Printed Pages : 4

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EC-302(MTU)

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

PAPER ID : 995302

Roll No.

B.Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

DIGITAL DESIGN

Time : 3 Hours] [Total Marks : 100

Note: Attempt all Sections. Instruction for each question is given there.

Section – A

1. Attempt **ALL** questions. **2x10=20**

(a) Convert the following: $(62.72)_8 = (\ )_{16}$

(b) Represent the decimal number 6 in 84-2-1 code, excess-3 code & BCD code.

(c) Minimize the following expression using k-map:

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

(d) Explain state assignment.

(e) Draw the JK flip-flop using NAND gate.

(f) Implement the following Boolean function by using multiplexer. $F(P,Q,R,S) = \Sigma m(0,5,7,8,9,10,11,12,13,15)$

(g) How many address lines are needed to operate a 2K x 8 ROM?

(h) What is race-around condition in JK Flip-Flop?

(i) Explain the Hazards in combinational circuit.

(j) Differentiate synchronous and asynchronous sequential circuits.

Section - B

2. Attempt any THREE of the following: - 3x10 = 30

(a) For the following function find the reduced Boolean equation using Quine McCluskey Method.

$F(A,B,C,D)=\sum m(1,3,4,6,9,11,12) + \sum d(5,8,15)$

(b) What is magnitude comparator? Draw the circuit of four-bit magnitude comparator and explain its operation.

(c) What are the steps for the analysis of asynchronous sequential circuit? Explain with example.

(d) Discuss the concept of transition table, flow table and primitive flow table to design fundamental mode asynchronous sequential circuit.

(e) Implement the following Boolean function by using PAL

$F_1(w,x,y,z)= \Sigma m(0,2,4,6,8,10,12,14,15)$

$F_2(w,x,y,z)= \Sigma m(0,1,2,6,8,9,10)$

$F_3(w,x,y,z)= \Sigma m(3,4,6,7,11,12,13,14,15)$

$F_4(w,x,y,z)= \Sigma m(5,6,7,8,9,10,11,12,13,14,15)$

Section - C

3. Attempt any TWO Questions. 5x2=10

(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) Perform the following operations by using 2's complement method: i) 46-23 ii) 21-42

(c) Determine minimal sum of product from for the following multiple output system using K-map:

a. $f(A,B,C,D,E)=\sum m(0,1,2,3,6,7,14,15,17,19,31)$

4. Attempt any TWO Questions. **2x5=10**

a). Design a full subtractor circuit with a decoder and two OR Gates.

b). What is priority encoder? Explain with the help of suitable example.

c). Design a combinational logic circuit with three input variables that will produce logic 1 output when more than one input variables are logic 0.

5. Attempt any ONE Question. **10x1=10**

a). Draw neat diagram of Universal shift register. Explanation not required.

b). Draw Mod 10/BCD counter. Also draw state diagram for it. Explanation not required.

6. Attempt any ONE Question. **10x1=10**

a). Explain Random Access Memory (RAM). Also draw block diagram of 4x4 RAM.

b). Reduce the state diagram shown in figure-1.

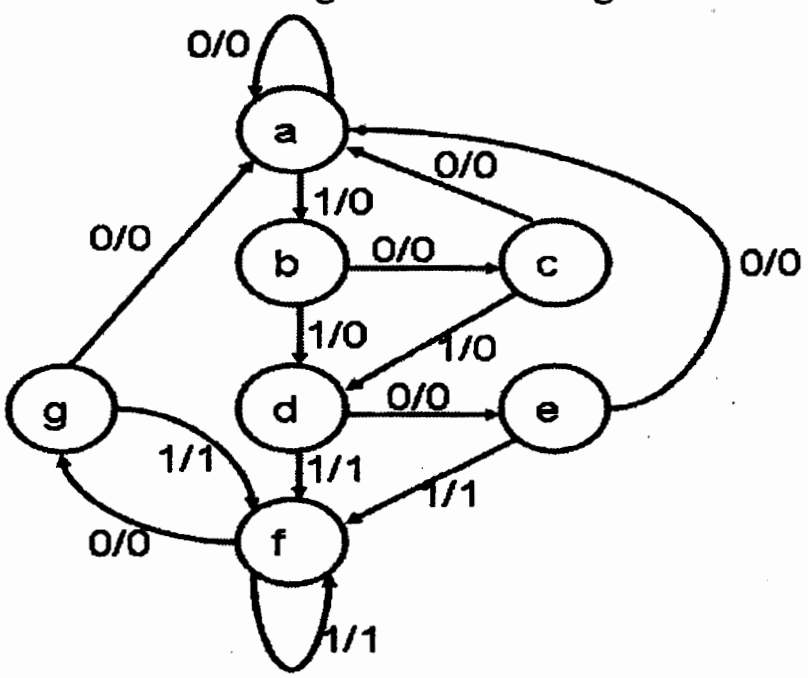

Figure.-1

7. Attempt any ONE Question. **10x1=10**

a). Explain the design procedure of asynchronous sequential circuit with suitable example.

b). Explain race free state assignment in asynchronous sequential circuit with suitable example. Also explain Critical Race and Noncritical Race.