



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCE
SEPTEMBER 2020_1 EXAMINATION

COURSE CODE: PHY 492
COURSE TITLE: LABORATORY PHYSICS III
CREDIT UNIT: 3
TIME ALLOWED: (2½ HRS)
INSTRUCTION: Answer question 1 and any other four questions

QUESTION 1

a) A NOUN Physics student performed experiment on light and got the following results:

U (cm)	V (cm)
16.50	51.00
20.00	34.00
28.00	23.00
45.00	17.50
60.0	15.50

i) Prepare a composite table containing $U + V$ and $U V$ for each reading above. (5 marks)

ii) Plot a graph of $U + V$ against $U V$ (6 marks)

iii) Determine the slope S of the graph. (2 marks)

iv) Deduce $\frac{1}{S}$ (1 mark)

b) Given that the lens equation; $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ and magnification (m) is $m = \frac{u}{f} - 1$.

i) What type of graph is the plot of m against u ? (3 marks)

ii) What is the slope of the graph of m against u ? (3 marks)

iii) If s is the slope, what is $\frac{1}{S}$? (2 marks)

QUESTION 2

a) Mention three (3) apparatus required in determining the radius of curvature of a lens by mirror method. (3marks)

b) If x is the distance of the object from the lens, r is the radius of curvature of the lens and f is the focal length of the mirror, state the equation that relates x , r and f . (3 marks)

- c) State 3 first steps required in the experiment to determine refractive index of a glass and liquid by real and apparent depth method by using travelling microscope (6 marks)

QUESTION 3

- a) Mention two (2) types of amplifiers (2 marks)

- (b) State the equation for Gains in terms of Voltage and Resistance (2 marks)

- (b) Given that resonance frequency f_r is given by $f_r = \frac{1}{2\pi\sqrt{LC}}$

- i) Define the parameter L and C (2 marks)

- ii) How can you use the above equation to investigate the properties of a series resonance circuit ? (4 marks)

- iii) What is the reason why minimum value of V_{LC} is non-zero? (2 marks)

QUESTION 4

- (a) What is meant by the statement the refractive index of glass is 1.5? (4 marks)

- b) The bottom of a pool 4m deep appears to be displaced by 1m when viewed from above. Calculate the refractive index in the pool. (6 Marks)

- c) State two (2) precautions taken to obtain accurate results in the determination of refractive index. (2 marks)

QUESTION 5

- a. What is the function of an operational amplifier (OP-AMP)? (3 marks)

- b. Mention three (3) properties of OP-AMP (3 marks)

- c. Draw a simple diagram of OP-AMP (4 marks)

- d. What makes a measurement to be precise? (2 marks)

QUESTION 6

- (a) What is: i) forward bias diode? (3 marks)

- ii) reverse bias diode ? (3 marks)

- b) State three (3) precautions that should be taken in the experiment of drawing the I-V characteristics of a P-n junction in forward and reverse bias. (3 marks)

- c) State three (3) sources of errors. (3 marks)