



FACULTY: ENGINEERING
SECOND SEMESTER EXAMINATIONS (JULY 2016)
2015/ 2016 ACADEMIC SESSION

HOD'S SIGNATURE

COURSE CODE: GNE 236
COURSE TITLE: BASIC THERMODYNAMICS
DURATION: 2 HOURS

INSTRUCTIONS

- 1. ATTEMPT ANY 3 QUESTIONS IN SECTION A. QUESTIONS IN SECTION B ARE COMPULSORY**
- 2. SHOW STEP BY STEP CALCULATIONS**
- 3. BOLD AND LEGIBLE WRITING WILL BE REWARDED**

SECTION A (ATTEMPT ANY 3 QUESTIONS OF YOUR CHOICE)

QUESTION ONE (1)

- Define Thermodynamics (2 marks)
- Give the meaning of Thermodynamics from Greek point of view (2 marks)
- Thermodynamics can be viewed from two perspectives. Mention and explain these two views (4 marks)
- Differentiate between the base and derived units in International System (1 mark). Hence, mention four (4) quantities each for both units and give their symbols (4 marks)
- Give the alternative names for the following S.I. Units: - (i) N/m^2 (ii) kg/m^2 (iii) Nm/s (iv) Nm (2 marks)

QUESTION TWO (2)

- What is a Thermodynamic System? (2 marks)
- Define the following terms as far as a Thermodynamic System is concerned:- (i) Boundary (ii) Surrounding (iii) Isolated System (3 marks)
- Define the following processes: - (i) Isothermal (ii) Isobaric (iii) Adiabatic (6 marks)
- Differentiate between open and closed system (2 marks)
- State the Zeroth Law of Thermodynamics (2 marks)

QUESTION THREE (3)

- Define the term Thermodynamic Cycle. Hence, with the aid of diagram only, show a typical thermodynamic cycle (4 marks)
- State the difference between a point and path function Give two (2) examples for each (4 marks)
- Define the term Thermodynamic Process (2 marks)
- Mention two (2) conditions for a process to be reversible (2 marks)
- Define specific volume and state the relationship between it and density. State their units (3 marks)

QUESTION FOUR (4)

- State the First Law of Thermodynamics. Hence, write its mathematical expression (3 marks)
- Write any two (2) corollaries from the First Law of Thermodynamics (2 marks)
- Define Thermodynamic Equilibrium. Hence, mention three (3) types of thermodynamic equilibrium (4 marks)
- State the Second Law of Thermodynamics (2 marks)
- State the fundamental difference between Energy and Work (4 marks)

SECTION B (ATTEMPT ALL QUESTIONS)

QUESTION FIVE (5) COMPULSORY

- Mention the names of the corresponding thermometric properties employed in the following kinds of thermometers: - (i) Constant volume gas (ii) Alcohol or Mercury-in. Glass (iii) Constant pressure gas (iv) Thermocouple (2 marks)
- The temperature on a thermometric scale is defined in terms of a property P by the relation, $t = a \log_e P + b$, where a , and b are constants. The temperatures of the ice and steam point are assigned the numbers 32 and 212 respectively. Experiment gives values of P of 1.86 and 6.81 at the ice and steam points respectively. Evaluate the temperature corresponding to a reading of $P = 2.50$ on the thermometer. State the unit of given scale (6 marks)

PLEASE TURN OVER FOR QUESTION SIX (6)

QUESTION SIX (6) COMPULSORY

- a) If W represents work done or received, and Q represents heat received or rejected. What are the sign conventions for the following conditions? (i) Work input to the system (ii) Work output of the system (iii) Heat rejected by the system (iv) Heat received by the system (2 marks)
- b) A piston-cylinder machine containing a fluid has a stirring device as shown in Fig. Q6. The piston is frictionless, and it is held down against the fluid by atmospheric pressure of 101.3kPa . The stirring device is turned 9500 revolutions with an average torque of 1.25Nm against the fluid. If the piston is of diameter 0.65m and moves a distance of 0.60m outwards, find the net work transfer for the system (6 marks).

