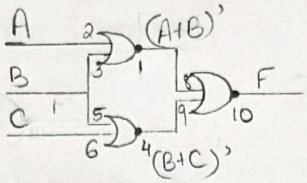
1) PRE-LAB:-

For Obj. 1 →

a) $F = (A+B)(B+C)$



b)

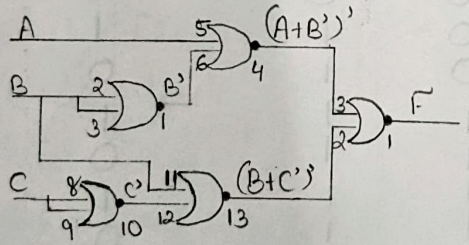
Inputs			Outputs		
A	B	C	(A+B)	(B+C)	F = (A+B)(B+C)
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	1	1
0	1	1	1	1	1
1	0	0	1	0	0
1	0	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1

For Obj. 2 →

2) $F = \prod M(2,3,4,5,6,7,10,11)$

⇒ $F = (A+B')(B+C')$

a)



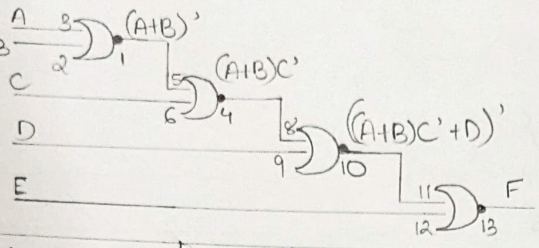
b)

Inputs			Outputs				
A	B	C	B'	C'	A+B'	B+C'	F = (A+B')(B+C')
0	0	0	1	1	1	1	1
0	0	1	1	0	1	0	0
0	1	0	0	1	0	1	0
0	1	1	0	0	0	1	0
1	0	0	1	1	1	1	1
1	0	1	1	0	1	0	0
1	1	0	0	1	1	1	1
1	1	1	0	0	1	1	1

For Obj. 3 →

$F = ((((A+B)C')+D)E')$

a)



Inputs					Outputs					
A	B	C	D	E	C'	E'	(A+B)	(A+B)C'	((A+B)C'+D)	((A+B)C'+D)E' = F
0	0	0	0	0	1	1	0	0	0	0
0	0	0	0	1	1	0	0	0	0	0
0	0	0	1	0	1	1	0	0	1	0
0	0	0	1	1	1	0	0	0	1	0
0	0	1	0	0	0	1	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	0	1	1	0	0	1	0	0	1	0
0	0	1	1	1	0	0	0	0	1	0
0	1	0	0	0	1	1	1	1	1	0
0	1	0	0	1	1	0	1	1	1	0
0	1	0	1	0	1	1	1	1	1	0
0	1	0	1	1	1	0	1	1	1	0
0	1	1	0	0	0	1	1	0	0	0
0	1	1	0	1	0	0	1	0	0	0
0	1	1	1	0	0	1	1	0	1	0
0	1	1	1	1	0	0	1	0	1	0
1	0	0	0	0	1	1	1	1	1	0
1	0	0	0	1	1	0	1	1	1	0
1	0	0	1	0	1	1	1	1	1	0
1	0	0	1	1	1	0	1	1	1	0
1	0	1	0	0	0	1	1	0	0	0
1	0	1	0	1	0	0	1	0	0	0
1	0	1	1	0	0	1	1	0	1	0
1	0	1	1	1	0	0	1	0	1	0
1	1	0	0	0	1	1	1	1	1	0
1	1	0	0	1	1	0	1	1	1	0
1	1	0	1	0	1	1	1	1	1	0
1	1	0	1	1	1	0	1	1	1	0
1	1	1	0	0	0	1	1	0	0	0
1	1	1	0	1	0	0	1	0	0	0
1	1	1	1	0	0	1	1	0	1	0
1	1	1	1	1	0	0	1	0	1	0

LAB → Components Sl. No.

