PART - A (10 Marks)

1. $(116.8125)_{10} - (111011.1101)_2 = (71.00000)_8$ **[2 marks]**

2. Convert the given number to IEEE 32-bit Floating point value: 0.5625 **[1.5 marks]**

   Answer: 0 $\quad$ 01111110 $\quad$ $00100\cdots\cdot0$

   $\underline{20\ 0's}$

3. Convert the given 32-bit floating point number to Decimal value: 3E640000

   Answer: **[1.5 marks]**

4. A decimal number 'K' is converted to an octal number 'L'. If 'L' is considered as a decimal number (with base-10), then the difference between decimal L and K is $(36)_{10}$, give one possible value of K for which this is true.

   $(K)_{10} = \underline{70}$ **[2 marks]**

   Eg. If K is $(21)_{10}$ then L would be $(25)_8$ So if we consider L as decimal it would be $(25)_{10}$ and the difference between decimal L and K would be $(4)_{10}$.

5. There are three singular gates, X, Y and Z and there are two output expressions OP1 and OP2. According to the following conditions find out the gates represented by X, Y and Z respectively: **[3 marks]**

   If A=0 OP1 is BD' [This OP1 is after applying Demorgan's theorem once] and OP2= B'C' + BC
   If B=1 OP1 is (A+D)' and OP2=A'C+AC'
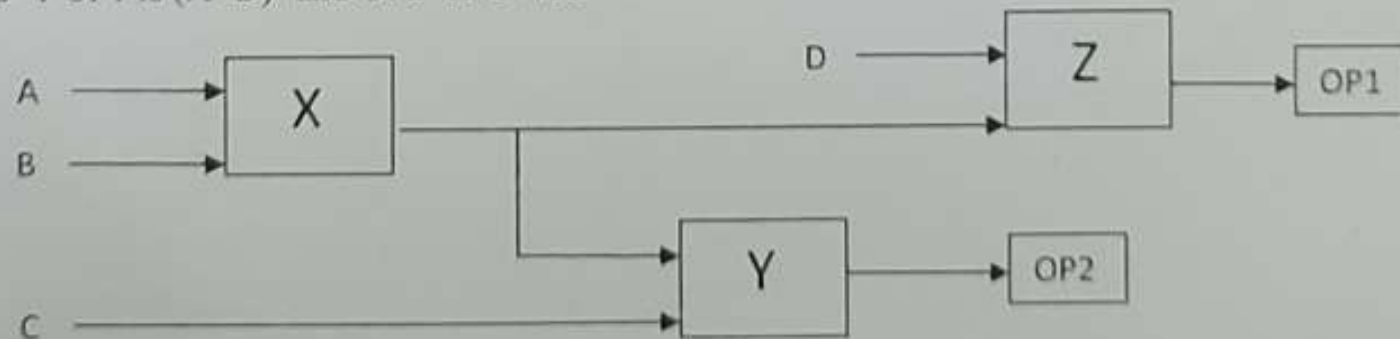
X: XNOR $\qquad$ Y: XOR $\qquad$ Z: NOR

PART - B (20 Marks)

1. Simplify the following 5 variable Boolean expression in SOP using K map, where min-terms and don't care conditions are given as follows:

   $F(A,B,C,D,E)=\sum m(0, 6, 7, 9, 10, 11, 13, 16, 17, 22,. 23, 24, 25, 26, 27, 29)$ and $d(4,14,20,30)$. **[6 marks]**

2. Draw a Circuit for base-9 adder. This circuit should take 2 base-9 numbers of single digit each (0-8) as inputs and add both the numbers. The output should again be a base-9 number i.e. each digit should be a base-9 number.

   Note: Standard circuits like 4-bit adders/subtractors/comparators can be used.   **[5 marks]**

3. There are two kids Vijay and Sriram, who want to play a game involving 2 keyboards (C for Vijay and K for Sriram) having four buttons each, c0, c1, c2, c3 and k0, k1, k2, k3. In both the keyboards number 0-3 are pasted in sequence for each key (i.e. 0, 1, 2, 3). Design a circuit that will take input from these keyboards at the same and will display output using three LED's, L1, L2 and L3 according to the following conditions. L1 will glow if Sriram has entered a number higher than Vijay's and L2 will glow if Vijay's number is greater than Sriram. All three LED's will glow if both enter same number. Assume input 1 makes LED glow.

   Note: For Part B, Question 3, Standard circuit module, if used should have gate level representation of the circuit   **[6 marks]**

4. Draw a Full adder circuit with its truth table.

   [3 marks]

--ALL THE BEST--