Q.2. (a) Perform the following conversions.

i) $(7825.6875)_{10} \rightarrow (.....)_8$

ii) $(A4F)_{16} \rightarrow (.....)_8$

iii) $(3F2A)_{16} \rightarrow (.....)_2$

iv) $(546)_8 \rightarrow (.....)_{16}$

Answer (a)

(i) $(7825.6875)_{10} \rightarrow (.....)_8$

	Quotient	Remainder	LSB
7825/8	978	1	↑
978/8	122	2	
122/8	15	2	
15/8	1	7	
1/8	0	1	MSB

	Integer bit	MSB
0.6875*8 =5.5000	5	↓
0.5000*8 =4.000	4	LSB

Answer (ii) $(A4F)_{16} \rightarrow (.....)_8$

$(A4F)_{16} = (101001001111)_2$

$= (5117)_8$

Answer (iii) $(3F2A)_{16} \rightarrow (.....)_2$

= (0011) (1111) (0010) (1010)

3 F 2 A

$= (0011111100101010)_2 = (11111100101010)_2$

Answer (iv) $(546)_8 \rightarrow (.....)_{16}$

$(546)_8 = (101)\ (100)\ (110)$

$= (000101100110)_2$

$(166)_{16}$

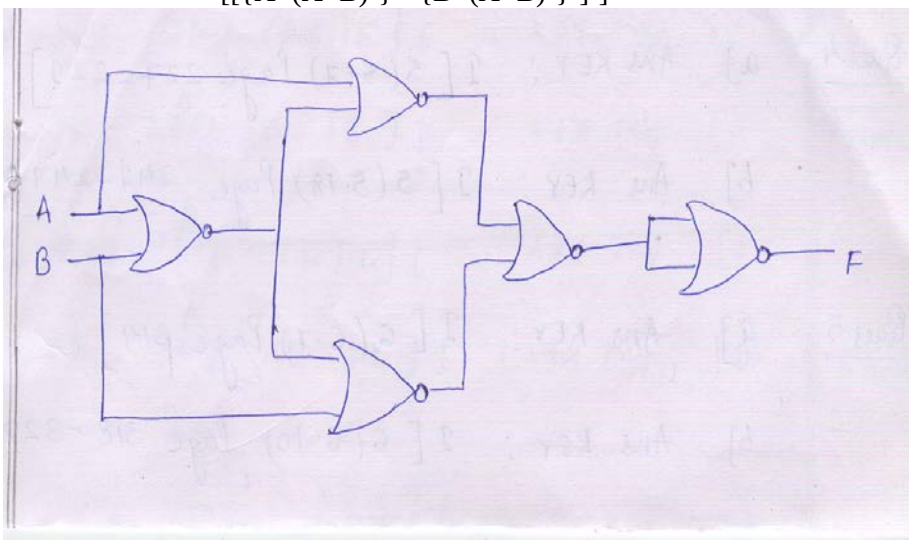
Q2. (b) Compare Analog and Digital systems. Explain the advantages and disadvantages of digital systems over analog systems.

Answer b Text Book 1, 1.2 of page 5-8

Q3 (a) Implement two input Ex-OR gate using minimum number of two input NOR gates only.

Answer3 (a) Output Ex-OR gate

F=A'B+AB'=(A+B) (A'+B')
= A'(A+B)+B'(A+B)
= [A+(A+B)'+[B+(A+B)']'
= [A+(A+B)']'+[B+(A+B)']'
= [[{A+(A+B)'}'+{B+(A+B)'}']']'



Q3. (b) Simplify the Boolean function f $f(w,x,y,z) = \sum(0,1,6,7,14,15) + \sum d(3,4,11,12)$ **by using the don't care conditions d in**

i) SOP Form

ii) POS Form

Answer 3 (b) $f(w,x,y,z) = \sum(0,1,6,7,14,15) + \sum d(3,4,11,12)$

wx \ yz	00	01	11	10
	1	1	X	0
	X	0	1	1
	X	0	1	1
	0	0	X	0

Combineing 1's & X's

wx \ yz	00	01	11	10
	1	1	X	0
	X	0	1	1
	X	0	1	1
	0	0	X	0

Combineing O's & X's

Sop f(w,x,y,z)=yz+w'x'y'+xy
Pos f(w,x,y,z)=(x'+y)(w'+y)(y'+x)

Q3 (c) Find the simplified complemented expression for the following function

$f(A,B,C) = ABC + AB\overline{C} + \overline{A}\overline{B}C + \overline{A}BC$

Answer 3(c) $f(A,B,C) = ABC + AB\overline{C} + \overline{A}\overline{B}C + \overline{A}BC$

a \ bc	00	01	11	10
	0	1	1	0
	0	0	1	1

=A'C+AB

$\overline{f} = (A+\overline{c})(\overline{A}+\overline{B})$

$=A\overline{B}+\overline{A}\overline{C}+\overline{B}\overline{C}$

Q4 (a) Explain the working of JK Flip Flop with the help of its logic diagram, characteristic equation, state table and excitation table .

Answer Text Book 1, 5.7 of page 227-229

Q4 (b) Describe the working of 4 bit serial in serial out shift register using logic diagram and waveforms

Answer Text Book 1, 5.18 of page 247-249

Q5 (a) Represent $(275)_{10}$ and $(641)_{10}$ in BCD and then perform BCD addition. Check your work by converting the result back to decimal

Answer Text Book 1, 6.7 of page 314

Q5 (b) Describe the working of a five bit parallel binary adder circuit using full adders

Answer Text Book 1, 6.10 of page 318-320

Q5 (c) Compute the following using 2's complement arithmetic
(i) – 9 – 4
(ii) – 4 + 9

Answer Text Book 1, 6.3 of page 306-307

Q6 (a) Explain the operation of a 4 bit asynchronous up counter using JKFF with the help of logic diagram and waveforms

Answer Text Book 1, 7.1 of page 362-363

Q6 (b) Design a MOD 5 synchronous counter using D Flip Flop.

Answer Text Book 1, 7.10 of page 403-404

Q7 (a) Draw and explain the logic circuit and truth table for an octal to binary encoder.

Answer Text Book 1, 9.4 of page 591-592

Q7 (b) Design a 1line to 8line de multiplexer.

Answer Text Book 1, 9.8 of page 610-611

Q8 (a) Distinguish between Serial in /Parallel out and Parallel in/Serial out shift registers.

Answer Text Book 1, 7.18 of page 441-444

Q8 (b) Design a three bit serial in serial out shift register using JKFF.

Answer Text Book 1, page number 248

Q9 (a) Describe the timing diagrams for read cycle and write cycle for static RAM.

Answer Text Book 1, 12.12 of page number 818-821

Q9 (b) Write a short note on the following:

1. **Static memory device**
2. **Dynamic memory device**
3. **Access**
4. **External memory**

Answer Text Book 1, page number 786-845

Text Book

Digital Systems-Principle and Applications, Ronald J Tocci, Neal S. Wildmer, Gregory L. Moss, Ninth Edition, Pearson Education, 2008