

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

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

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

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

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

**Answer (a)**

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

	Quotient	Remainder	MSB ↑ LSB
7825/8	978	1	↑ ↓
978/8	122	2	
122/8	15	2	
15/8	1	7	
1/8	0	1	
0.6875*8 =5.5000		Integer bit 5	MSB ↓ LSB
0.5000*8 =4.000		4	

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

$$(A4F)_{16} = (101001001111)_2 = (5117)_8$$

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

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

3      F      2      A

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

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

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

$$= (000101100110)_2$$

$$(166)_{16}$$

**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  

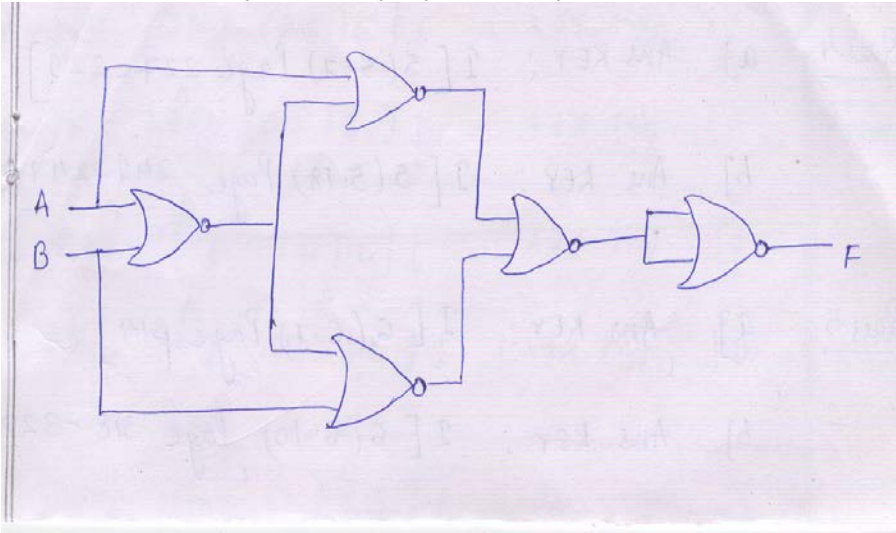
$$F = A'B + AB' = (A+B)(A'+B')$$

$$= A'(A+B) + B'(A+B)$$

$$= [A+(A+B)'] + [B+(A+B)']'$$

$$= [A+(A+B)']' + [B+(A+B)']'$$

$$= [[\{A+(A+B)'\}' + \{B+(A+B)'\}']']'$$



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

- i) **SOP Form**
- ii) **POS Form**

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

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

Combining 1's & X's

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

Combining O's & X's

$$\begin{array}{l} \text{Sop} \quad f(w,x,y,z)=yz+w'x'y'+xy \\ \text{Pos} \quad f(w,x,y,z)=(x'+y)(w'+y)(y'+x) \end{array}$$

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

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

**Answer 3(c)**

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

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

$$=A'C+AB$$

$$f^- = (A+c^-) (A^-+B^-)$$

$$=AB^-+A^-C^-+B^-C^-$$

**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**