Task I

Optimized Design and Implementation of Logic Circuit

a. Design and implement the circuit using only two input NAND gates. calculate the number of two input NAND gates required to design. Justify your designed circuit requires less number of logical elements to obtain F and F'. (Two unique SOP Expressions F and F' is provided for every individual)

Provide Aim, Components and tools required, truth table, Boolean Expression & its simplification using Boolean Laws, Simplification using K-MAP technique, Circuit diagram using two input gates AND-OR -INV logic, two input NAND logic, simulation results, output verification with proper justification, Result, Inference.

Example:

F(w,x, y, z) =∑m(0,1,2,4,5,6,11,12,14) and F'(w,x,y,z)=∑m(3,7,9,10,13,15).

b. Design and implement the circuit using only two input NOR gates. How many 2 input NOR gates required to design. Justify your circuit requires less number of logical elements. (Two unique POS Expressions F and F' is provided for every individual)

provide Aim, Components and tools required, truth table, Boolean Expression & its simplification using Boolean Laws, Simplification using K-MAP technique, Circuit diagram using two input gates OR-AND -INV logic, two input NOR logic, simulation result, output verification with proper justification, Result, Inference.

Example:

F(w,x,y,z) = π_M (0,1,2,4,5,6,11,12,14) and F'(w,x,y,z)= π_M (3,7,9,10,13,15).

