EE5803 FPGA Lab Assignment 1

Sumanth Naidu Merugula EE22MTECH02004

Question [CBSE 2018 Q6 (d)]:

Reduce the following Boolean Expression to its simplest form using K-map:

$G(U,V,W,Z) = \sum(3,5,6,7,11,12,13,15)$

Solution:

Simplification using K-map:

	$\bar{W}\bar{Z}$	$\bar{W}Z$	WZ	$W\bar{Z}$
$\bar{U}\bar{V}$	0	0	1	0
$\bar{U}V$	0	1	1	1
UV	1	1	1	0
$U\bar{V}$	0	0	1	0

The simplified representation from the above map can be written as

$$G = WZ + VZ + UV\bar{W} + \bar{U}VW$$

NAND realization:

$$G = WZ + VZ + UV\bar{W} + \bar{U}VW$$

$$\bar{\bar{G}} = \overline{\overline{WZ + VZ + UV\bar{W} + \bar{U}VW}}$$

$$G = \overline{\overline{(WZ)}\,\overline{(VZ)}\,\overline{(UV\bar{W})}\,\overline{(\bar{U}VW)}}$$