Q.1 (a) Determine the base of the numbers in LHS for each case of the following operations to be correct: (i) $203/12 = (15)_{10}$ (ii) $24 * 18 = (320)_{10}$ **[3]**

OR

A particular number system has two consecutive digits X and Y, when written as XY gives decimal value 129 and when written as YX gives decimal value 143. Find the base of this number system and digits X and Y.

(b) Multiply following numbers without converting to any other base.   **[3]**
     $(135.4)_6 \times (14.4)_6$

(c) Obtain 2's complement of binary numbers 011010 and 010.010.   **[2]**

(d) Convert following decimal numbers in to base 5 and base 7. (i) 234.125 (ii) 98.23 **[4]**

Q.2 (a) Simplify the Boolean function $F(W,X,Y,Z)=\sum(0,1,2,8,9,11,15)$ that has Don't care as $d(W,X,Y,Z)=\sum(7,4)$ **[3]**

(b) Obtain boolean equation of borrow output of a Full Subtrator and realize it with NAND only logic.   **[3]**

OR

Simplify following Boolean expression by algebraic manipulation.
$f(k,l,m,n)= k'lm'+k'm'n+klm'n'+ lmn'$

(c) Design Even parity generator for 4-bit message and implement it with two input X-NOR gates and an inverter.   **[3]**

Q.3 (a) Draw the waveform of output of latch Q_L and output of positive edge triggered flip flop Q_F if both $Q_L=Q_F=0$ initially.   **[2]**
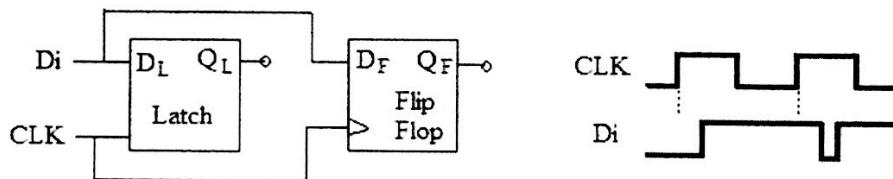
(b) Obtain characteristic table and characteristic equation of following latch.   **[3]**
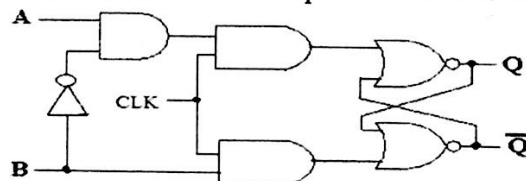
(c) Design & Draw clocked sequential circuit for state diagram shown below using JK flip flop.   **[4]**