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Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
DECEMBER 2012

CS/ IT 04 305 —SWITCHING THEORY AND LOGIC DESIGN

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. (a) Convert the following number conversion :

(i) $(2BC)_{16} = (?)_{10}$

(ii) $(7300)_{10} = (?)_{16}$

(iii) $(1000)_{10} = (?)_{8}$

(b) Prove that following theorems :

(i) $\bar{A}B\bar{C} + \bar{A}BC + \bar{A}\bar{B}C = \bar{A}\,\bar{B} + \bar{A}C$.

(ii) $AB + BC + CA = (A + B)(B + C)(C + A)$.

(c) Design a full adder circuit.

(d) Draw and explain 3 to 8 decoder circuit.

(e) Explain about fault model.

(f) Explain what is meant by path sensitizing.

(g) Explain what is meant by race around condition.

(h) What is meant by ripple counter ? Explain.

(8 × 5 = 40 marks)

Part B

II. (a) Reduce the following functions by Karnaugh map and represent the reduced function in sum of products and product of sums forms :

$F = \pi (0, 1, 2, 3, 8, 9, 10, 11, 14, 15, 20, 21, 22, 23, 24, 25)$

Or

Turn over

(b) Using Quine-McClusky method reduce the following function :

$Y = \Sigma (0, 2, 3, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 26, 27)$.

III. (a) Design a logic circuit to convert 2-4-2-1 code to 8-4-2-1 code.

Or

(b) Design a combinational circuit using a ROM. The circuit accepts a 3 -bit number and generates an output binary number equal to the square of the input number.

IV. (a) Devise a test to distinguish between two circuits that implement the following expressions :

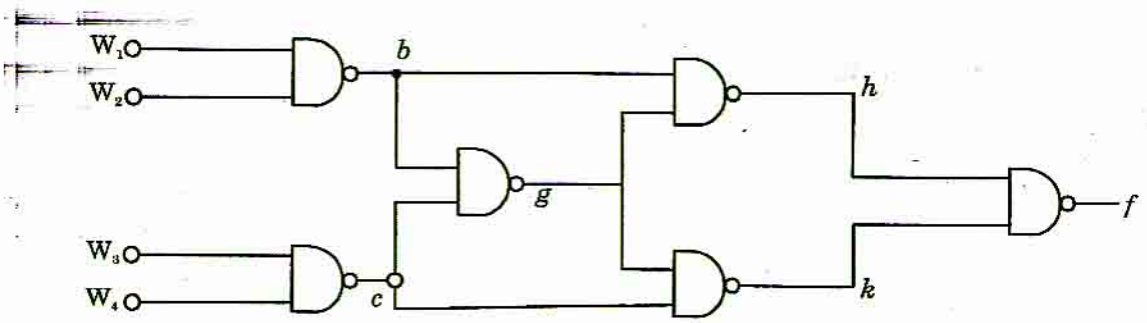
$$f = x_1 x_2 x_3 + x_2 \bar{x}_3 x_4 + \bar{x}_1 \bar{x}_2 x_4 + \bar{x}_1 x_3 \bar{x}_4$$

$$g = (\bar{x}_1 + x_2)(x_3 + x_4).$$

Or

(b) List all single faults in the circuit shown below that can be detected using each of the tests

$W_1 W_2 W_3 W_4 = 1100, 0010,$ and 0110.



V. (a) With neat diagrams, explain the working of

(i) Serial-in, serial out

(ii) Parallel- in, serial out

shift registers.

Or

(b) Design a sequential circuit to count the following sequence repeatedly using J-K- flip-flop :

1, 3, 7, 0, 1, 3, 7, 0, ...

(4 × 15 = 60 marks)