073105T4PLM

PLUMBING LEVEL 5

CON/OS/PL/CC/03/5/A

Apply Scientific Principles

March/April 2025

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

WRITTEN ASSESSMENT

INSTRUCTIONS TO CANDIDATE

1. The 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 this question paper.
6. Take g = 9.81 m/s^2 and the density of water = 1000 kg/m^3

This paper consists of THREE (3) 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.

(Assume g = 9.81 m/s^2 and the density of water = 1000 kg/m^3).

1. Scientific principles support the design, installation, and maintenance of plumbing systems. Define the following scientific principles:
    a) Work. (1 Mark)
    b) Energy. (1 Mark)
    c) Power. (1 Mark)
2. Heat refers to the transfer of thermal energy from one body to another due to a temperature difference. Identify TWO sources of heat and highlight their significance in plumbing systems. (4 Marks)
3. In plumbing, converting measurements is essential when working with different units. Convert the following measurements to the given units:
    a) 1500 mm to meters. (1 Mark)
    b) 1200 grams to kilograms. (1 Mark)
    c) 25 liters to cubic (1 Mark)
4. A valve requires a force of 30 with a coefficient of friction of 0.2. Calculate the frictional force. (3 Marks)
5. Friction plays a significant role in plumbing systems and other mechanical applications. State THREE advantages of friction in plumbing. (3 Marks)
6. A tank contains water with a density of 1000 kg/m³. Calculate the pressure exerted at a depth of 5 meters. (3 Marks)
7. Mass and weight are two distinct physical quantities which are related. Highlight TWO differences between mass and weight. (4 Marks)
8. Plumbing materials possess different properties to ensure durability and efficiency in plumbing systems. Differentiate between brittle and ductile materials. (4 Marks)
9. Several plumbing equipment and systems utilize magnetism for their operation. Name THREE plumbing equipment where magnetism applies. (3 Marks)
10. Heat can affect the performance of pipes in plumbing systems. Give FOUR effects of heat on pipes. (4 Marks)
11. A pump does 500 joules of work in 10 seconds. Determine its power. (3 Marks)
12. Kinetic energy is the energy that an object possesses due to its motion. List THREE forms of kinetic energy. (3 Marks)

SECTION B (60 MARKS)

Answer Any THREE Questions in This Section

13.

a) Heat flows from the hotter object to the cooler one until thermal equilibrium is reached. Explain the THREE methods of heat transfer and give an example in each. (9 Marks)

b) A hydraulic jack has a small piston of area 10 cm^2 and a large piston of area 100 cm^2. If a force of 100 N is applied to the small piston. Determine the force exerted on the large piston. (6 Marks)

c) A plumber lifts a 20 kg toolbox 2 meters high. Calculate the work done. (5 Marks)

14.

a) Plastic pipes are widely used in plumbing systems. Discuss FIVE advantages of using plastic pipes. (10 Marks)

b) Noise from water pipes can result from various factors and it indicates unde (10 Marks)

a) Voltage is the measure of the energy per unit charge that drives electric current through a circuit. Discuss THREE importances of maintaining the correct voltage in electrical plumbing systems. (6 Marks)

b) Discuss FIVE electrical safety practices that must be followed when installing plumbing systems that use electrical components. (10 Marks)

c) Calculate the current in a circuit if the voltage is 230 V and the resistance is 10 ohms**.** (4 Marks)

15. Friction is the force that resists the relative motion between two surfaces in contact. In relation to this principle:

a) Define the following terms

i. Static Friction. (2 Marks)

ii. Kinetic Friction. (2 Marks)

b) Discuss FIVE ways on how friction can be reduced in a machine. (10 Marks)

c) Discuss THREE benefits of friction in everyday activities. (6 Marks)

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