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

PAPER ID : 0323   **Roll No.** ☐☐☐☐☐☐☐☐☐

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) $84\overline{2}\overline{1}$ 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 $\overline{EX-OR}$ 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.
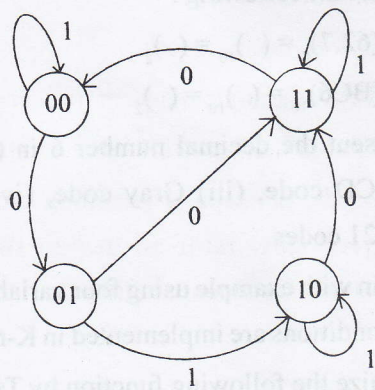
(c) Design a 3-bit synchronous counter using J-K flip-flops.

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 :

$$Y_1 = \overline{x}_1 x_2 + x_2 y_1$$
$$Y_2 = x_1 y_2 + x_2$$

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.