

091405T4SLT

SCIENCE LABORATORY TECHNOLOGY LEVEL 5

SLT/OS/SL/CR/02/5

Apply Physics Techniques

November/December 2025



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL
(TVET CDACC)**

WRITTEN

TEST

INSTRUCTIONS TO CANDIDATE

1. This paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section A and **ANY THREE** (3) questions in section B.
3. Marks for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet
5. Do not write on the question paper.

This paper consists of FIVE (5) printed pages

Candidate should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A**Answer ALL Questions in this section**

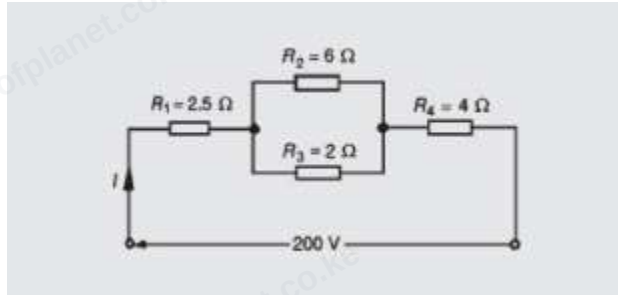
1. Magnetic materials can be classified as either hard or soft material. Distinguish between soft and hard magnetic material. (4 Marks)
2. When light falls on a material it interacts differently depending on the type of material. State four ways in which light can interact with materials. (4 Marks)
3. Quantities of measurement are classified as either basic quantity or derived quantity. Highlight FOUR examples of derived quantities of measurement. (4 Marks)
4. A concave mirror forms an image at 15 cm from the mirror when the object is 30 cm away. Calculate the focal length. (4 Marks)
5. A block of iron of volume 0.002 m^3 has a mass of 1560g. Find its density in kg/m^3 . (4 Marks)
6. Two resistors of 6Ω and 12Ω are connected in parallel. Find the equivalent resistance. (4 Marks)
7. Materials that do not have magnetic properties are converted to magnets through a process called magnetization. List FOUR types of magnetization. (4 Marks)
8. Electrical energy sources can be classified as either renewable or non-renewable sources. List four renewable sources of electrical energy. (4 Marks)
9. When analyzing an electrical circuit measurement of electric quantities is important. State TWO electrical quantities and the instrument used to measure it. (4 Marks)
10. Heat capacity is a property of materials that shows how different materials respond to same amount of heat energy. Differentiate between:
 - i. Specific heat capacity and heat capacity. (2 Marks)
 - ii. latent heat of fusion and latent heat of vaporization. (2 Marks)

SECTION B (60MARKS)

Answer any **THREE** questions in this section

11.

- a) During the design of an electrical circuit four resistors were connected as shown below.

