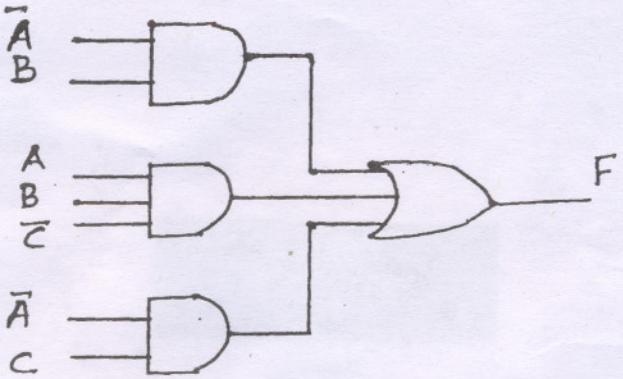
(2) Attempt any **four** out of remaining **six** questions.

1. (a) Draw a circuit diagram of a CMOS inverter. Draw its transfer characteristic and explain its operation. **10**

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



2. (a) (i) Convert to Hexadecimal number $(367{\cdot}32)_{10}$ **10**

   (ii) Solve using 2's complement method. $(48)_{10} - (32)_{10}$

   (iii) Convert $(351{\cdot}02)_5$ to base 7 number.

   (iv) Divide $(10101)_2$ by $(10)_2$

   (v) Convert $(AOBO)_4$ to Binary.

   (b) Implement the following function using only one 4:1 mux and minimum number of gates. **10**

   $F(A\ B\ C\ D) = \Sigma m\ (2, 3, 4, 5, 9, 11) + \Sigma\ d(0, 1)$

3. (a) Explain the essential features of VHDL and write a VHDL program for active low 3:8 decoder. **10**

   (b) Define the following parameters of logic families and give values for CMOS logic family. **10**

   (i) Fan out
   (ii) Figure of merit
   (iii) Propagation delay time
   (iv) Noise margin
   (v) Current parameters.

4. (a) Write a VHDL code for an 8 – to – 3 priority encoder using conditional signal assignment. **10**

   (b) Implement the following functions using active low decoder :— **10**

   (i) $F(A, B, C) = \Sigma m\ (1, 2, 4, 5)$

   $F(A, B, C) = \pi M(1, 3, 5, 7)$ [Do not convert to SOP-form]

5. (a) Convert (1) SR FF to T FF and **10**

   (2) D FF to JK FF

   (b) Implement the two functions using (i) PLA and (ii) PAL **10**

   $F_1\ (A\ B\ C\ D) = \Sigma m\ (5, 8, 9, 12, 13)$

   $F_2\ (A\ B\ C\ D) = \Sigma m\ (1, 3, 5, 8, 9, 11)$

6. (a) Implement BCD adder using 4 bit binary adder IC 7483. Explain its operation by adding 0101 and 0110. **10**

   (b) Using K map, simplify the following expressions and implement them using only NOR gates : **10**

   (i) $F(A\ B\ C\ D) = \Sigma m\ (0, 1, 3, 4, 6, 9, 11, 12, 14)$

   (ii) $F(A\ B\ C\ D) = \Sigma m\ (4, 6, 12, 14) + \Sigma d\ (1, 3, 9, 11)$

7. (a) Explain working of comparator IC 7485 and implement 10 bit comparator using same ICS. **10**

   (b) Write short notes on any **two** :— **10**

   (i) Parity generator and checker IC 74180
   (ii) Quine McCluskey method
   (iii) Interfacing TTL and CMOS logic families.