M·E·(ETRX) Sem I (R)
Digital System Design
21/12/09

Con. 5276–09. BB–6116

(4 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume **suitable** additional data if **required**.
(4) **Figures** to the **right** indicate **full** marks.

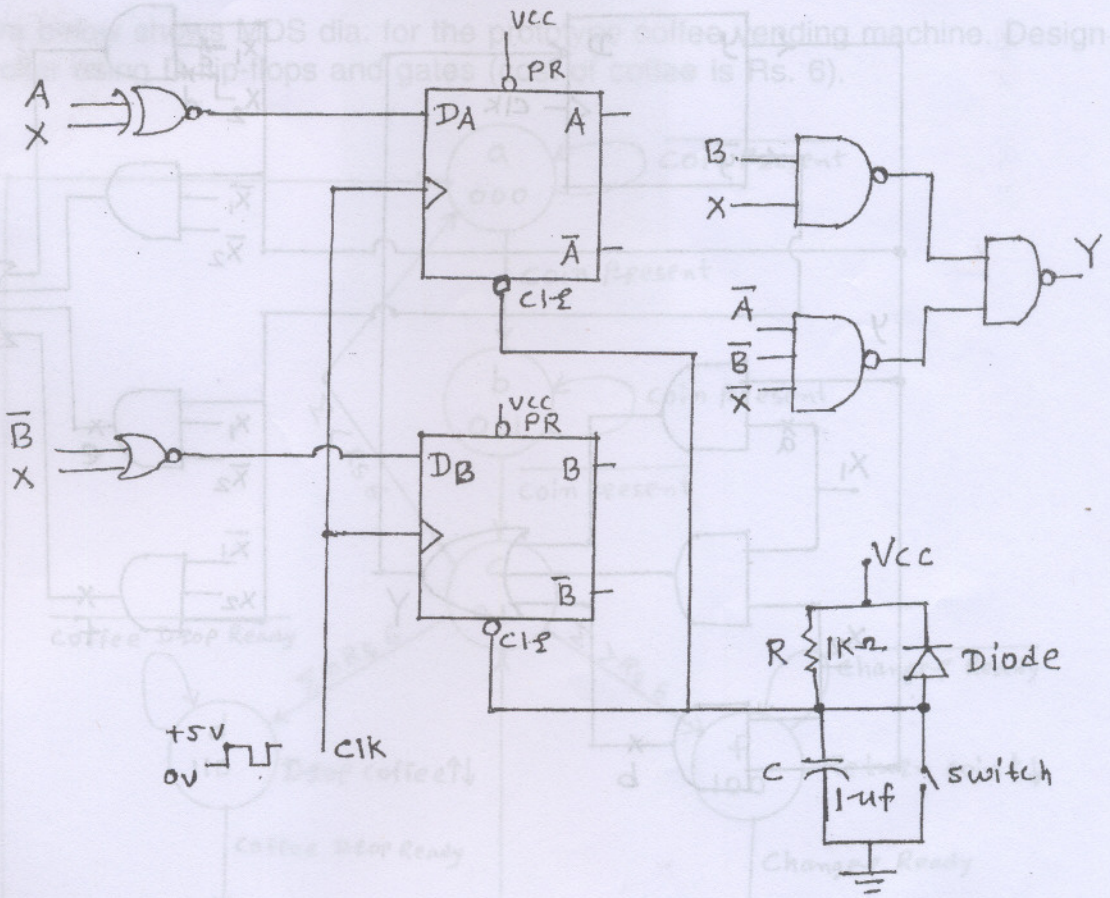
1. (a) Develope a ROM for BCD to Excess 3 code converter. **8**

   (b) Use demux with active low O/Ps and gates with Fan in 2 to realize the function– **6**
   $Y = F(A, B, C) = \Sigma m(0, 3, 4, 6)$

   (c) Realize the following function with type 2 mux design method and only one inverter :– **6**
   $Y = F(A, B, C, D) = \Sigma m(0, 1, 2, 3, 9, 11, 12, 13)$

2. Design a logic ckt that will give O/P high when invalid BCD code arrives in the form of serial data. **20**

3. (a) For the logic diagram shown in following **figure**, carry out the detailed analysis (Including state dia and power on reset ckt). X is i/p and Y is o/p signal. **10**



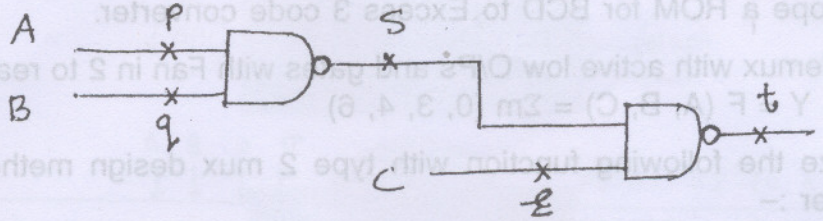
   (b) Design BCD to seven segment code converter using PAL. Give specifications of the PAL. **10**

