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EC–302

B. TECH.

THIRD SEMESTER EXAMINATION, 2003-2004

SWITCHING THEORY & LOGIC DESIGN

Time : 2 Hours *Total Marks : 50*

Note : Answer ALL questions.

1. Answer any ONE of the following :— (10×1=10)

   (a) Minimize the following using Tablar method :—

   $$f(xyzwp) = \sum m(13,15,17,18,19,20,21,23,25,27,29,31) + \sum d(1,2,12,24).$$

   (b) *(i)* Minimize the above function in 1*(a)*, using K-map in SOP form.

   (ii) Minimize the above function in 1*(a)*, using K-map in POS form.

2. Answer any THREE parts of the following :— (4×3=12)

   (a) Write 9's and 10's complement of the following numbers :—

   + 9090
   − 3578
   + 136·8
   − 136·28

   (b) A combinational circuit is defined by the following Boolean functions. Design circuit with a decoder and external gates :—

   $$F_1(x, y, z) = x'y'z' + xz$$
   $$F_2(x, y, z) = x\,y'z + x'z$$

(c) Using four-input multiplexers, implement the following function :—

$$F(A,B,C) = \sum m(0,2,3,5,7)$$

control variables A and B.

(d) Write notes on the following :—

(i) Parallel Adder

(ii) Look-ahead Carry Adder

3. Answer any TWO of the following :— (7×2=14)

(a) Using NAND gates, sketch a clocked-RS flip-flop. Using this FF, sketch MSJK flip-flop and using this MSJK FF, sketch Toggle and Delay flip-flops.

(b)

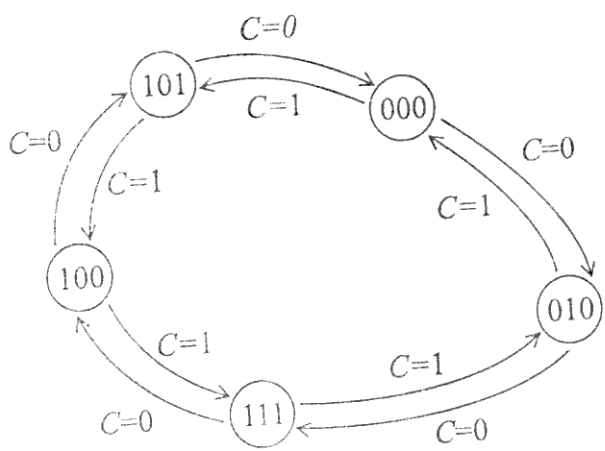

Fig.–1

Implement the state transition diagram shown in fig.-1, using T–flip-flops.

(c) Analyse the synchronous sequential circuit shown in Fig.-2 and draw the state diagram for it.

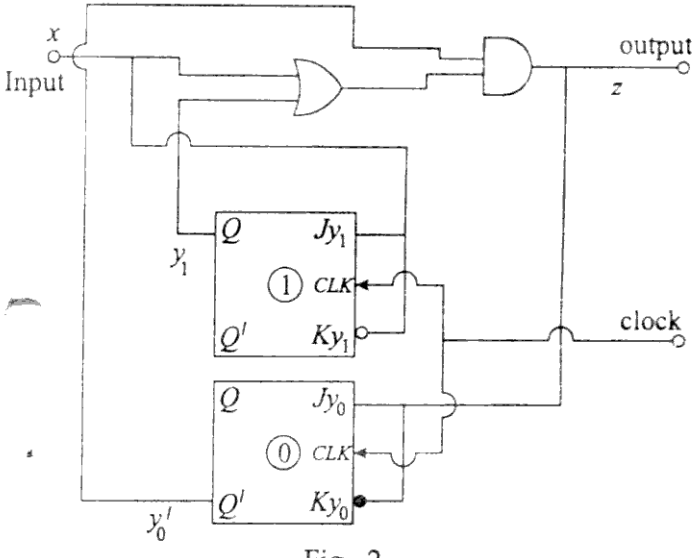

Fig.–2

Answer any TWO of the following :— **(7×2=14)**

(a) Explain the floating-point data representation for decimal number and binary number. What are the advantages and disadvantages of having different values for base and radix in floating-point number format ? Consider both the cases when the base is an integral power of the radix and when it is not.

(b) An asynchronous sequential circuit has two internal states and one output. The excitation and output functions describing the circuit are as follows :

$$Y_1 = x_1x_2 + x_1y_2' + x_2'y_1$$

$$Y_2 = x_2 + x_1y_1'y_2 + x_1'y_1$$

$$z = x_2 + y_1$$