C 1266 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. [ENGINEERING] (14 SCHEME) DEGREE EXAMINATION, APRIL 2016

EE 14 405—DIGITAL ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

1. Answer any *eight* questions :

1 Express the following function in sum of minterm and product of maxterm F (A, B, C, D) = B'D + A'D + BD.

2 Obtain 1' and 2' complement for the following binary numbers :—

(a) 11101010

(b) 01111110

(c) 00000001

(d) 10000000

(e) 00000000

3 Convert the following function into canonical form F $(x, y, z) = \Sigma (1, 3, 7)$.

4 Implement a full adder with two 4 * 1 multiplexers.

5 Explain about Master-Slave D flip-flop ?

6 Design a combinational circuit that converts a 4 bit gray code to a 4 bit binary number and implement the circuit with exclusive OR gate.

7 Design a half adder with input x and y and outputs S and C .The circuits add the inputs and place the outputs in S and C.

8 Design a 4-bit binary synchronous counter with D flip-flops.

9 Explain about the construction of Johnson counter ?

10 Explain about the instruction set of 8085 ?

(8 × 5 = 40 marks)

Part B

2. (a) Simplify the following Boolean expression to a minimum number of literal

(a) XY + XY'.

(b) ABC + A'B + ABC'.

Or

(b) Simplify the Boolean function F $(w, x, y, z) = \Sigma (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ using Karnaugh map.

Turn over

3. (a) A combinational circuit is defined by the following Boolean function $F_1 = X'Y'Z' + XZ$ $F_2 = XY'Z' + X'Y$ $F_3 = X'Y'Z + XY$. Design the circuit with a decoder.

Or

(b) Implement the following Boolean function with PLA A $(x, y, z) = \Sigma (1, 2, 4, 6)$ B $(x, y, z) = \Sigma (0, 1, 6, 7)$ C $(x, y, z) = \Sigma (2, 6)$ D $(x, y, z) = \Sigma (1, 2, 3, 5, 7)$.

4. (a) A sequential circuit has two JK flip-flops A and B and one input x. The circuit is described by the following flip-flop input equations :

$J_A = \dot{x}\ K_A = B'$

$J_B = x\ K_B = A$

(a) Draw the logic diagram of the circuit.

(b) Tabulate the state table.

(c) Derive the state equations A $(t + 1)$ and B $(t + 1)$ by substituting the input equations for the J and K variables.

Or

(b) Draw the logic diagram of a 4-bit ripple down counter using (a) flip-flops that trigger on the positive edge of the clock ; (b) flip-flops that trigger on the negative edge of the clock.

5. (a) With a neat diagram, briefly explain about the architecture of 8085 ?

Or

(b) (i) Write a program using ADI instruction to add two hexadecimal numbers 3 AH and 48 H.

(ii) Discuss about mode 0 and mode 1 operation of 8255 ?

(4 × 15 = 60 marks)