****

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

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

 **FACULTY OF SCIENCES**

 **DEPARTMENT OF PURE AND APPLIED SCIENCES**

 **July 2018 Examinations**

**COURSE CODE: PHY 405**

**COURSE TITLE: ELECTRONICS III**

**CREDIT UNIT 3**

**TIME ALLOWED (3 HRS)**

**INSTRUCTION: *Answer question one (1) and any other four (4) questions***

**QUESTION 1**

(a) What is an ASCII code**?** [2marks]

(b) Add the following binary numbers 11100012 and 10101012[3marks]

(c) Draw the realisation of NOT gate using a transistor [3marks]

(d) Describe Boolean algebra [3marks]

(e) Minimise the expression  and draw the circuit diagrams of the expression

 and the minimized version. [5marks]

(f) Differentiate a combinational logic circuit from a sequential one [3marks]

(g) Draw a digital circuit for a 5-bit binary adder [3marks]

**QUESTION 2**

1. What are logic gates? [1mark])
2. Draw an AND gate using switches and explain its workability [4marks]
3. Represent an OR using switches and explain how this is possible [4marks]
4. Draw the symbol of a NAND gate and give its truth table [3marks]

**QUESTION 3**

1. Give the Boolean expressions for AND, OR and NOT gates [3marks]
2. Give the logic circuits for the given expression Y = AB+A (B+C) +B (B+C) and its minimized expression. [4marks]
3. Simplify the 3 bit full adder whose truth table is given below and draw its circuit [5marks]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | CARRY | SUM |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

**QUESTION 4**

1. What are flip-flops? [2marks]
2. Differentiate an RS flip-flop from the clocked JK flip-flop [6marks]
3. Draw the circuit of (i) edge triggered RS flip-flop (ii) Edge triggered D flip-flop with preset and clear [4marks]

**QUESTION 5**

1. Simplify the expression **** [3marks]
2. Draw a controlled Shift-left register explain how it works [6marks]
3. Draw the circuit of a synchronous counter [3marks]

**QUESTION 6**

1. Differentiate a register from a counter [4marks]
2. Discuss buffer register[4marks]
3. Draw a shift left register including its timing diagram [4marks]