TEVETA

Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN SCIENCE LABORATORY

LEVEL 6 YEAR II EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATION

SITTING: NOVEMBER / DECEMBER 2025

SUBJECT: PHYSICS II

TIME: THREE (3) HOURS **TOTAL MARKS: 100**

INSTRUCTIONS TO CANDIDATE **PASS MARK: 50**

1. Write your Examination number and National Registration Card (NRC) number on the answer booklet provided. Ensure you append your signature in the space provided on the answer booklet.
2. Write the ANSWER SCRIPT SERIAL NUMBER on the examination register and on the entry slip.
3. This paper has Eight (8) Questions
4. Answer FIVE (5) QUESTIONS
5. Diagrams may be used where necessary to clarify your answer.
6. Cell phone and programmable calculators are not allowed in the examination room

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 1

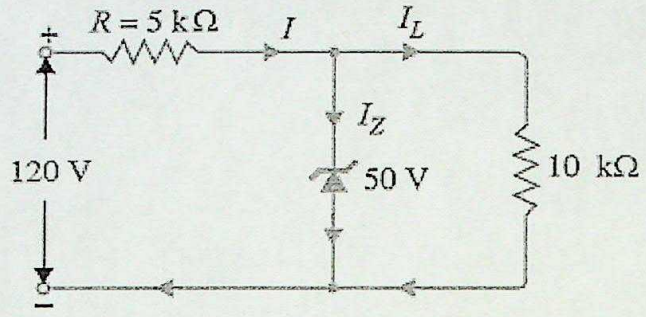
(a) Explain the meaning of the following terms.

(i) Zener break down. **[4 marks]**

(ii) Avalanche break down. **[4 marks]**

(b) Explain the operation of Zener diode as a voltage regulator. **[4 marks]**

(c) The figure below shows a voltage regulator



Find:

(i) the output voltage. **[3marks]**

(ii) the voltage drops across series resistance. **[3marks]**

(iii) the current through zener diode. **[2 marks]**

[TOTAL: 20 Marks]

QUESTION 2

Describe the following types of amplifiers clearly.

(a) Summing amplifier. **[4 marks]**

(b) Differential amplifier. **[4 marks]**

(c) Comparator amplifier. **[4 marks]**

(d) Inverting amplifier. **[4 marks]**

(e) Non-inverting amplifier. **[4 marks]**

[TOTAL: 20 Marks]

QUESTION 3

(a) Explain the operation of a transformer. **[6 marks]**

(b) Explain **three** causes of power loss in a transformer. **[6 marks]**

(c) The primary of an ideal transformer has 1000 turns and the secondary has 100 turns. The current in the primary is 2 A and the input power is 12 W. determine the resistance in the secondary coil. **[4 marks]**

(d) The rms value of voltage source is 100 volts. Determine its rms value, if it's modulated to 30% of its amplitude. **[4 marks]**

[TOTAL: 20 Marks]

QUESTION 4

(a) Figure 1.0 shows a parallel capacitor separated by an insulator

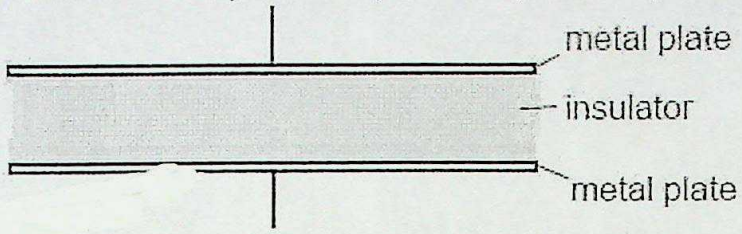


Fig.1.0

(i) What scientific term is used to describe the insulator between the metal plates of a capacitor? **[1 mark]**

(ii) State **three (3)** uses of an insulator in a capacitor. **[3 marks]**

(b) Figure 1.1 shows a net work of capacitors connected to a 9.0-volt supply.

