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

**Digital Circuits and Systems (EO-203)**

Assignment 1

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**Attempt All Questions**

1. (a) Minimize the following boolean function-
   $F(A, B, C, D) = \sum m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$. **(2 Marks)**

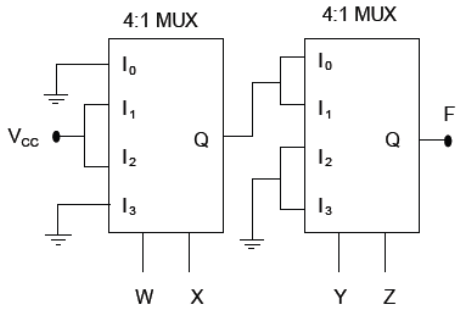
   (b) Minimize the following boolean function-
   $F(A, B, C, D) = \sum m(0, 1, 3, 5, 7, 8, 9, 11, 13, 15)$. **(2 Marks)**

   (c) Minimize the following boolean function-
   $F(A, B, C, D) = \sum m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \sum d(0, 2, 14)$ . **(2 Marks)**

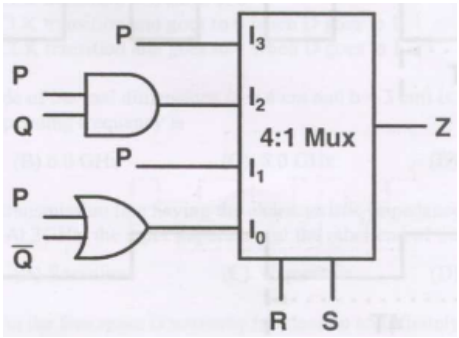
   (d) Provide the 16 bit 2's complement representation for decimal number (-28). **(2 Marks)**

   (e) 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. **(5 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. **(5 Marks)**




4. 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. **(5 Marks)**

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

**Best wishes**