NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PHYSICS
2023_1 POP EXAMINATION

COURSE CODE: **PHY 391**
COURSE TITLE: **PHYSICS LABORATORY II**
CREDIT UNIT: **2**
TIME ALLOWED: **(2 HRS)**

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

QUESTION 1

a) State one difference and one similarity between latent heat of fusion and latent heat of vaporization. 4marks

b) State the three precautions to be taken in carrying out the experiment on the acoustic resonance in a tube. 3marks

c) Show that the heat capacity at constant pressure is greater than heat capacity at constant volume by a factor nR where n is the number of moles in the volume of gas and R is the universal gas constant. 3marks

d) i) What is an unpolarised light? 2mark

ii) How can you make an unpolarised light to be linearly polarized using a Polaroid? 2marks

e) i) Why is a diverging lens called a negative lens? 2mark

ii) Write down four differences between diverging and converging lens. 4marks

f) Briefly explain what a transducer means 3marks

g) i) What is an OP-amp? 2mark

ii) What are the names of the 2 inputs of an opamp? 3marks

iii) Explain the effect on the signal applied at the 2 input? 2marks

QUESTION 2

ai) What is an electrical network? 3marks

aii) Differentiate between an active and a passive network 5marks

b) A voltage source of V_1 = 3 volts is connected to a resistor of 150 ohms. Measure the current. 3marks

Repeat with V_2 = 3volts alone.

-Another voltage of 3 volts is connected to the 1st voltage source and is connected to the same resistor. Measure the current. 3marks

-Compare your result when the current is

a) V_1 alone, V_2 alone and $V_1 + V_2$ 3mks

b) State the principle guiding the action in (a) 3marks

QUESTION 3

a) In studying the application of Thevinin's theorem in a network, list 3 precautions to be taken 6marks

b) In the study of the energy band gap of a thermometer, the equation is given as:

$Ln(R_t) = LnR_0 + \frac{Eg}{2K}\ \frac{1}{T}$

Where,

R_T is the resistance at the T temperature and R_0 is resistance at OK

When a graph is plotted between $\frac{1}{T}$ on the X axis and $Ln(R_t)$ on Y axis a straight line is formed

i) What is the slope? 3mks

ii) How will you calculate LnR_0? 4mks

iii) What is the value of the energy band gap? 3mks

iv) What is the meaning of the band gap of material? 4mks

QUESTION 4

a) What is meant by the ripple factor of a rectifier circuit? 4mks

b) How do you determine the polarity of a diode, if you are taking measurements with it? 5mks

c.i) Define the rms value of an AC current. 3mks

(ii) If the peak AC current is 20A, what is the rms value? 4mks

d) If you are provided with 1000 microfarads, 25V capacitor and several load with connecting wires. How can the ripple factor for each load be calculated? 4mks

QUESTION 5

a) Explain what happens when a capacitor and an inductor is put as filters in the out terminal 4mks

b) What is negative feedback? 3mks

c) Calculate the gain for the inverting OP Amp if the values of the resistance are given as:

i) $R_R = 5k\Omega$, $R_F = 12k\Omega$ 3mks

ii) $R_R = 5k\Omega$, $R_F = 5k\Omega$ 3mks

iii) $R_R = 5k\Omega$, $R_F = 2.5k\Omega$ 3mks

iv) State 2 observations or inferences from the results gotten from i, ii and iii. 4mks