****

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCE**

 **NOVEMBER, 2018 EXAMINATIONS**

**COURSE CODE: PHY 405**

**COURSE TITLE: ELECTRONICS III**

**CREDIT UNIT 3**

**TIME ALLOWED (2½ HRS)**

**INSTRUCTION: *Answer question 1 and any other four questions***

**QUESTION 1**

a(i). Explain briefly on how to convert decimal to binary numbers. (2 marks)

 (ii). Convert 11011011010.11012 into its decimal equivalent. (3 marks)

b(i). Convert 110011011100I0102 into its octal equivalent. (3 marks)

 (ii). Define logic gate. (2 marks)

c(i). Complete the truth table below for an AND gate.

 Inputs Output

 A B Y

 0 0

 0 0

 0 0

 1 1 (4 marks)

 (ii). Explain the term Register. (2 marks)

d(i). List six (6) major subsystems of the oscilloscope. (3 marks)

(ii). If the time/div control is set to 2 μ s/div and the displayed signal covers 4 div on the

 horizontal scale of the CRT screen, determine the frequency of the signal. (3 marks)

**QUESTION 2**

(a). Write the 3-bit binary equivalent of all the octal digits. (3 marks)

(b). Write the decimal and 4-bit binary equivalent of all the hexadecimal digits. (3 marks)

(c). Add the following binary numbers 1110001 and 1010101(3 marks)

(d). Multiply 101.1 by 11.01(3 marks)

**QUESTION 3**

(a). What is the largest decimal number represented by a five digit octal number? (2 marks)

 (b). Complete the truth table below for an NAND gate. (4 marks)

 A B Y

 0 1

 0 1

 0 1

 1 0

(c). Mention the methodology needed in Boolean algebra for reducing a complex digital circuit

 into a simple one. (3 marks)

(d). Find the MSP expression for

 Y = AB + A (B + C) + B (B + C) (3 marks)

**QUESTION 4**

(a). Differentiate between half adder and full adder. (2 marks)

(b). How many types of shift register; list them. (4 marks)

(c). Define counter and give the two types of counter. (4 marks)

(d). Explain the term Memory. (2 marks)

**QUESTION 5**

(a). A user has two memory devices. One of them stores 10M words of 8-bit size, while the

 other stores 2M words of 16-bit size. Which of the two stores most bits? (4 marks)

(b). What is Read Only Memory (ROM)? (2 marks)

(c). A 5-bit DAC produces 0.5V for 00001. Find Vout for 11010. (3 marks)

(d). A 5-bit DAC produces a 10mV output for a digital input of 10100.

 What will Vout be for a digital input of 11101? (3 marks)

**QUESTION 6**

(a). A computer X has memory 1M x 8 and computer Y has memory 500K x 16. What are the

 word sizes of the memories of the two computers? Which of these two computers can store?

 more bits? (3 marks)

(b). What is the Mod of a counter which consists of six flip-flops? (2 marks)

(c). A certain memory is specified as 32K x 8. What is the size of the word and what is the total

 number of bits stored by the memory? (4 marks)

(d). What is resolution (step size) of the DAC of Q5(d) above? Describe the staircase signal out

 of this DAC. (3 marks)