SN	PROG	REG NO	NAME	F	F'
1	BCB	21BCB0081	ARCHITA SHARMA	Σm(0,1,2,8,11,12)	Σm(3,4,5,6,7,9,10,13,14,15)
2	BCB	21BCB0092	JAVVAJI VARUN REDDY	Σm(0,1,2,8,9,11,12)	Σm(3,4,5,6,7,10,13,14,15)
3	BCB	21BCB0095	KOTAGIRI SUSHMITH	Σm(0,1,2,5,8,9,11,12)	Σm(3,4,6,7,10,13,14,15)
4	BCB	21BCB0112	RAVI PRANAVI	Σm(0,1,2,11,12)	Σm(3,4,5,6,7,8,9,10,13,14,15)
5	BCB	21BCB0192	POOJA V R	Σm(0,1,2,9,11,12)	Σm(3,4,5,6,7,8,10,13,14,15)
6	BCE	21BCE0055	ROHIT C AJITH	Σm(0,1,2,5,11,12,14)	Σm(3,4,6,7,8,9,10,13,15)
7	BCE	21BCE0071	JEFFREY RAGHUL A	Σm(0,1,2,7,11,12,14)	Σm(3,4,5,6,8,9,10,13,15)
8	BCE	21BCE0077	YUVRAJ KUMAR SINGH	Σm(0,1,2,7,11)	Σm(3,4,5,6,8,9,10,12,13,14,15)
9	BCE	21BCE0094	PRATYUSH KUMAR	Σm(0,1,2,4,9,11,12,14)	Σm(3,5,6,7,8,10,13,15)
10	BCE	21BCE0180	NEELAY YADAV	Σm(0,1,2,8,11,12,14)	Σm(3,4,5,6,7,9,10,13,15)
11	BCE	21BCE0231	ASHWANI YADAV	Σm(0,1,2,3,11,12,14)	Σm(4,5,6,7,8,9,10,13,15)
12	BCE	21BCE0236	YASHIKA GOYAL	Σm(0,1,2,3,6,11,12,14)	Σm(4,5,7,8,9,10,13,15)
13	BCE	21BCE0547	SAYAN SAHU	Σm(0,1,2,4,5,7,11,12,14)	Σm(3,6,8,9,10,13,15)
14	BCE	21BCE0758	AKSHAY A	Σm(0,1,2,4,5,7,8,11,12,14)	Σm(3,6,9,10,13,15)
15	BCE	21BCE0855	SURYA VENKATESH	Σm(0,1,2,5,8,11,12,14)	Σm(3,4,6,7,9,10,13,15)
16	BCE	21BCE0882	SIDDHARTH KHANDELWAL	Σm(0,1,2,8,11)	Σm(3,4,5,6,7,9,10,12,13,14,15)
17	BCE	21BCE0898	SAMARTH ASHWINI GAKHAR	Σm(0,1,2,8,9,11)	Σm(3,4,5,6,7,10,12,13,14,15)
18	BCE	21BCE0916	SURYA R	Σm(0,1,2,6,9,11)	Σm(3,4,5,7,8,10,12,13,14,15)
19	BCE	21BCE0932	MUKILVANNAN M	Σm(0,1,2,3,11,12)	Σm(4,5,6,7,8,9,10,13,14,15)
20	BCE	21BCE2028	CHANDRA SHEKHAR GAMBHIR	Σm(0,1,2,8,11,12,14)	Σm(3,4,5,6,7,9,10,13,15)
21	BCE	21BCE2282	ADITYA BHATTACHARYYA	Σm(1,2,8,11,12,14)	Σm(0,3,4,5,6,7,9,10,13,15)
22	BCE	21BCE2420	SAM KAVIN	Σm(0,1,2,4,11,12,14)	Σm(3,5,6,7,8,9,10,13,15)
23	BCE	21BCE2465	RIYA SINGH	Σm(1,2,4,5,6,11,12,14)	Σm(0,3,7,8,9,10,13,15)
24	BCE	21BCE2478	SAAHITHYA A	Σm(1,2,4,7,8,11,12,14)	Σm(0,3,5,6,9,10,13,15)
25	BCE	21BCE2689	SHILKI KUMARI	Σm(1,2,6,8,9,11,12,14)	Σm(0,3,4,5,7,10,13,15)
26	BCE	21BCE2703	YASH PRIYADERSHI	Σm(1,2,3,7,11,12,14)	Σm(0,4,5,6,8,9,10,13,15)
27	BCE	21BCE2788	SANJEEVKUMAR B	Σm(1,2,3,7,8,11,12,14)	Σm(0,4,5,6,9,10,13,15)
28	BCE	21BCE2796	JADHAV VEDANT RAJESH	Σm(1,2,6,7,9,11,12,14)	Σm(0,3,4,5,8,10,13,15)
29	BCE	21BCE3020	VARAD ASHISH YADAV	Σm(0,1,2,3,14)	Σm(4,5,6,7,8,9,10,11,12,13,15)
30	BCE	21BCE3131	NISHIT DUA	Σm(0,1,2,3,11,13,14)	Σm(4,5,6,7,8,9,10,12,15)
31	BCE	21BCE3321	DEVANSH VERMA	Σm(0,1,2,3,15)	Σm(4,5,6,7,8,9,10,11,12,13,14)
32	BCE	21BCE3341	SURYAPRAKASH RAJ	Σm(0,1,2,3,4,15)	Σm(5,6,7,8,9,10,11,12,13,14)
33	BCE	21BCE3482	NIHAL MUHAMMED ASRAF	Σm(1,2,3,4,8,12,15)	Σm(0,5,6,7,9,10,11,13,14)
34	BCE	21BCE3605	RAI ANJALI	Σm(0,1,2,3,4,6,13,15)	Σm(5,7,8,9,10,11,12,14)
35	BCE	21BCE3618	VAIBHAV ANAND	Σm(1,2,3,4,6,8,13)	Σm(0,5,7,9,10,11,12,14,15)
36	BCE	21BCE3766	SAMIR SHAH	Σm(0,1,2,3,6,7,13,14,15)	Σm(4,5,8,9,10,11,12)

