COE 202, Term 121
Digital Logic Design

Quiz# 3

Date: Saturday, Nov. 10

Q1. For the Boolean function F(W, X, Y, Z)=Σ m(0, 1, 2, 3, 7, 8, 10), d(W, X, Y, Z)=Σ m(5, 6, 11, 15) shown in the k-map below:

WX \ YZ	00	01	11	10
00	1	1	1	1
01	0	x	1	x
11	0	0	x	0
10	1	0	x	1

(i)   Identify all the *prime implicants* and the *essential prime implicants* of F.

(ii) Simplify the Boolean function **F** into a minimal sum-of-products expression.

Q2. Implement the logic circuit given below using only NOR and NOT gates
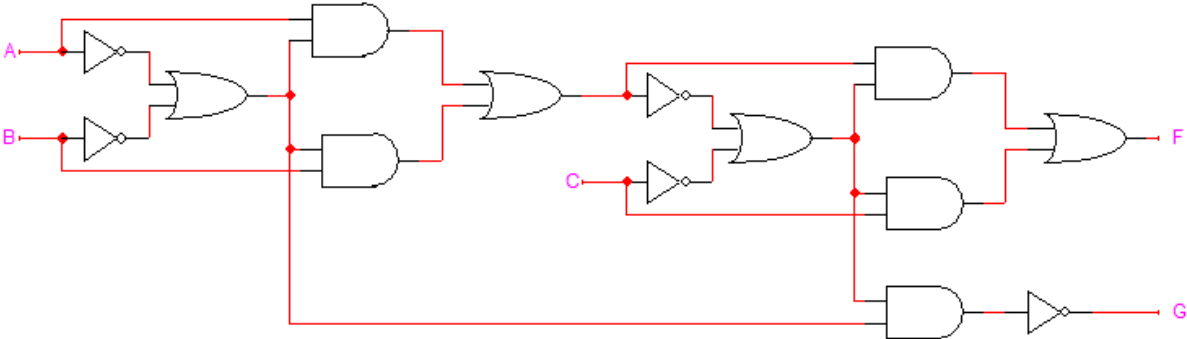
Q3. Design a 3-bit decrementer using only basic gates (AND, OR, and NOT). The circuit takes a 3-bit unsigned number $I = I_2 I_1 I_0$ as input and generates a 3-bit output number $Z = Z_2 Z_1 Z_0$ and a **Valid** output **V.** Whenever $I > 0$ the output $Z = I\text{-}1$ and **V=1**. If **I=0**, the output is invalid which is indicated by an output **V=0.** Derive the simplified Boolean expressions of all outputs.