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ASSIGNMENT-1

0.1 Question-2013 Section D Q6(d)

Obtain the Minimal Form for the Boolean Expression:

$$H(P,Q,R,S) = \sum(0, 1, 2, 3, 5, 7, 8, 9, 10, 14, 15)$$

0.2 Contents

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Abstract- This manual shows the Boolean Logic for the given minterms using k-map

P	Q	R	S	H
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

Table 5.0

0.3 Components

Component	Value	Quantity
Resistor	220 Ohm	1
Arduino	UNO	1
Jumper Wires	M-M	20
Breadboard		1

Table 3.0

1.The following K-map is obtained from the above truth table.

2.As we have Four Variables we obtain a 16 cell K-Map

		RS			
		00	01	11	10
PQ	00	1	1	1	1
	01	0	1	1	0
	11	0	0	1	1
	10	1	1	0	1

Table 5.1

0.4 Hardware

- 1.Make connections with arduino pins which are declared as the input and output pins. 2.Connect the output pin to the Resistor and the LED.
- 3.When the input is given from the bread board then the LED glows accordingly.
- 4.In this we used the number 5 as an input to the Arduino and that would give the output as 1 so the LED starts blinking and when the input is changes there will be change in the state of LED.

3.Now we do grouping to obtain the minimal expression using the K-Map.

0.5 Solution

Truth Table

$PQ \backslash RS$	00	01	11	10
00	1	1	1	1
01	0	1	1	0
11	0	0	1	1
10	1	1	0	1

Table 5.2

The minterm expression for the two groupings are $\overline{Q}\overline{S}$ and $\overline{P}S$

$PQ \backslash RS$	00	01	11	10
00	1	1	1	1
01	0	1	1	0
11	0	0	1	1
10	1	1	0	1

Table 5.3

The minterm expression for the two groupings are PQR and $P\overline{Q}\overline{R}$

$PQ \backslash RS$	00	01	11	10
00	1	1	1	1
01	0	1	1	0
11	0	0	1	1
10	1	1	0	1

Table 5.4

The Minimal expression is
 $H = \overline{Q}\overline{S} + \overline{P}S + PQR + P\overline{Q}\overline{R}S$

4. Download the code from the given link and upload to the Arduino.

<https://github.com/siva-gayathri/FWC/blob/main/assignment-1/assembly/codes/hello.asm>

5. Go to the working directory execute `pio run` and `pio run -t upload`.

6. Whenever you change the inputs you will see the respective output.