Time: 3 HRS   **Marks: 80**

Note: 1. Q. No1 is compulsory

       2. Solve any three questions out of the remaining five

       3. Figures to right indicate full marks

       4. Assume suitable data where necessary

Q.1   **Solve any four**   **(20)**

       a) Draw and implement EX-OR and EX-NOR GATES using NAND gates

       b) What is the difference between Multiplexer and De- multiplexer circuits?

       c) Implement Basic gate using NAND and NOR gate

       d) Convert $(101101.1101)_2$ to decimal, hexadecimal and octal form

       e) Convert JK Flip flop to D Flip Flop

Q.2

       a. Draw and explain various types of Shift Register with neat diagram.   **(10)**

       b. Draw and explain Ring Counter with a neat diagram   **(10)**

Q.3.   a. Draw and explain Comparator lC 7485 and ALU IC 74181   **(10)**

       b. Draw and explain data objects and types in VHDL   **(10)**

Q.4.   a.   Implement the following Boolean function using only one 8:1 Mux and a few gates

       F= $\sum m$ (0, 1, 3, 4, 5, 7, 9, 11, 12, 15)   **(10)**

      b. Draw and explain BCD and Excess 3 code with examples.   **(10)**

Q.5.   a.   Design Mod 10 ripple counter using suitable Flip Flop   **(10)**

      b.   Design and simplify using Quine – Mcclusky Method   **(10)**

             F(A,B,C,D= $\sum m$ (0,3,5,11,13)+ d(1,2,5)

Q.6.   **Solve any four**   **(20)**

       i.   Perform subtraction of $(33)_{10}$ and $(44)_{10}$ using ones complement.

       ii.   Current mirror circuit

       iii.   Sequential and Combinational Circuit

       iv.   VHDL program format

       v.   Convert SR to T Flip Flop

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