



NATIONAL OPEN UNIVERSITY OF NIGERIA  
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA  
FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

2024 1 EXAMINATION

COURSE CODE: PHY 405  
COURSE TITLE: ELECTRONICS III  
CREDIT UNIT: 3  
TIME ALLOWED: (3 HRS)

INSTRUCTION: Answer question 1 and any other THREE questions

**Question 1**

- What are registers? 4marks
- Identify the LSB and MSB in this number 10000010000111 2marks
- Convert these binary numbers to hexadecimal 0011101101111110 and 111010010110 6marks
- Prove  $A + AB = A$  4marks
- Sketch a waveform for this binary number 110001110 3marks
- Design this expression  $Y = AB + BC + AC$  using logic gate 6marks

**Question 2**

- List and draw the basic combinational logic gates with their truth tables 3marks
- Sketch the circuit diagrams for basic logic gates using diodes and transistors 6marks
- Deduce the MSP expression for the following expression i.  $Y = (A + B)C + AB$  ii.  $Y = AB + A(B + C) + B(B + C)$ . 6marks

**Question 3**

- Generate the truth tables and symbols for i. XOR ii. XNOR and NAND gates 6marks
- Sketch the circuit for the following systems i. Half adder ii. Full adder 5marks
- Draw a digital circuit for a 4-bit binary adder 4marks

**Question 4**

- List the major components of a general-purpose CRT 4marks
- Draw the block diagram of a dual trace oscilloscope 5marks
- Define the following (i) Rise Time (ii) Fall Time (iii) Duty cycle 6marks

**Question 5**

- What is computer memory? 3marks
- Define and give 2 examples of active and passive components 6marks
- Define and give examples of Volatile and Non-volatile memory 6marks

**Question 6**

- Design a buffered register? 3marks
- Obtain the truth table for the following Boolean expression  $Y = A + AB + CA$  6marks
- In tabular form distinguish between sequential and combinational circuits with examples 6marks