

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

PAPER ID : 0109

Roll No.

--	--	--	--	--	--	--	--	--	--

**B. Tech.**

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2010-11

**DIGITAL LOGIC DESIGN**

Time : 3 Hours

Total Marks : 100

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

(2) All questions carry equal marks.

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

(a) (i) Convert the following numbers as indicated :

(A)  $(62.7)_8 = ( )_{16} = ( )_2$

(B)  $(BC64)_{16} = ( )_{10} = ( )_2$

(C)  $(111011)_2 = ( )_5$

(ii) Represent the unsigned decimal number 965 and 672 in BCD and then show the steps necessary to find their sum.

(b) (i) Minimize the given Boolean function using K-Map and implement the simplified function using NAND gates only  $F(A, B, C, D) = \Sigma m(0, 1, 2, 9, 11, 15) + d(8, 10, 14)$ .

(ii) (A) Express the Boolean function :

$$F = AB + AC + A\bar{D}$$
 in a sum of minterms form.

(B) Implement two input XOR gate using NOR gates only.

(c) Consider a (7, 4) cyclic code. The generator polynomial for this code is given as  $g(x) = 1 + x + x^3$ . Find all the code words of this code.

2. Attempt any **four** parts of the following : (5×4=20)

(a) Implement the function :

$$F(A, B, C) = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

using a 4 : 1 multiplexer.

(b) Implement the full subtractor using a 1 : 8 demultiplexer.

(c) Design a single bit magnitude comparator.

(d) Design an Excess-3 to BCD code converter.

(e) Design an octal to binary encoder.

(f) Design a decimal adder.

3. Attempt any **four** parts of the following : (5×4=20)

(a) Explain how SR-FF is converted into D-FF.

(b) Explain the working of the master slave JK flip-flop.

(c) Design modulo 3-counter using S-R flip-flop.

(d) Design a circuit that implements the state diagrams of figure 1.

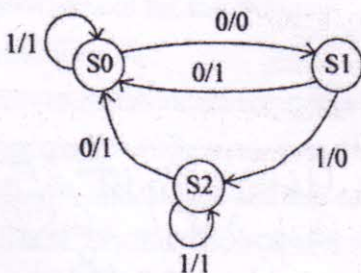


Figure 1

(e) Design a 4 bit serial in-serial out shift register using JK flip-flop.

(f) Design a shift register counter to generate a sequence length of 5 having self-start feature.

4. Attempt any **four** parts of the following : (5×4=20)

- (a) Design a combinational circuit using a ROM that accepts a 3 bit number and generates an output binary number equal to the square of the input number.
- (b) Implement the following functions using 3-input, 3 product terms and 2 output PLA :

$$F_1 = A\bar{B} + AC$$

$$F_2 = AC + BC.$$

- (c) It is required to obtain a memory system of  $2K \times 8$  bits for a certain application. Given that memory ICs available are  $1K \times 8$ . Obtain the desired system.
- (d) Draw and explain the ASM chart for binary multiplexer.
- (e) Explain the basic elements of the ASM chart. How does it differ from conventional flow chart ?
- (f) Distinguish between SRAM and DRAM. Also draw static RAM cell.

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

- (a) Write short notes on :
  - (i) Fundamental mode asynchronous sequential circuit
  - (ii) Pulse mode asynchronous sequential circuit.
- (b) (i) What are critical race and non-critical race ? How can they be avoided ? Is race-around condition an example of race ?
  - (ii) Design a JK-FF asynchronous sequential circuit that has two inputs and single output. The circuit is required to give an output equal to 1 if and only if the same input variable changes two or more times consecutively.



- (c) Suppose the circuit of Figure 2 is operating in fundamental mode. Analyse the circuit by forming the :
- (i) Flow table,
  - (ii) Transition flow diagram, and
  - (iii) Transition flow table if exists.

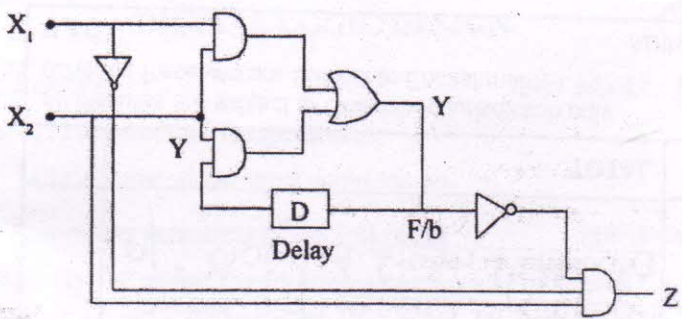


Figure 2