

**SIR ARTHUR LEWIS COMMUNITY COLLEGE**  
**ENGINEERING AND THE CIRCULAR ECONOMY**  
**ACADEMIC YEAR (2024/2025) - SEMESTER ONE**

**END OF SEMESTER EXAMINATION**

TUTOR (S) : Mr. Kwame Frederick

PROGRAMME TITLE : Refrigeration of Air Conditioning - Part II  
Motor Vehicle Mechanics - Part II

COURSE TITLE : Basic Electronics I

COURSE CODE : ELE114

LEVEL : Certificate/ Year Twos

PAPER : One (1)

DATE : Wednesday, 11<sup>th</sup> December 2024

COMMENCEMENT TIME : 9:00a.m.

DURATION : TWO (2) HOURS

INVIGILATOR(S) : L. Hunte-Marty (Chief), I. Lambert &  
K Emmanuel

ROOM(S) : VAR-0R-03

STUDENT ID :

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**GENERAL INFORMATION AND INSTRUCTIONS**

- This paper consist of One (1) Section with four (4) questions. **You are required to answer ALL questions. in the spaces provided on the question paper.** You may request additional sheets to complete your responses. ENSURE the additional sheet are properly stapled to your answer booklet and your answers are visiblle
- The marks for each question is indicated next to the question
- Ensure your student ID number is clearly written on the paper.
- Where you are required to draw to scale FREE HAND SKETCHES will not be accepted.
- **Note: Bags, Books as well as writing paper not given by the invigilator should be deposited at the front of the examination room or as otherwise indicated.**
- All cell phones must be turned off during the exam

**DO NOT TURN THIS COVER SHEET UNTIL  
YOU ARE TOLD TO DO SO!!**

**SECTION A**

You are required to answer **all** questions within this section in the spaces provided on this paper.

**Question One – Electronic Components**

(A) Electronic components can be categorized into two main types: active components and passive components. Differentiate between active and passive components and provide an example of each. **[4 Marks]**

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(B) Provide a short description of how each of the following components functions. **[3 Marks]**

**Switch** \_\_\_\_\_  
\_\_\_\_\_

**Fuse** \_\_\_\_\_  
\_\_\_\_\_

**Capacitor** \_\_\_\_\_  
\_\_\_\_\_

(C) Using a switch, a light bulb, and connecting wires, draw two circuit diagrams: one showing an open circuit and the other a closed circuit. Next, explain how the state of the switch in each setup affects the light bulb’s status and explain why this occurs. **[6 Marks]**

OPEN CIRCUIT	CLOSED CIRCUIT

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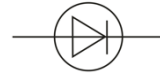
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(D) Using a drawing show how three resistors connected in series are arranged differently to three connected in parallel. Include your power source. **[4 Marks]**

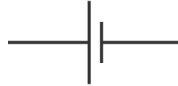
SERIES CIRCUIT	PARALLEL CIRCUIT

(E) Match the component to the right circuit symbol. **[5 Marks]**

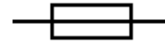
Cell



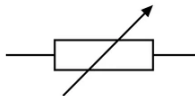
Variable Resistor



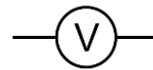
Voltmeter



Fuse



Diode



**[TOTAL 22 MARKS]**

**Question Two – Electronic Devices**

(A) Define semiconductors and state what is unique about their valance (last) shell. **[3 Marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(B) Silicon is often preferred over germanium due to its greater. What specific property of silicon contributes to this increased stability? **[2 Marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(C) Semiconductors can be categorized into N-Type and P-Type. Identify the majority charge carriers in each type. **[2 Marks]**

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Student ID \_\_\_\_\_

(D) What is the primary function of a diode? **[1 Mark]**

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(E) Draw a diode in both a forward-biased and a reverse-biased configuration. **[4 Marks]**

REVERSE BIAS	FORWARD BIAS

(F) Explain on a microscopic level what happens in the diode when the diode is forward-biased and a reverse-biased configuration. **[6 Marks]**

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(G) Explain the term barrier potential and state the barrier potential for silicon. **[2 Marks]**

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**[TOTAL 20 MARKS]**

**Question Three – Rectifiers & Transistors**

(A) What function does a rectifier serve? **[2 Mark]**

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(B) What are the two main categories of rectifiers? **[2 Marks]**

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- (C) The two primary types of bipolar transistors are **NPN** and **PNP** transistors, each constructed with different arrangements of semiconductor materials. Draw the block diagram and schematic for each type. **[6 Marks]**

**NPN**

BLOCK DIAGRAM	SCHEMATIC

**PNP**

BLOCK DIAGRAM	SCHAMATIC

**[TOTAL 10 MARKS]**

**Question Four – Digital Electronics**

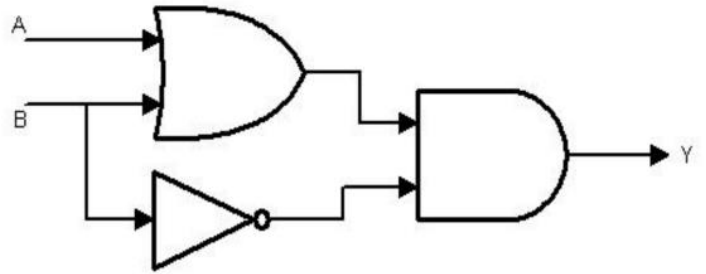
- (A) Decimal to binary conversion. Write the following numbers in binary: **[4 Marks]**

- I. 10
- II. 134

- (B) Binary to decimal conversion. Convert the following binary numbers to decimal numbers: **[2 Marks]**

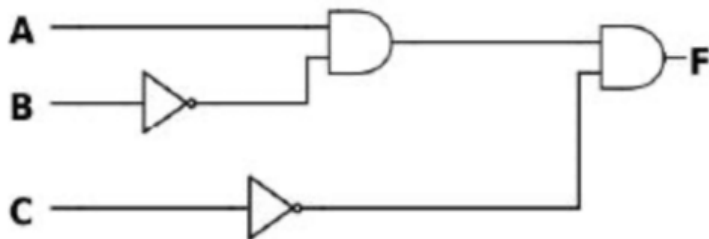
- I. 1001

(C) Use the following diagram composed of OR, AND and NOT gates to trace the output Y if  $A = 1100$  and  $B = 1010$  [8 Marks]



(D) Determine the truth table output for the following circuit.

[10 Marks]



[TOTAL 16 MARKS]

**END OF EXAMINATION!!**