



UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Second Semester – 2019

PAPER: Thermodynamics and Kinetic Theory

Course Code: PHY-104, PHY-12329 Part – I (Compulsory) Time: 15 Min. Marks: 10

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

1. Why does the glass sometimes break if you quickly pour boiling water into it?
 - i) Hot water expands, pushing the glass out
 - ii) Hot water cools when it touches the glass
 - iii) The glass becomes hot and expands, causing the molecules to break
 - iv) The inside of the glass expands faster than the outside of the glass, causing the glass to break.
2. Which has the higher mass density at same temperature and pressure.
 - i) Dry air
 - ii) Humid air
 - iii) Both have same
 - iv) Other conditions needed to be mentioned
3. Which of the following is not a State Function of the system
 - i) Pressure
 - ii) Temperature
 - iii) Internal Energy
 - iv) Work
4. In Carnot Engine, Internal Energy in one Cycle is
 - i) Positive
 - ii) Negative
 - iii) Constant
 - iv) Zero
5. The Efficiency of the Carnot engine in terms of T_1 and T_2 is
 - i) $1 - (T_2/T_1)$
 - ii) $1 - (T_1/T_2)$
 - iii) $1 + (T_2/T_1)$
 - v) $1 + (T_1/T_2)$
6. The density of gas in a bell jar is kept constant while varying the temperature, if the temperature is doubled, then the mean free path will
 - i) Double
 - ii) Remain the same
 - iii) Decrease by half
 - iv) Becomes four times

P.T.O.

7. Which type of ideal gas will have the largest value of C_p/C_v
- Monoatomic
 - Diatomic
 - Polyatomic
 - The value will be the same for all
8. Which of the following is a necessary condition for a process involving an ideal gas to do work
- $\Delta T \neq 0$
 - $\Delta P \neq 0$
 - $\Delta V \neq 0$
 - $Q \neq 0$
9. A block of Aluminium originally at 80°C is placed into an insulated container of water originally at 25°C , After a while the system reaches an equilibrium temperature of 31°C , During the process
- Change in entropy of Aluminium block is positive
 - Change in entropy of Aluminium block is negative
 - Change in entropy of Aluminium block is zero
 - None of the above
10. Work done in an adiabatic process is _____ than that in isothermal process
- Greater
 - Smaller
 - Equal
 - Zero



UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Second Semester – 2019

Roll No.

PAPER: Thermodynamics and Kinetic Theory

Course Code: PHY-104, PHY-12329 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Section I

Q#2

Note: Give brief answers to the following questions: 2×10=20

1. State the two forms of zeroth law of thermodynamics
2. Write conversion formulae between Fahrenheit and Kelvin Scales.
3. Write the expressions for the van der Waals equation of state of real gases. And write the reason for volume correction.
4. Define the linear Coefficient of thermal expansion in solids and relate it to the corresponding coefficient of volume expansion.
5. Explain the strange behavior of volume expansion of water in the temperature range 0-4°C
6. Write the statements of the second law of thermodynamics in terms of
 - i) Entropy
 - ii) Heat engine.
7. Define the latent heat of
 - i) Fusion
 - ii) VaporizationAlso write the respective units
8. Write the expressions for the following thermodynamic potentials mentioning the quantities involved
 - i) Helmholtz Free Energy
 - ii) Gibbs Free energy
9. Derive any one of the Maxwell thermodynamic relations.
10. The turbine in the steam power plant takes steam from a boiler at 600°C temperature reservoir and rejects at 60°C, calculate its efficiency.

Section II

Q#3

Note : Give the detailed answers:

(30)

- 1) Derive the following expressions considering one mole of the ideal gas to be the thermodynamic system under consideration with the standard notations for the quantities:
(10)
 - i) $PV^\gamma = \text{Constant}$
 - ii) $C_p - C_v = R$
- 2) What do you mean by thermoelectricity and thermocouple, Explain the Seebeck Effect and Peltier effect. (10)
- 3) Derive the first and the second TdS equations and explain one application in each case.