

2021

(September)

PHYSICS

(Major)

Course: 201

(Thermal Physics and Waves and Oscillations)

Full Marks: 20

Time: 1 hr

Answer any four questions from the following

5×4 = 20

1. ^4He gas is assumed to obey Maxwell's law for distribution of velocities. The molecular diameter of atoms of ^4He is 10^{-10}m . One mole of the gas occupies 20 litres at 20K. Calculate the mean free path and average speed of the molecules. **5**
2. Discuss the various observations obtained from Andrew's experiment on CO_2 . **5**
3. A Carnot engine converts $1/3^{\text{rd}}$ of heat into work. When the temperature of the sink is reduced by 100°C , it converts one-half of heat input into work. Calculate the temperatures of the source and sink. **5**
4. Obtain a relationship between C_p and C_v using Maxwell's thermodynamic relationships. **5**
5. Write Planck's Black body Distribution law and use it to deduce Stefan's law for a perfect black body. **1+4= 5**
6. Derive an expression for velocity of sound in a gaseous medium. Also mention the factors on which the velocity of sound in such medium depends. **4+1=5**
