



12th Science:- Physics  
Kinetic Theory of Gases and Radiation,

DATE:

TIME: 1 hr

MARKS: 25

SEAT NO:

--	--	--	--	--	--

**Note:-**

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

**Section A**

**Q.1 Select and Write the correct answer.**

**(4)**

1. The pressure exerted by the gas in terms of total kinetic energy per unit volume (E) is  
A)  $\frac{3}{2} E$       B) E  
C)  $\frac{2}{3} E$       D)  $\sqrt{3} E$
2. The unit of Stefan's constant is  
A) watt/m<sup>2</sup>k<sup>4</sup>      B) watt/m<sup>3</sup>k  
C) watt/m<sup>2</sup>k      D) watt/m<sup>3</sup>k<sup>4</sup>
3. The rms velocity of the gas molecules moving with velocities 2 m/s, 4m/s and 6 m/s is  
A) 2.8 m/s      B) 3.0 m/s  
C) 3.8 m/s      D) 4.32 m/s
4. The light from the sun is found to have a maximum intensity near the wave length of 470 nm. Assuming surface of the sun as a black body, the temperature of the sun is ..... [Wien's constant b = 2.898 × 10<sup>-8</sup> mK]  
A) 5800K      B) 6050K  
C) 6166K      D) 6500K

**Q.2 Answer the following.**

**(3)**

1. Define Polyatomic Gases.
2. What is the dimensional formula of R?
3. Does heat transfer by radiation need a material medium?

**Section B**

**Attempt any Four**

- Q.3 If a hot body and a cold body are kept in vacuum, separated from each other, can they exchange heat? If yes, which mode of transfer of heat causes change in their temperatures? If not, give reasons. **(2)**
- Q.4  $\lambda_{\max}$  the wavelength corresponding to maximum intensity for the sun is in the blue-green region of visible spectrum. Why does the sun then appear yellow to us? **(2)**
- Q.5 What is Dalton's law of partial pressures? **(2)**
- Q.6 Mention the conditions under which a real gas obeys ideal gas equation. **(2)**

Q.7 During an experiment, an ideal gas is found to obey an additional law  $Vp^2 = \text{constant}$ . The gas is initially at a temperature  $T$  and volume  $V$ . When it expands to a volume  $2V$ , the temperature becomes ..... (1987, 2M) **(2)**

Q.8 Calculate the kinetic energy of Hydrogen in 1 litre of volume, at a pressure of 1 atmosphere. **(2)**

**Section C**  
**Attempt any Two**

Q.9 Explain, on the basis of kinetic theory, how the pressure of gas changes if its volume is reduced at constant temperature. **(3)**

Q.10 How is ideal gas different from real gases? **(3)**

Q.11 Two spheres of same material having diameters in the ratio 2 : 1 are maintained at same temperature and kept in same enclosure. Compare their rates of emission. **(3)**

**Section D**  
**Attempt any One**

Q.12 Draw neat labelled diagram of Ferry's black body. **(4)**

Molar volume is the volume occupied by 1 mol of any (ideal) gas at standard temperature and pressure (STP : 1 atmospheric pressure, 0 °C). Show that it is 22.4 litres.

Q.13 Explain spectral distributon of blackbody radiation. **(4)**