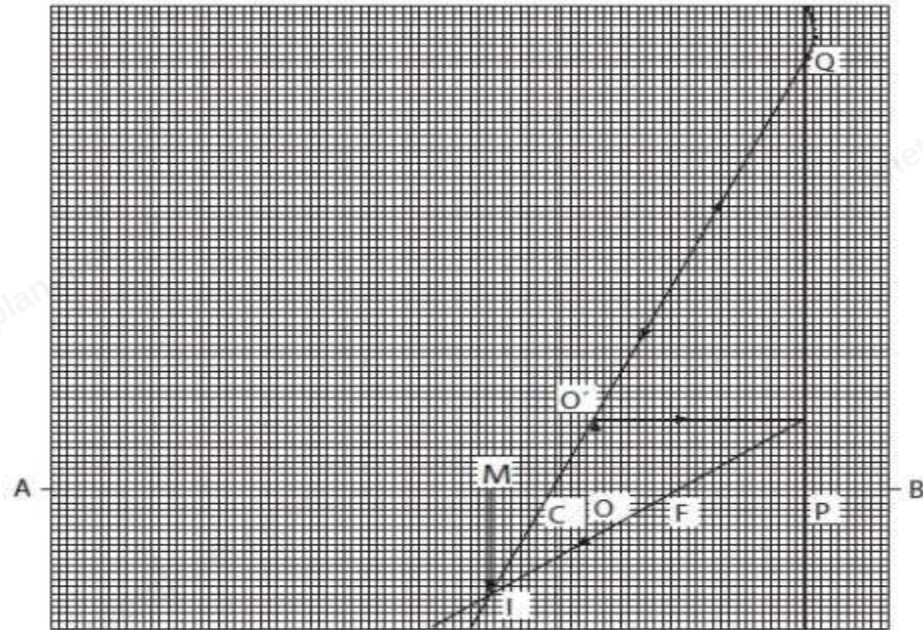


Determine

- i. The total circuit resistance. (6 Marks)
 - ii. The current flowing in the circ (2 Marks)
 - iii. The voltage across the $4\ \Omega$ resis (2 Marks)
- b) 10 kg of water at 50°C was comple d into steam at 100°C , given that the specific heat capacity of water is 4 and the specific latent heat of vaporization of water is 2260 kJ/kg. Calculate the heat energy required. (6 Marks)
- c) Convection is a mode of heat transfer which enables heat to be transferred from one point to another in a fluid. Explain TWO practical applications of convection. (4 Marks)

12.

- a) Electromagnets are applied in various systems to form functional units. Explain FOUR applications of electromagnets. (8 Marks)
- b) An object of height 10 mm is placed 50 mm in front of a concave mirror of focal length 30 mm. By scale drawing, determine the:
 - i. Position of the image. (8 Marks)



- ii. Size of the image. (1mark)
- iii. Nature of the image formed (3 Marks)

13.

- a) The following data was obtained during an experiment to determine the density of a liquid.

Mass of an empty density bottle = 30g

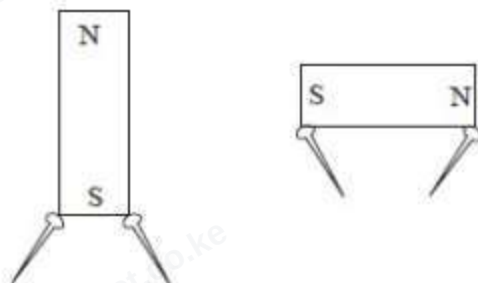
Mass of density bottle full of water = 360g

Mass of density bottle full of liquid x = 340g

Given that the density of water is 1g/cm^3 , determine the density of liquid X. (5 Marks)

- b) A trainee was studying behavior of magnetic materials, the trainee attached two pins to a magnet as shown in the diagrams below, Explain the behavior of the pins in each case.

(8 Marks)

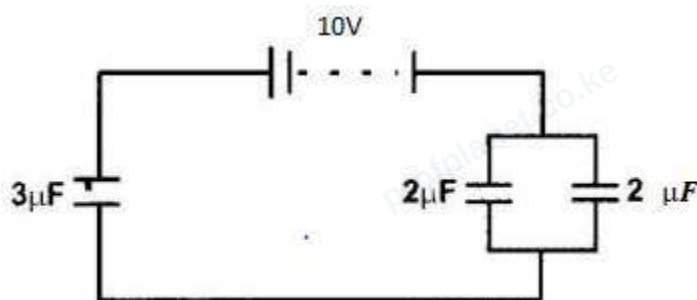


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- c) The initial reading of a measuring cylinder was 30.5cm^3 . When a cube of mass 30g was submerged in the liquid, the new reading of the measuring cylinder was 75.8cm^3 .
determine the density of the cube in Kg/M^3 . (7 Marks)

14.

- a) A group of trainees connected a network of capacitors as shown in the circuit diagram below



Determine;

- i. The total circuit capacitance; (5 Marks)
 - ii. The charge stored by the circuit. (2 Marks)
 - iii. The voltage across the $3\mu\text{F}$. (3 Marks)
- b) A scientist was investigating the interaction of light with diamond metal. He found out that the refractive index of diamond was 2.51 . If the velocity of light in air is $3.0 \times 10^8 \text{ m/s}$. calculate the velocity of light in diamond. (4 Marks)
- c) Total internal reflection causes formation of mirage which is an optical illusion of an inverted pool of water. Explain the formation of a mirage. (6 Marks)