MAASAI MARA UNIVERSITY

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

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

COURSE CODE: PHY 3222-1
COURSE TITLE: PHYSICS LABORATORY VI

DATE: 03/6/24 **TIME:1430-1630HRS**

INTRUCTIONS TO CANDIDATES

Answer all questions.

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

Use of diagrams and illustrations where applicable are highly encouraged.

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

QUESTION ONE (10 MARKS)

a) Outline and draw the two universal gates that we have. Explain why they are known as universal gates. **(4 marks)**

b) Show that the above two universal gates can be used by themselves to implement OR gate. Use well labeled diagrams and truth tables. **(6 marks)**

QUESTION TWO (10 MARKS)

a) With a well labeled diagram illustrate arrangement of gates in IC 7400. **(4 marks)**

b) Suppose you have a gate of 3 inputs, how many possible outputs will you expect? **(4 marks)**

c) Explain any one real-life application of IC 7400 drawn above. **(2 marks)**

QUESTION THREE (10 MARKS)

a) Briefly describe what a full ADDER is and its function in electronics. **(3 marks)**

b) Mention two logic gates you used to implement full ADDER during your experiments this semester. **(1 mark)**

c) Use the above-mentioned gates to design a full ADDER circuit diagram. **(4 marks)**

d) Give the truth of the circuit you've designed above. **(2 marks)**

QUESTION FOUR (10 MARKS)

a) Differentiate between combinational logic and sequential logic. **(2 marks)**

b) What is a 'flip flop' as used in digital electronics? **(2 marks)**

c) Differentiate between multiplexer and demultiplexer. **(2 marks)**

d) Draw a well labeled block diagram of a multiplexer and briefly explain the underlying theory of diagram you've just drawn. **(4 marks)**