$[X(A, B, C) = \sum m(0, 1, 3, 5),$$

$$Y(A, B, C) = \sum(0, 1, 2, 4, 6),$$

$$Z(A, B, C) = \sum m(0, 2, 6, 7) \text{ and}$$

$$W(A, B, C) = \sum m(3, 6)].$$

3 Attempt any **two** of the following :

10×2=20

- (a) Design a synchronous BCD counter with JK flip flops.
- (b) (i) Define critical and non critical race.
(ii) With the help of two shift registers design a 4-bit serial adder.
- (c) (i) Explain ASM technique for designing sequential ckt.
(ii) Draw an ASM chart for a 2-bit binary counter having one enable line E such that
- $E = 1$ (counting enabled)
 $E = 0$ (counting disabled)

4 Attempt any **two** of the following : 10×2=20

(a) Design an asynchronous sequential circuit that has two inputs X_2 and X_1 and one output Z . When $X_1 = 0$ the output Z is 0. The first change in X_2 that occurs while X_1 is 1 will cause output Z to be 1. The output Z will remain 1 until X_1 returns to 0.

(b) (i) Draw and explain the basic CMOS inverter circuit.

(ii) Give the characteristics of ECL family.

(c) What are Hazards ? Give hazard free realisation for the following boolean function

$$f(A, B, C, D) = \sum m(2, 3, 5, 7, 10, 14)$$

5 Attempt any **two** of following : 10×2=20

(a) Explain the working of dynamic RAM cell. Explain the read cycle timing and write cycle timing of RAM with the help of neat timing diagram.

(b) Obtain a 16×8 memory using 16×4 memory ICs and draw the concerned IC circuit.

(c) Draw the circuit of MOSFET RAM cell and explain its operation.

