

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE : BMT2133 / BET1133  
COURSE : THERMODYNAMIC AND FLUID  
SEMESTER/SESSION: 1 – 2022/2023  
DURATION : 3 HOURS

**Instructions:**

1. This booklet contains 4 questions. Answer **all** questions.
2. All answers should be written in the answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise up your hands and ask the invigilator.

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**

**THIS BOOKLET CONTAINS ~~4~~ PRINTED PAGES INCLUDING COVER PAGE**

**QUESTION 1**

- a) Explain in detail each term below:
- i. Zeroth law of thermodynamic and its application (3 marks)
  - ii. First law of thermodynamic and its application (3 marks)
  - iii. Second law of thermodynamic and its application (3 marks)
- b) Equilibrium deals with thermodynamic system, define equilibrium and explain each of the term below:
- i. Thermal equilibrium (2 marks)
  - ii. Mechanical equilibrium (3 marks)
  - iii. Chemical equilibrium (3 marks)
- c) A manometer is used to measure the pressure in a tank. The fluid used has a specific gravity of 0.85, and the manometer column height is 55 cm. if the local atmospheric pressure is 96 kPa, determine the absolute pressure within the tank. (8 marks)

**QUESTION 2**

- a) Interpret three (3) mechanisms of heat transfer and give an example of an application for each of them. (10 marks)
- b) Basic concept of heat transfer is to predict the energy transfer between material bodies. State the difference between Heat Transfer and Thermodynamics. (7 marks)
- c) Determine the atmospheric pressure at a location where the barometric reading is 740 mm Hg and gravitational acceleration is  $g = 9.81 \text{ m/s}^2$ . assume the temperature of mercury to be  $10 \text{ }^\circ\text{C}$ , at which its density is  $13,570 \text{ kg/m}^3$ . (8 marks)

**QUESTION 3**

- a) Explain and give example for each below;
- i. Archimedes principle (5 marks)
  - ii. Hydrometer principle (5 marks)
- b) Explain in detail about Pascal's Law. (7 marks)
- c) The hydraulic lift has a large cross section and a small cross section. Large cross-sectional area is 20 times the small cross-sectional area. If the small cross section is given an input force of 25 N, then determine the output force. (8 marks)

**QUESTION 4**

- a) Explain and give example for each below;
- i. Laminar flow (4 marks)
  - ii. Turbulence flow (4 marks)
- b) Explain in detail three (3) major assumptions used in the derivation of the Bernoulli Equation. (7 marks)
- c) Water is flowing through a pipe having diameter 0.35 m and 0.2 m at the upper end and bottom end having a pressure of 15 Pa and 25 Pa respectively. Using Bernoulli's equation, determine the difference in the datum head, if the rate of flow through the pipe is 350 lit/sec. (10 marks)

.....**END OF QUESTION**.....