



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, MAY 2018

COURSE NO: EL 278

COURSE NAME: DIGITAL ELECTRONICS

CLASS: EL II

TIME: 3 HOURS

Name: _____ Index Number: _____

ANSWER ALL QUESTIONS ON THIS QUESTION PAPER

1. Draw the following regarding logic gates.

Ladder Logic for AND gate	Ladder Logic for NAND gate
Switch Logic for AND gate	Switch Logic for NAND gate

2. An output Boolean expression is given as, $Out = \bar{B}CD + BCD + AB\bar{C} + ABC\bar{D}$. Represent the Output expression on a Karnaugh map and loop carefully to obtain the most simplified output expression. Draw the digital logic circuit of the simplified output in the space provided.

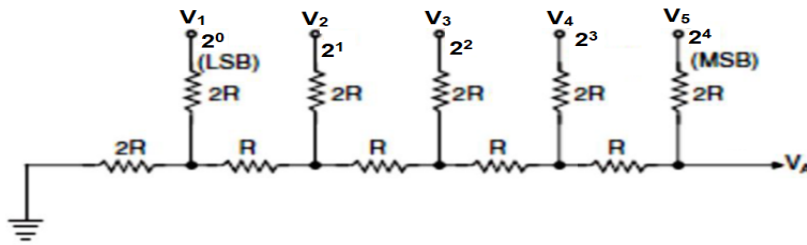
K-Map and Looping

Simplified Output Expression

Simplified Logic Circuit

6. A ripple counter is to be designed to count a maximum of 5740 pulses of items. Determine the number of flip-flops required.

7. The binary ladder DAC network has digital voltage levels of $V_1 = \text{Low}$; $V_2 = \text{High}$; $V_3 = \text{Low}$; $V_4 = \text{High}$ and $V_5 = \text{High}$. Determine the analogue output V_A obtained from the network.



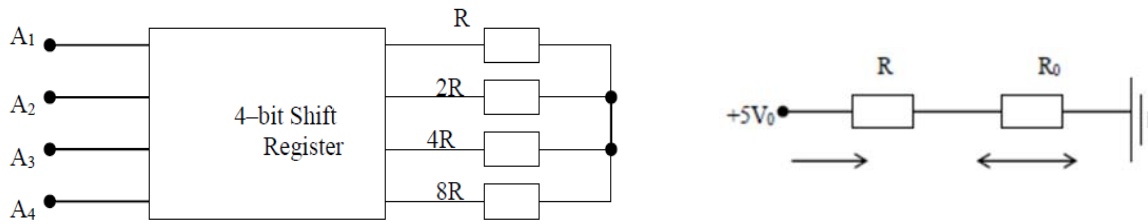
8. a. Briefly explain the following:

a. *Arithmetic Logic Unit (ALU):*

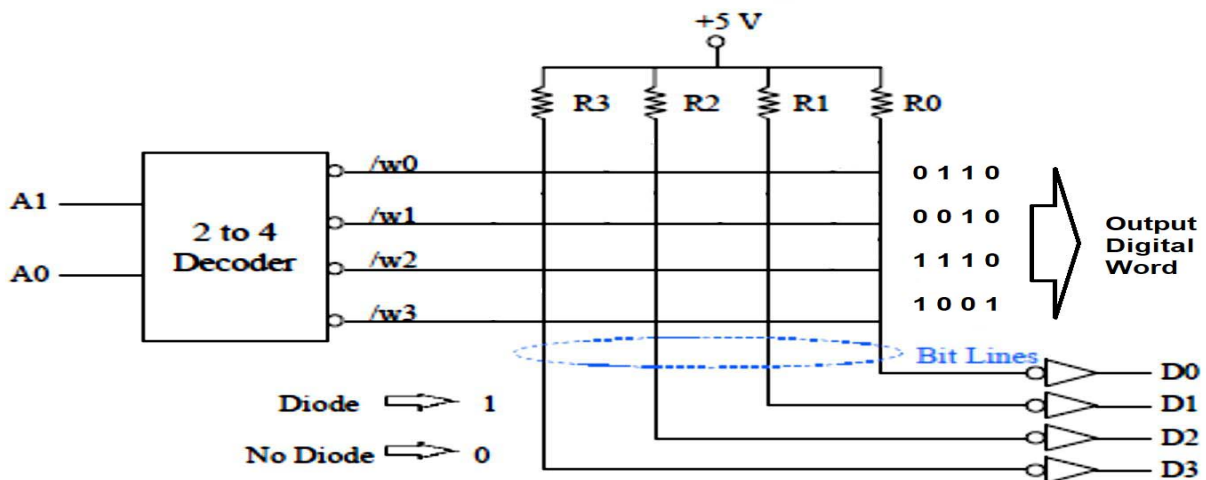
b. *Central Processing Unit (CPU):*

c. *Basic Input Output System (BIOS):*

- b. A parallel output N-Bit Shift Register DAC is shown below. Given a digital word of 1010, redraw the DAC and determine the values of R and R₀. Determine also the analogue voltages V and V₀ that corresponds to R and R₀ respectively.



9. a. A 4 x 4 diode matrix Read Only Memory (ROM) is shown below. Modify the circuit with diodes to produce the given output digital words.



b. Find the binary equivalent of the BCD number 011110010011. 01010111

10. a. The circuit in question 4 is to be employed to count a maximum of 12 pulses. Modify the MOD-16 counter to make a MOD-12 counter.

b. Calculate the resolution of an 8-bit digital word, with ± 15 V analogue voltage range.
