(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
2010-11

### DIGITAL ELECTRONICS

*Time : 3 Hours*             *Total Marks : 100*

Note :   (1) Attempt **all** questions.

        (2) All questions carry equal marks.

1. Attempt any **four** of the following :

   (a) Convert the following decimal numbers to their binary equivalents :

     (i)   $(83)_{10}$

     (ii)   $(79.515)_{10}$

     (iii)   $(109.125)_{10}$

   (b) Perform the following operations by using 2's complement method :

     (i)   $46 - 23$

     (ii)   $21 - 42$

   (c) Perform the following subtractions of BCD numbers using 9's complement :

     (i)   $68 - 24$

     (ii)   $24 - 29$

   (d) Explain with examples, how Hamming code is useful for detecting and correcting errors in digital data transmission.

   (e) Convert the following Boolean function into standard SOP and express it in terms of minterms :

$$Y(A, B, C) = AB + AC + B\bar{C}.$$

   (f) Minimize the following expression using K-map :

$$Y(A, B, C) = \Sigma(1, 2, 6, 7) + d(0, 5).$$

2. Attempt any **four** of the following :

   (a) Design a 8-bit BCD adder.

   (b) Implement a 16 : 1 Multiplexer using 4 : 1 Multiplexers.

   (c) Design a BCD to Excess-3 Code Converter.

   (d) Design a full adder using NAND gates only.

   (e) Design a combinational logic circuit with three input variables that will produce logic 1 output when more than one input variables are logic 1.

   (f) Design a 2-bit comparator using logic gates.

3. Attempt any **two** of the following :

   (a) What is race-around condition ? How does it get eliminated in Master-slave J-K flip flop ? Explain.

   (b) Design and implement a Mod-6 synchronous counter using D-flip flop.

   (c) Design an asynchronous sequential circuit with two inputs $I_1$ and $I_2$, and one output, Z. Initially, both inputs are equal to 0. When $I_1$ changes from 0 to 1, Z becomes 1. When $I_2$ changes from 0 to 1, Z becomes 0. Otherwise, Z is 0. Realize the circuit using J-K flip flop.

4. Attempt any **two** of the following :

   (a) Describe the differences between the following :

     (i)   PLA and PAL

     (ii)   Registered output PAL and GAL

   Use logic diagrams for explanation.

(b) Write short notes on the following :

    (i)   Sequential and Random Access memories.

    (ii)  One and multi-dimensional selection arrangement of memories.

(c) Draw an ASM chart for a modulo-6 counter with a reset input.

5. Attempt any **two** of the following :

(a) For the state diagram shown in figure, obtain the state table and design the circuit using minimum number of J-K FFs.
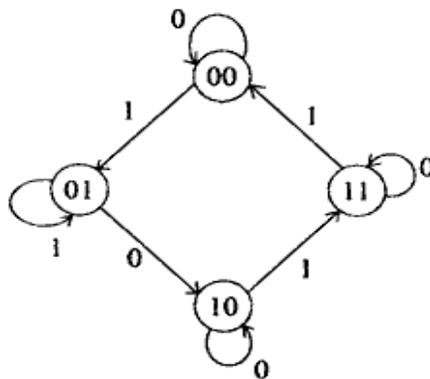


(b) Differentiate synchronous and asynchronous sequential circuits. Explain the problem in asynchronous circuits.

(c) What are the different types of hazards in asynchronous circuits ? Differentiate static-0 and static-1 hazards with waveform.