

Date: 30.07.2025 11:37 AM

073105T4PLM

PLUMBING LEVEL 5

CON/OS/PL/CC/03/5

Apply Scientific Principles

July/August 2025

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

Technical And Vocational College

Date: 30.07.2025 11:37 AM

WRITTEN ASSESSMENT

Time: 3 HOURS

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INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Answer **ALL** questions in section **A** and any **Three** in section **B**.
4. Candidates are provided with a separate answer booklet
5. **DO NOT** write on this question paper
6. Take $g = 9.81 \text{ m/s}^2$ and the density of water = 1000 kg/m^3

This paper consists of FOUR (4) printed pages

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

SECTION A (40 MARKS)*Answer ALL the questions in this section.*

1. Energy can be transferred bts or systems. State THREE sources of energy.
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Date: 30.07.2025 11:37 AM (3 Marks)
2. Energy conversion is a fundamental concept in physics, and it occurs according to scientific principles. Outline how each of the following energy is converted:
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 - i. Kinetic to potential energy (2 Marks)
 - ii. Potential to kinetic energy (2 Marks)
3. A car has a mass of 1000 kg and is moving at a velocity of 20 m/s. Calculate the kinetic energy of the car.
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Date: 30.07.2025 11:37 AM (3 Marks)
4. Friction is a type of force that opposes relative motion between two objects;
 - a) Outline THREE laws of friction (3 Marks)
 - b) State FOUR advantages of friction. (4 Marks)
5. Mechanical properties are characteristics of materials that describe how they respond to applied forces or loads. Define the following mechanical properties
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 - i. Elasticity. (1 Mark)
 - ii. Strength. (1 Mark)
 - iii. Ductility. (1 Mark)
6. A 10kg block slides down an inclined plane with an angle of 30 degrees. Calculate the acceleration of the block.
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Date: 30.07.2025 11:37 AM (2 Marks)
7. Power is a fundamental concept that describes the rate at which work is done. Calculate the power of a lift, which lifts a mass of 100 kg to a height of 10 m in 20s. (3 Marks)
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8. Metal is one of the most commonly used materials in plumbing. State THREE advantages of using metals.
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Date: 30.07.2025 11:37 AM (3 Marks)
9. Archimedes' Principle is crucial in understanding fluid dynamics and the behavior of objects in fluids. State the Archimedes' principle.
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10. Liquids display cohesive forces acting at the surface. List TWO factors affecting surface tension. (2 Marks)
11. Ohm's Law is a principle that relates voltage, current, and resistance in an electrical circuit
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 - a) State Ohm's law and provide the equation associated with it. (2 Marks)
 - b) Calculate the current flowing through a resistor of 5 ohms when a voltage of 10 volts is applied across it. Show your working. (3 Marks)

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12. The mass of an empty density bottle is 20 g. Its mass when filled with water is 40.0 g and 50.0 g when filled with liquid X. Calculate the density of liquid X if the density of water is $1,000 \text{ kgm}^{-3}$.

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(3 Marks)

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SECTION B (60 MARKS)

Answer **THREE** questions from this section.

13. Sound insulation is imporgs where noise can be a disturbance

a) Discuss FOUR advantages of sound insulation in a residential building. (8 Marks)

b) Explain SIX ways of insulating a room. (12 Marks)

14. The master cylinder piston in a car braking system has a diameter of 2.0 cm. The

effective area of the brake pads on each of the four wheels is 30 cm². The driver exerts a force of 500 N on the brake pedal. Calculate:

a) The pressure in the master cylinder (4 Marks)

b) The total braking force in the car. (4 Marks)

c) Discuss SIX factors affecting fluid pressure. (12 Marks)

15. Plumbing systems often interact with electrical systems especially when installing water heaters and pumps.

a) Explain FOUR importance of electrical safety in plumbing installations. (8 Marks)

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b) Identify FOUR common electrical hazards encountered in plumbing work. (8 Marks)

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c) Outline the steps to be taken to ensure electrical safety during plumbing maintenance. (4 Marks)

16. Friction in plumbing plays a big role in how water flows th stem.

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a) Define friction and explain any THREE roles of friction in various plumbing systems. (8 Marks)

b) Describe methods employed to reduce friction in plumbing systems. (6 Marks)

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c) Calculate the force required to overcome friction in a system where a 100 kg object is being pushed across a surface with a coefficient of friction of 0.3. (6 Marks)

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