Printed Pages : 3 EC-302

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

PAPER ID : 3003 Roll No.

B. Tech.

(SEM. III) EXAMINATION, 2007-08

SWITCHING THEORY AND LOGIC DESIGN

Time : 3 Hours] *[Total Marks : 50*

Note : *Attempt **all** questions.*

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

(a) (i) Prove :

$$X \cdot Y + \bar{X} \cdot Z + Y \cdot Z = X \cdot Y + \bar{X} \cdot Z$$

(ii) Using Karnaugh map, find minimal sum of product expression for

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

(b) Consider a logic expression :

$$F = \bar{W} \cdot Y + \bar{X} \cdot \bar{Y} + W \cdot X \cdot Z$$

Find all static hazards in the two level AND-OR or OR-AND circuit realization of above function.

(c) Design a hazard free circuit to realize the logic function of Q.1 (b)

2 Attempt any **two** parts of the following : 7×2=14

(a) Each of the following arithmetic operations is correct in at least one number system. Determine one possible radix for each operation.

(i) **1234 + 5432 = 6666**

(ii) **41 / 3 = 3**

(b) Suppose a 4n-bit number B is represented by an n-digit hexadecimal number H. Prove that the two's complement of B is represented by 16's complement of H.

(c) Design a 3-bit carry look ahead adder. Compare it with ripple adder.

3 Attempt any **two** parts of the following : 6.5×2=13

(a) Design a synchronous mod-5 counter using J-K flip-flops.

(b) What is the problem of 1s and 0s catching in master slave JK flip-flop ? How is it solved in triggered J-K flip-flop ?

(c) Write the excitation equations, transition table and output table for following clocked synchronous state machine :

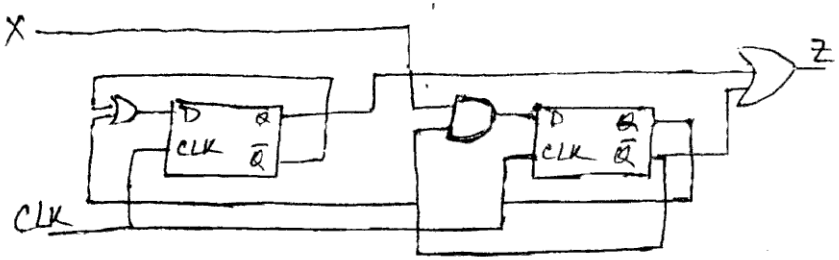

Fig. 1

Attempt any **two** parts of the following : **6.5×2=13**

(a) Represent the number $(+48.5)_{10}$ as a floating point binary number with 32 bits. The normalized fraction mantissa has 20 bits plus sign and the exponent has 10 bits plus sign.

(b) Define parity groups for a distance-3 hamming code with 11 information bits.

(c) Draw the circuit of a positive edge-triggered D flip-flop with preset and clear using NAND gates. Derive its excitation equations and construct a transition table.