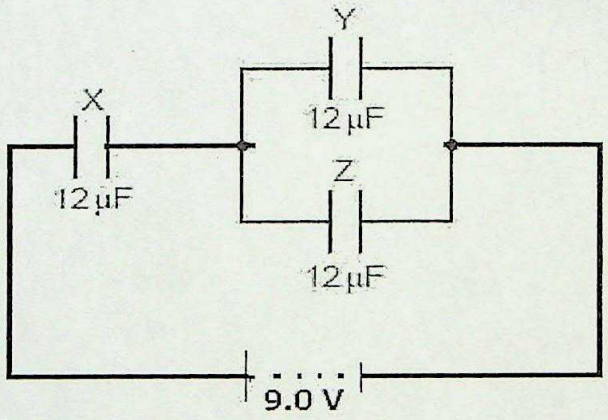


Fig 1.1

Determine the

(i) Total capacitance. **[4 marks]**

(ii) Total charge. **[3 marks]**

(iii) Potential difference across Y and Z. **[3 marks]**

(iv) Energy on each capacitor. **[6 marks]**

[TOTAL: 20 Marks]

QUESTION 5

(a) Define the following terms.

(i) Doping. **[2marks]**

(ii) Depletion layer. **[2marks]**

(b) With the help of clear labeled diagrams, distinguish between P-type and N-type semi-conductors. **[16 marks]**

[TOTAL: 20 Marks]

QUESTION 6

(a) What is meant by the following terms.

(i) Coefficient of resistance. **[2 marks]**

(ii) resistivity of a wire. **[2 marks]**

(iii) negative temperature coefficient of a conductor. **[2 marks]**

(b) The A copper wire has a resistance of 200 Ω at 20°C. A current is passed through the wire and the temperature rises to 90°C. Determine the resistance of the wire at 90°C, correct to the nearest ohm, assuming the temperature coefficient of resistance is 0.004/°C. **[6 marks]**

(c) An aluminum cable has a resistance of 27 Ω at a temperature of 35°C. Determine its resistance at 0°C. Take the temperature coefficient of resistance at 0°C to be 0.0038/°C. **[5 marks]**

(d) A copper wire with a resistance of 22 m Ω has a length of 6.2 m. if its resistivity is 1.7×10^{-8} Ωm, determine the area of the wire. **[3 marks]**

[TOTAL: 20 Marks]

QUESTION 7

(a) Draw diagrams for each of the following types of transistors configuration.

(i) Common base configuration. **[3 marks]**

(ii) Common emitter configuration. **[3 marks]**

(iii) Common collector configuration. **[3 marks]**

(b) Fig.5.0 below shows a transistor in common emitter (CE) configuration in which the collector supply is 8 V and the voltage drop across resistor R_C is 0.5 V. The value of **Rc** is 800 Ω and α *is* 0.96.

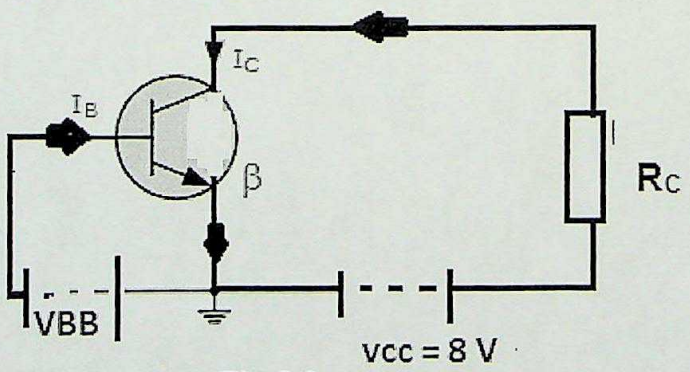


Fig.2.0

Determine

(i) Collector-emitter voltage. **[4 marks]**

(ii) Base current. **[7 marks]**

[TOTAL: 20 Marks]

QUESTION 8

(a) Use a simple block diagram to describe a filter circuit. **[3 marks]**

(b) Draw a rectified full wave form fed into the filter circuit and show the output of a filtered wave form. **[5 marks]**

(c) Describe an operation of a capacitor inductor capacitor (CLC) or π filter. **[12 marks]**

[TOTAL: 20 Marks]