

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

PAPER ID : 0323

Roll No.

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**B.Tech.**

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2012-13

**DIGITAL ELECTRONICS**

Time : 3 Hours

Total Marks : 100

**Note :** Attempt all questions. All questions carry equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**
- (a) The solution to the quadratic equation " $x^2 - 11x + 22 = 0$ " are  $x = 3$  and  $x = 6$ . What is the base of the number system used ?
- (b) Represent the unsigned decimal number 965 and 672 in BCD and then show the steps necessary to find their sum.
- (c) Convert the following :
- (i)  $(62.7)_8 = ( )_{16} = ( )_2$
- (ii)  $(BC6)_{16} = ( )_{10} = ( )_2$
- (d) Represent the decimal number 6 in (i) Excess-3 code, (ii) BCD code, (iii) Gray code, (iv)  $8421\bar{1}$  code and (v) 2421 codes.
- (e) Explain with example using four variable map, how don't care conditions are implemented in K-map minimization.
- (f) Minimize the following function by Tabular method and implement the result using NAND gate only :
- $$f(w, x, y, z) = \Sigma m(1, 4, 8, 9, 13, 14, 15) + d(2, 3, 11, 12)$$

2. Attempt any two parts of the following : (10×2=20)

(a) Design a combinational circuit that converts a 3-bit Gray code to a 3-bit binary number. Implement the circuit with

(i) exclusive OR gate

(ii) NAND gate only.

(b) Design a parity generator to generate an odd parity bit for a 4-bit word. Use EX-OR and  $\overline{\text{EX-OR}}$  gate.

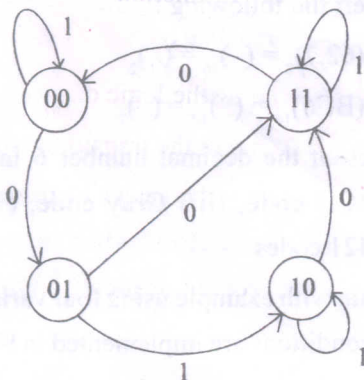
(c) Implement the following function with a multiplexer using A, B, C variables to the selection lines :

$$F(A, B, C, D) = \Sigma(0, 1, 3, 4, 8, 9, 15).$$

3. Attempt any two parts of the following : (10×2=20)

(a) Draw J-K flip flop and write the characteristic table and characteristic equation for it. Explain how will you convert it into T flip-flop.

(b) Design a clocked sequential circuit for the state diagram.



(c) Design a 3-bit synchronous counter using J-K flip-flops.

4. Attempt any **two** parts of the following : (10×2=20)
- (a) What is RAM ? Distinguish between SRAM and DRAM. Also draw static RAM cell.
  - (b) What is PLA ? Explain the programming table of a PLA. How is the size of a PLA specified ?
  - (c) Explain how a multiplexer can be used as ROM ?
5. Attempt any **two** parts of the following : (10×2=20)
- (a) Differentiate between :
    - (i) Stable state and unstable state.
    - (ii) Critical race and non-critical race.
  - (b) An asynchronous sequential circuit has two internal states and one output. The excitation functions and output function of the circuit are as follows :  
$$Y_1 = \bar{x}_1 x_2 + x_2 y_1$$
$$Y_2 = x_1 y_2 + x_2$$
and output function  
$$Z = x_1 + y_2$$
    - (i) Draw the logic diagram of the circuit.
    - (ii) Obtain the transition table and output map.
  - (c) Discuss the concept of transition table, flow table and primitive flow table to design fundamental mode asynchronous sequential circuit.