MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
SECOND YEAR, SECOND SEMESTER

SCHOOL OF PURE, APPLIED AND HEALTH SCIENCES
DEPARTMENT OF MATHEMATICS AND PHYSICAL SCIENCES

COURSE CODE: PHY 2212-1
COURSE TITLE: PHYSICS LABORATORY IV

DATE: 25/4/2024   TIME: 1430-1630 HRS

<u>INSTRUCTIONS TO CANDIDATES</u>

Answer all questions.

Read, understand and adhere to all exam rules and regulations at the front of your answer booklet.

The use of diagrams and illustrations where applicable is highly encouraged.

This paper consists of 3 printed pages. Please turn it over.

Question one

    I.   Consider the circuit in Figure 1, and calculate the currents flowing through all the resistors.   (10 marks)
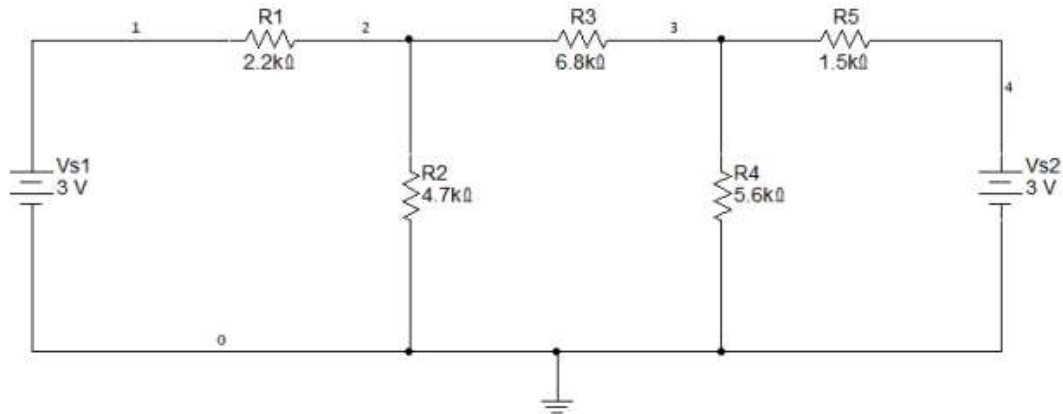

        Figure 1

Question two (10 marks)

    I.   Draw a well-labelled diagram of a diode in reverse and forward bias, considering charge carriers.   (4 marks)

    II.   On the same axes, sketch the diode characteristics in reversed and forward bias. (4 marks)

    III.   Mention any two key differences between germanium and silicon diodes you noted during lab sessions this semester.   (2 marks)

Question three (10 marks)

    I.   Consider figures 2 and 3, give the figures appropriate names, and sketch the waveforms you saw on the oscilloscope when a pure sine wave was input in the circuits during your lab experiment session.   (6 marks)

Figure 2

Figure 3

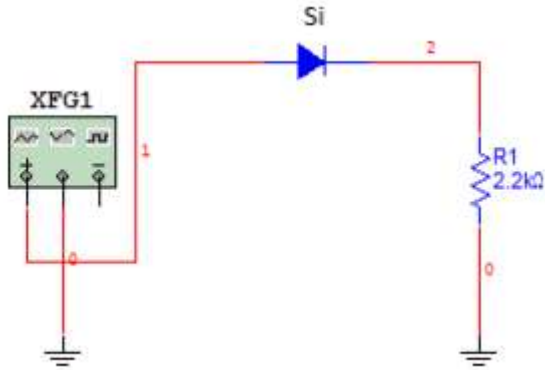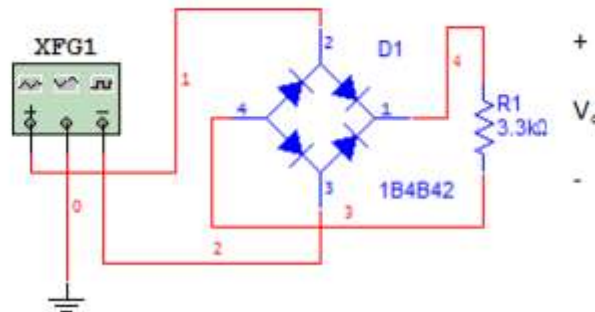II.   Sketch how the signals will look like when a capacitor is added to the circuits in I.   (4 marks)

Question four (10 marks)

I.   Articulate the meaning of linearity and superposition principle.   (2 marks)
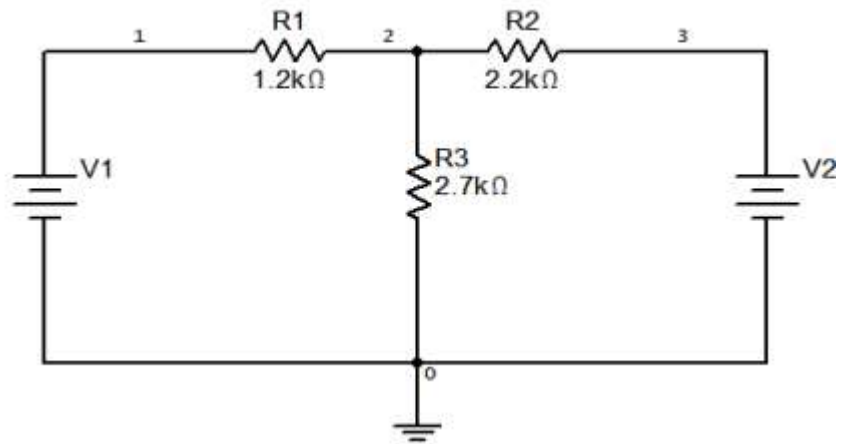II.   Find the current through resistor R3, when V1 is 10v and V2 is 15v in Figure 4. (6 marks)

Figure 3

III.   Differentiate between Node-Voltage and Mesh-current circuit analysis
        techniques.   (2 marks)