Indian Institute of Technology BHU Varanasi, Varanasi
Department of Electronics Engineering

Digital Circuits and Systems (EO-203)

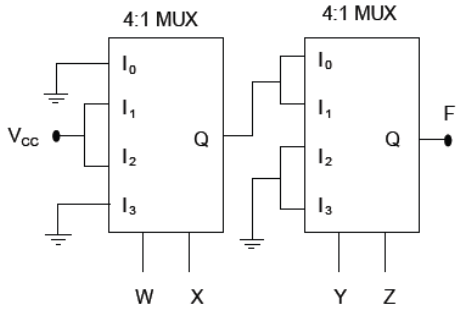
Mid Term Examination, Date: February 28, 2022

Timing: 08:00 Am onwards | Both Part 2 and Part 3 | Max mark: 30

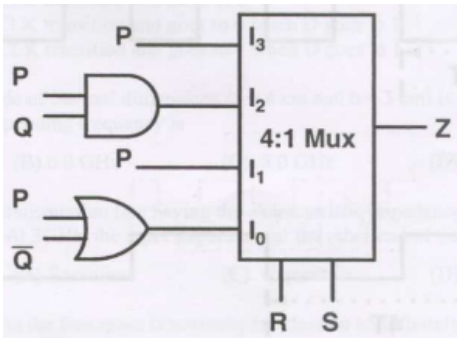
Attempt All Questions

1. (a) Implement F(A, B, C, D) = $\sum$ m(0, 1, 5, 6, 8, 10, 12, 15) using 8:1 MUX. **(4 Marks)**
   (b) Provide the 16 bit 2's complement representation for decimal number (-28). **(2 Marks)**
   (c) Convert the binary number 1011 in the form of Gray code. **(2 Marks)**

2. Please derive the minimized Boolean expression corresponding to the output F in below Figure. Please note that W and Y are the MSBs. **(4 Marks)**



3. In the below multiplexer circuit, I_0 to I_3 are the inputs, while R and S are the control bits. Please obtain the minimized expression corresponding to the output Z. **(4 Marks)**



4. The Boolean function f(A, B, C, D) = $\sum$ m(2, 3, 8, 10, 11, 12, 14, 15), is given using minterms. Please provide the minimized expression in the form SOP using K-map. Additionally, provide the realization using two input NAND gates. **(4 Marks)**

5. If the Boolean function $f(w, x, y, z) = wy + xy + \bar{w}xyz + \bar{w}\bar{x}y + xz + \bar{x}\bar{y}\bar{z}$. Then, please provide the complete list of essential prime implicants corresponding to this function. **(4 Marks)**

6. Please provide the Excess-3 addition of $(2)_{10} + (5)_{10}$. **(2 Marks)**

7. Please explain the complete circuit diagram of BCD adder. **(4 Marks)**

Best wishes