NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PHYSICS
2025_2 EXAMINATIONS

COURSE CODE: **PHY308**
COURSE TITLE: **ELECTRONICS I**
CREDIT UNIT: **2**
TIME ALLOWED: **(2 HRS)**
INSTRUCTION: ***Answer question 1 and any other two questions***

Question 1

i. Define amplifier gain and explain how it is calculated. 5marks
ii. Define biasing and explain its importance in transistor operation. 4marks
iii. Identify and explain the three key elements of a Bipolar Junction Transistor (BJT). 6marks
iv. Illustrate the three configurations of a Bipolar Junction Transistor with labeled diagrams. 6marks
v. List and describe the three major configurations of a Bipolar Junction Transistor. 6marks
vi. Sketch the symbol of an NPN transistor and indicate the directions of currents and voltages. 3marks

(***6marks)***

(***30 marks)***

Question 2.

a. Define an amplifier and describe its primary functions. 5mrks
b. With the aid of equations, explain the following terms:
    i. Amplifier gain
    ii. Voltage gain
    iii. Current gain
    iv. Efficiency 8marks
c. Determine the voltage gain, current gain, and power gain for an amplifier with: an input signal of 1mA at 10mV and an output signal of 10mA at 1V. ***(7marks)***

Question 3

- Define an oscillator and draw the basic block diagram of an oscillator. 6marks
- Discuss the following terms:
    - Feedback
    - Negative feedback
    - Positive feedback 9marks

- An amplifier with 10% negative feedback has an open-loop gain of 50. If the open-loop gain increases by 10%, calculate the percentage change in the closed-loop gain. 5marks

i. **Question 4**.

a. Define a power supply and outline its significance in electronic circuits. 5marks

b. Differentiate between renewable and non-renewable power supply sources, highlighting their advantages and disadvantages. 9marks

- A half-wave rectifier uses a silicon diode with a secondary EMF of 14.14V(rms) with a resistance of 0.2Ω. The diode has a forward resistance of 0.005Ω and a threshold voltage of 0.7V. If the load resistance is 10Ω. Determine DC load current
- DC load voltage
- Voltage regulation
- Efficiency 8marks

Question 5.

a. Define integrated circuits and discuss their benefits in electronics. 5mrk

b. List four applications of operational amplifiers and explain their uses. 8marks

ii. Analyze the given circuit to determine the output voltage ***(7 marks)***