37	BCE	21BCE3821	NISCHINT SHRESTA NIJAGUNA	Σm(1,2,3,6,7,8,12,14,15)	Σm(0,4,5,9,10,11)
38	BCE	21BCE3840	SHRUVI KHANDELWAL	Σm(1,2,3,4,8,10,12,14,15)	Σm(0,5,6,7,9,11,13)
39	BCE	21BCE3913	DHERYA CHAUDHARY	Σm(1,2,3,9,13,12,14,15)	Σm(0,4,5,6,7,8,10,11)
40	BCE	21BCE3971	PRANAV SHANKAR	Σm(1,2,3,7,9,13)	Σm(0,4,5,6,8,10,11,12,14,15)
41	BCE	21BCE3986	SHUBHAM KUMAR SINGH	Σm(1,2,3,6,7,8,9,13)	Σm(0,4,5,10,11,12,14,15)
42	BCE	21BCE3993	ABHI MANDLOI	Σm(1,2,3,9,12,13)	Σm(0,4,5,6,7,8,10,11,14,15)
43	BCE	21BCE3996	VAKATI SAMANVITHA	Σm(1,2,3,6,9,12,13)	Σm(0,4,5,7,8,10,11,14,15)
44	BCI	21BCI0084	UMANG ASAD	Σm(2,4,8,10,12,14)	Σm(0,1,3,5,6,7,9,11,13,15)
45	BCI	21BCI0126	STUTI MAITRA SARKAR	Σm(2,6,10,11,12,14)	Σm(0,1,3,4,5,7,8,9,13,15)
46	BCI	21BCI0199	ARYAN BARUAH	Σm(2,9,10,11,12,14)	Σm(0,1,3,4,5,6,7,8,13,15)
47	BCI	21BCI0212	PATAN MOHAMMAD ABDUL	Σm(2,10,11,12,13,14)	Σm(0,1,3,4,5,6,7,8,9,15)
48	BCI	21BCI0236	VATAM SAI KOUSHIK REDDY	Σm(2,3,6,10,12,14)	Σm(0,1,4,5,7,8,9,11,13,15)
49	BCI	21BCI0257	M ABDUL NABEEL	Σm(2,5,7,10,12,14)	Σm(0,1,3,4,6,8,9,11,13,15)
50	BCI	21BCI0341	SIDDHU KUMAR ROY	Σm(2,3,4,10,12,14)	Σm(0,1,5,6,7,8,9,11,13,15)
51	BCI	21BCI0402	GUDIVADA C.S.VISHNU	Σm(2,3,4,10,12,14,15)	Σm(0,1,5,6,7,8,9,11,13)
52	BCT	21BCT0290	SHIVEN GUPTA	Σm(2,3,9,10,12,14)	Σm(0,1,4,5,6,7,8,11,13,15)
53	BDS	21BDS0024	BISWAYAN MANDAL	Σm(2,4,8,9,10,11)	Σm(0,1,3,5,6,7,12,13,14,15)
54	BDS	21BDS0035	PRAJWAL GUPTA	Σm(2,3,5,8,9,10,11)	Σm(0,1,4,6,7,12,13,14,15)
55	BDS	21BDS0115	SARTHAK PUNJ	Σm(2,8,9,10,11,15)	Σm(0,1,3,4,5,6,7,12,13,14)
56	BDS	21BDS0167	HRIDYESH DAS	Σm(2,3,6,7,8,9,10,11)	Σm(0,1,4,5,12,13,14,15)
57	BDS	21BDS0186	SAI SRIYA CHUNDRU	Σm(2,6,7,8,9,10,11)	Σm(0,1,3,4,5,12,13,14,15)
58	BDS	21BDS0212	HIMANSHU DIXIT	Σm(2,6,7,8,9,10,11,12)	Σm(0,1,3,4,5,13,14,15)
59	BDS	21BDS0298	K P MEENAKSHI SREEDUTH	Σm(2,8,9,10,11,12)	Σm(0,1,3,4,5,6,7,13,14,15)
60	BDS	21BDS0309	JASTI PAVAN	Σm(0,2,3,8,9,10,11,12,13)	Σm(1,4,5,6,7,14,15)
61	BDS	21BDS0335	ASHISH AARAN DAVID	Σm(2,3,8,9,10,11,13,15)	Σm(0,1,4,5,6,7,12,14)
62	BDS	21BDS0360	KULDEEP PAL SINGH	Σm(2,3,6,8,9,10,11,12)	Σm(0,1,4,5,7,13,14,15)
63	BKT	21BKT0005	ANURAG CHOUDHARY	Σm(4,6,8,9,10,11,13,15)	Σm(0,1,2,3,5,7,12,14)
64	BKT	21BKT0069	SAISRUJAN MISHRA	Σm(0,2,4,5,8,10,14,15)	Σm(1,3,6,7,9,11,12,13)