

(REVISED COURSE)

(3 Hours)

Digital System Design-I

[Total Marks : 100]

N.B. : (1) Question No. 1 is compulsory.

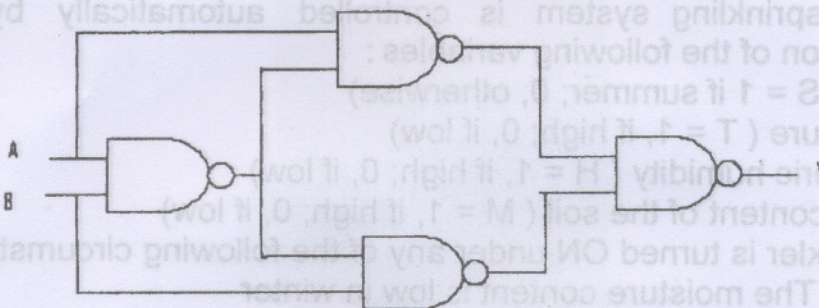
(2) Solve any four from remaining six questions.

12/12/09  
2:30 to 5:30

1. Answer the following questions:

20

- Construct Hamming code for BCD 0110. Use even parity.
- For the logic circuit shown, find out the logic function performed using Boolean theorems.



- With respect to a logic family define the following terms :  
1) Fanout 2) Noise Margin 3) Propagation delay 4) Voltage parameters.
- Explain with example self-complementing codes.

2. (a) For the expression  $Y = A + BC' + ABD' + ABCD$

- Convert to standard SOP
- Reduce using K-map
- Construct circuit using NAND gates only.

(b) Find the reduced POS form using K-map

$$F(A,B,C,D) = \pi M(0,6,7,8,12,13,14,15)$$

Implement using only NOR gates

(c) Explain the term "metastability", its causes and effects.

3. (a) Simplify the following 5 variable Boolean expression using Quine. McCluskey method

$$F = \sum m(0,1,9,15,24,29,30) + d(8,11,31)$$

(b) Design and explain one digit BCD adder using IC 7483 and NAND gates.

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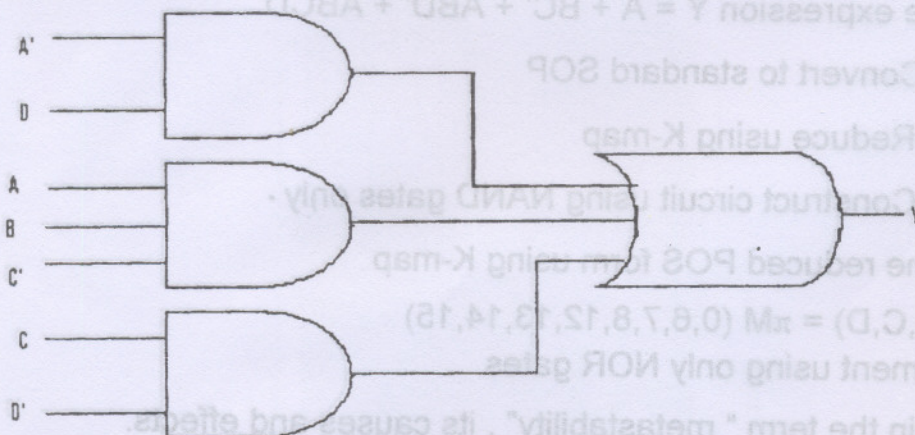


4. (a) Design an clocked XY flip-flop using JK flip-flop. The function table of XY flip-flop is as follows : 10

X	Y	$Q_{n+1}$
0	0	$Q_n'$
0	1	0
1	0	1
1	1	$Q_n$

- (b) Explain and draw MOD – 10 asynchronous counter using T- FF. Draw output waveforms and show where glitches occur. 10
5. (a) Construct a twisted ring counter using IC 74194 and draw the output waveforms. 10
- (b) A lawn sprinkling system is controlled automatically by certain combination of the following variables : 10  
 Season (  $S = 1$  if summer; 0, otherwise)  
 Temperature (  $T = 1$ , if high; 0, if low)  
 Atmospheric humidity (  $H = 1$ , if high; 0, if low)  
 Moisture content of the soil (  $M = 1$ , if high; 0, if low)  
 The sprinkler is turned ON under any of the following circumstances:  
 (i) The moisture content is low in winter  
 (ii) The temperature is high and moisture content is low in summer  
 (iii) The temperature is high and humidity is high in summer  
 (iv) The temperature is low and moisture content is low in summer  
 (v) The temperature is high and humidity is low.

6. (a) Find static hazards in the circuit given below and modify the circuit to eliminate the hazard. 10



- (b) Draw and explain a 16 - bit even parity checker using IC 74180. 10
7. (a) Implement the function using single IC 74151 and some gates 10  
 $F = \sum m(1,2,4,10,14,17,19,23,25,26,28,29,30,31)$
- (b) Design a mod -11 synchronous counter using 4-bit synchronous counter IC 74163 making use of its preset input and RCO output. 10