

PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
B.Sc. Supplementary, Winter 2017-18 Examination

Semester: 2

Subject Code: 11104151

Subject Name: Physics-II

Date: 05/01/2018

Time: 10.30 am to 1.00 pm

Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1. A) Answer the following questions. (Each of 04 marks) (08)**
- (a) Derive the rms velocity and represent it in terms of absolute temperature.
 - (b) Derive the relation between kinetic energy and temperature.
- Q.1. B) Answer the following questions. (Any two) (04)**
- (a) Do as directed. (Each of 02 marks) (04)
 1. State Zero and First law of thermodynamics
 2. Eight gas molecules chosen at random are found to have speeds of 1,1,2,2,2,3,4 and 5 m/s .
Determine a) the mean speed of the molecules b) the mean square speed of the molecules.
 - (b) Derive the relation between molar specific heat and degree of freedom. (04)
 - (c) Explain Gibb's free energy (04)
- Q.2. A) Answer the following questions. (04)**
- (a) Do as directed. (Each of 02 marks) (04)
 1. Define Entropy.
 2. Calculate the mean translational kinetic energy per molecule of a gas at 727 °C, given R=8.32 JK/mol
 - (b) Explain heat engine with its efficiency (04)
- Q.2. B) Answer the following questions (Any two) (03)**
- (a) Do as directed. (Each of 01 marks) (03)
 1. Calculate the number of molecules in one cubic meter of an ideal gas N.T.P
 2. Define Internal energy
 3. Calculate the change in entropy when 10 g of ice at 0 °C is converted into water at the same temperature
(latent heat of ice=80 cal/gm)
 - (b) Write Postulates of Kinetic theory of gases (03)
 - (c) Explain degree of freedom. (03)
- Q.3. A) Answer the following questions. (Each of 04 marks) (08)**
- (a) State Zeroth law of thermodynamics, Explain Concept of Temperature.
 - (b) Derive $U_2 - U_1 = W$ for adiabatic process
- Q.3. B) Answer the following questions (Any two) (04)**
- (a) Do as directed. (Each of 02 marks) (04)
 1. A cylinder contains a hydrogen gas of volume $2.40 \times 10^3 \text{ m}^3$ at 17 °C and $2.32 \times 10^6 \text{ Pa}$. Calculate the number of molecules of hydrogen in the cylinder,
 2. Calculate the rms velocity of the oxygen molecules at 27 °C
 - (b) Derive the expression of pressure exerted by a gas on the wall of the container. (04)
 - (c) Calculate the change in entropy for a reversible isobaric process (04)
- Q.4. A) Answer the following questions. (04)**
- (a) Do as directed. (Each of 02 marks) (04)
 1. Calculate the change in entropy when 5 kg of water at 100 °C is converted into steam at the same temperature (latent heat of steam=540 cal/gm)
 2. State Second law of thermodynamics
 - (b) Explain Carnot's cycle in details (04)
- Q.4. B) Answer the following questions (Any two) (03)**
- (a) Do as directed. (Each of 01 marks) (03)
 1. State 2nd law of thermodynamics given by Kelvin plank
 2. Define Helmholtz free energy (A/F)
 3. Write the equation of change in enthalpy
 - (b) Explain Maxwell's law of Equipartition of Energy. (03)
 - (c) Obtain $H=U+PV$ for isobaric process (03)