[TURN OVER

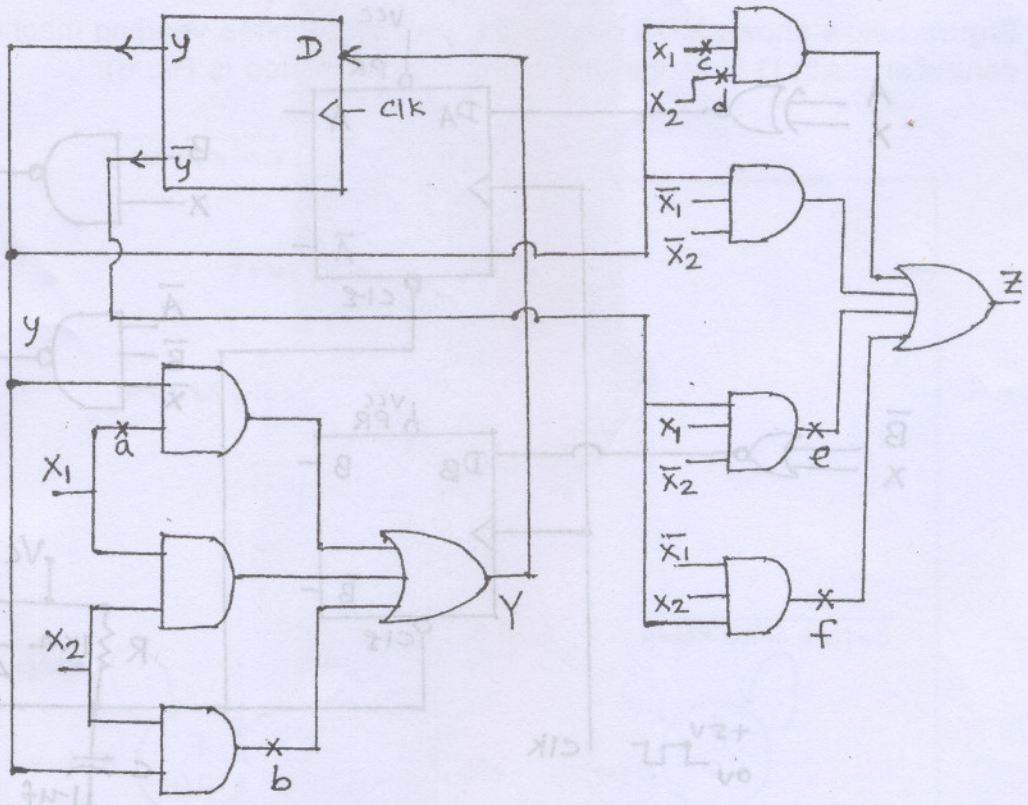
4. (a) For logic circuit whose Boolean equation is given below, find all logic hazards. How will you eliminate these logic hazards ? **10**

$$F = AB\overline{C} + (A + B)\left(\overline{A} + \overline{D}\right)$$

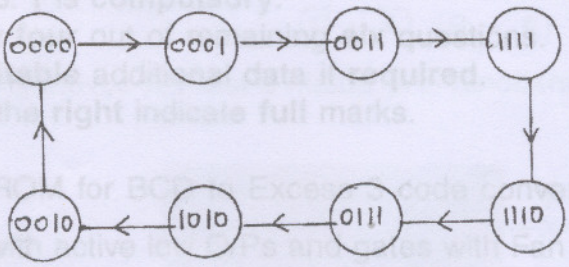
(b) For following combinational n/w, obtain a test set covering all the possible faults– **10**



5. For the following ckt find the shortest possible sequence to detect following faults :– **20**
   (a) s–a–0 faults at locations a, c, d
   (b) s–a–1 faults at locations b, e, f

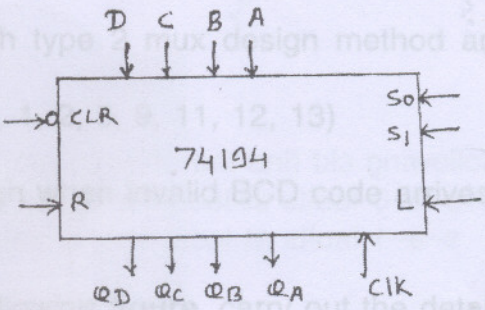


6. A synchronous sequential ckt having 4 bits o/p, follow through following sequence. Design the ckt using shift register IC 74194 and PLA. **20**



DATA of IC 74194

S_1	S_0	Operation
0	0	Hold
0	1	Shift Right
1	0	Shift Left
1	1	Load



7. **Figure** below shows MDS dia. for the prototype coffee vending machine. Design the controller using D flip-flops and gates (cost of coffee is Rs. 6). **20**