LAB →

Components Required →

Sl. No.	Name of the Component	Specification	Quantity
1	7402 IC	2 input NOR Gate	2
2	Universal Trainer Kit	–	1
3	Connecting Wires	23 SWG	As required

Observations →

For Obj. 1 → $F = (A+B)(B+C)$

Inputs			Theoritical Output	Practical Output
A	B	C	$F = (A+B)(B+C)$	
0	0	0	0	0
0	0	1	0	0
0	1	0	1	1
0	1	1	1	1
1	0	0	0	0
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

For Obj. 2 → $F = \Pi M(2,3,4,5,6,7,10,11)$

$\Rightarrow F = (A+B')(B+C')$

Inputs			Theoritical Output	Practical Output
A	B	C	$F = (A+B')(B+C')$	
0	0	0	1	1
0	0	1	0	0
0	1	0	0	0
0	1	1	0	0
1	0	0	1	1
1	0	1	0	0
1	1	0	1	1
1	1	1		

For Obj. 3 → $F = ((A+B)C' + D)E'$

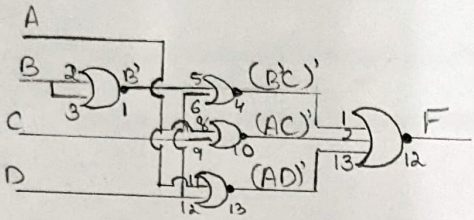
Inputs					Theoritical Output	Practical Output
A	B	C	D	E	$F = ((A+B)C' + D)E'$	
0	0	0	0	0	0	0
0	0	0	0	1	0	0
0	0	0	1	0	1	1
0	0	0	1	1	0	0
0	0	1	0	0	0	0
0	0	1	0	1	0	0
0	0	1	1	0	1	1
0	0	1	1	1	0	0
0	1	0	0	0	0	0
0	1	0	0	1	0	0
0	1	0	1	0	1	1
0	1	0	1	1	0	0
0	1	1	0	0	0	0
0	1	1	0	1	0	0
0	1	1	1	0	1	1
0	1	1	1	1	0	0
1	0	0	0	0	0	0
1	0	0	0	1	0	0
1	0	0	1	0	1	1
1	0	0	1	1	0	0
1	0	1	0	0	0	0
1	0	1	0	1	0	0
1	0	1	1	0	1	1
1	0	1	1	1	0	0
1	1	0	0	0	0	0
1	1	0	0	1	0	0
1	1	0	1	0	1	1
1	1	0	1	1	0	0
1	1	1	0	0	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	1
1	1	1	1	1	0	0

Conclusion →

This experiments implements Boolean function using logic gates. Some basics of logic gates (NOR) in sum of product representation of equations & their implemention using 7402 IC NOR logic gates.

IV) Post - LAB →

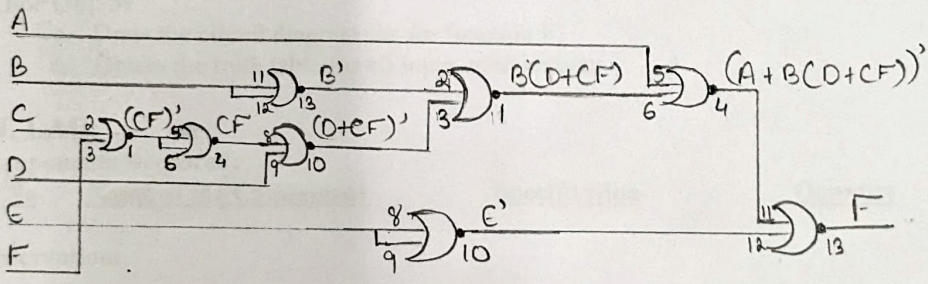
1) $F = AC + AD + B'D$



2) $F = AE + BDE + BCEF$

$= E(A + BD + BCF)$

$= E(A + B(D + CF))$



3) $F = \Sigma m(2, 3, 8, 9, 14, 15)$

$= A'B'C + ABC' + AB'C$

$= [(A'B'C + ABC' + AB'C)']'$

$= [(A'B'C)' \cdot (ABC')' \cdot (AB'C)']' = F_1$