

Question 1 (Use Boolean Algebra for Question 1)

1.a Simplify F:

$$F(A,B,C,D) = [AB + A'] \cdot [AB + A'C + BC]' \quad (2 \text{ marks})$$

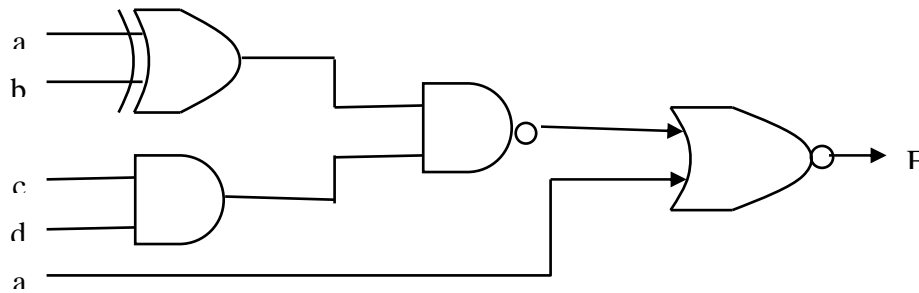
1.B Simplify to obtain minimum SOP

$$F(W,X,Y,Z) = [XY \oplus (X + Y')][W \odot (W + Y)] \quad (2 \text{ marks})$$

1.b Simplify to obtain minimum SOP

$$F(a,b,c,d) = a'b'(c + d')(1 + 0) + a'(c'd + cd' + 1) + (a'b + 0)cd \quad (2 \text{ marks})$$

1.c Minimize the following circuit, draw final minimized circuit.

You have single rails available to you. (2 marks)**Question 2**2.a Give **minimal SOP** for F(a,b,c,d) given by the following K-map (2 marks)**Identify the Prime Implicants and Essential Prime Implicant clearly.**

	ab					
		cd	00	01	11	10
00			1	1		
01				1	X	
11				X	1	
10			1	1		

2.b Give the **POS** of $F(A,B,C,D) = (A + BD)(B + AD)$ (1 mark)2.c Give the **minterm list** of $F(A,B,C,D) = B$ (1 mark)2.d Give the minimal **NOR-NOR** implementation of $F(A,B,C,D) = AC' + A(D + CB)$ (2 marks)

Question 3

- a) Given function F1 given in the K-map below determine F2 using F1.
 b) Draw the final circuit of F2 (6 Marks)

AR				
CD \	00	01	11	10
00		1		1
01	1		1	
11		1		1
10	1		1	

$F1 = A \oplus B \oplus C \oplus D$

ab				
cd \	00	01	11	10
00	1	1		1
01	1		1	
11	1	1	1	1
10	1	1		

F2

Question 4

Draw the timing diagram for F(A,B,C) for the following consecutive inputs:
 ABC = 000, 010, 110, 010, 111 (**follow these vectors in order given).
 Assume the following gate delays,

NAND = 3ns,

OR gate = 4ns,

(5 marks)

