073205T4BLD

BUILDING TECHNICIAN LEVEL 5

CON/OS/BUT/CC/03/5

APPLY SCIENTIFIC PRINCIPLES

July/August 2025

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

WRITTEN ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Candidates are provided with a separate answer booklet
4. DO NOT write on this question paper.

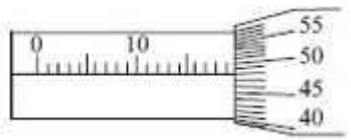
This paper consists of FOUR (4) printed pages.

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

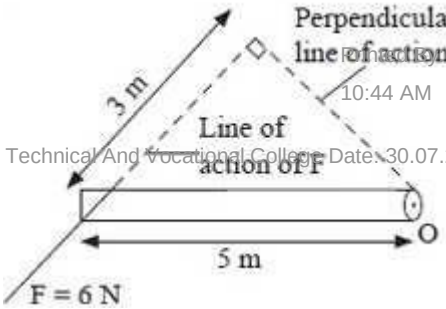
SECTION A (40 MARKS)

Answer ALL the questions in this section.

1. The weight of a man is $\frac{1}{6}$ his weight in grams? (2 marks)
2. Express $0.005 m^3$ in cm^3. (3 marks)
3. A block of glass is 5.0 cm long, 4.0 cm wide and 2.5 cm high. Calculate its volume. (4 marks)
4. A block of glass of mass 187.5 g is 5.0 cm long, 2.0 cm thick and 7.5 cm high. Calculate the density of the glass in kgm^{-3}. (4 marks)
5. A force is a push or a pull. List four effects of force on (4 marks)
6. A body weighs 100 N in air and 80 N when submerged in water. Calculate the up thrust acting on the body. (4 marks)
7. A man of mass 84 kg stands upright on a floor. If the area of contact of his shoes and floor is 420 cm^2, determine the average pressure he exerts on the floor.
   (Take g = 10 Nkg^{-1}) (4 marks)
8. Solids are good conductors of heat. Outline four factors that affect thermal conductivity of metals (4 marks)
9. Using a well labelled diagram, illustrate a broken circuit switch (4 marks)
10. What is the reading of the micrometer screw gauge in figure below. (3 marks)



11. Find the moment of the force about point O in the figu (4 marks)



SECTION B (60 MARKS)

Answer Any THREE Questions in This Section

12. The moment of anti-parallel force is the product of one of the forces and the perpendicular distance between them

    a. Outline three examples of these forces. (3 marks)

    b. U diagram describe an unstable equilibrium. (7 marks)

    c. A uniform meter rule pivoted at its center is balanced by a force of 4.8 N at 20 cm mark and some other two forces. F and 266 cm and 90cm marks respectively. Calculate the force F. (10 marks)

13. The nature of vibrating bodies determines the type of sound produced.

    a. Outline five areas in which pulse technique is applied (5 marks)

    b. The ship sends out an ultrasound whose echo is received after 10 seconds. If the wavelength of the ultrasound in water is 0.05 m and the frequency of the transmitter is 50 kHz, calculate the depth of the ocean. (5 marks)

    rotating uniformly produces sound of wavelength 1.65m. If it makes 10 revolutions per second, find the number of teeth on the wheel, given that the velocity of sound in air is 330 m/s. (10 marks)

14. When a person pushes or pulls an object and it moves in the direction of the force, the person is said to have done work.

    a. Calculate the work done by peter in lifting a stone of mass 15kg through a height of 3m. (4 marks)

    b. A car travelling at a speed of 72km/h is uniformly retarded by application of brakes and comes to rest after 8 seconds. If the car with its occupants has a mass of 1250kg, calculate:

        i. The braking (4 marks)

        ii. The work done in bringing it to rest. (4 marks)

    c. The radius of the effort piston of a hydraulic lift is 2.8cm while that of a load piston is 14cm.This machine is used to raise a load of 240kg at a constant velocity through a height of 5m. Given that the machine is 80% efficient, calculate:

        i. The effort needed (4 marks)

        ii. The energy wasted in using this machine (4 marks)

15. Heat is a form of energy which passes from a body at a higher temperature to a body at a lower temperature.

a. Explain why liquids are poor conductors of heat (4 marks)

b. Describe two types of heat convection (6 marks)

c. Using a sea breeze occurs. (10 marks)