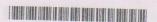
## B.Sc. II Semester Degree Examination, May 2013 PHYSICS

## Paper - 2.1 : Heat and Thermodynamics, Waves and Oscillations

Time: 3 Hours	Max. Marks: 80
Instructions: 1) Section I is compu 2) Answer any four q four questions from	uestions from Section II and
SECTI	ON-I
1. A) Answer any twelve of the following:	(1×12=12)
<ul> <li>i) Maxwell's law of distribution of ve</li> <li>a) Velocity of individual molecule</li> <li>b) Probability of velocity of molec</li> <li>c) Velocity of all molecule</li> <li>d) All of these</li> </ul>	2. What is mean free path ? Obtain an ex
ii) Change in entropy in a process is	given by
a) $ds = \frac{dT}{dQ}$ b) $ds = \frac{dQ}{T}$	c) $ds = \frac{T}{dQ}$ d) $ds = \frac{TQ}{m}$
iii) In Joule Thomson process, if $\frac{2a}{T}$	< b, then
a) Heating effect is observed c) No effect	<ul><li>b) Cooling effect is observed</li><li>d) Both a) and b)</li></ul>
iv) At resonance, the intensity of the	
ASSURED A MARKET AND A CONTRACTOR OF STREET	c) Maximum d) Unpredictable
B) Fill in the blanks:  i) R. M.S. velocity of a gas molecule gas.  ii) Below temper application of pressure alone.	e is directly proportional to of rature, the gas can be liquefied by the
iii) When the temperature of a black to by the black body increases by _	oody is doubled the total radiation emitted times initial value.
iv) In damped oscillations amplitude	of the wave



- C) State True or False:
  - i) During adiabatic, entropy remains constant.
  - ii) Boiling point of a given liquid decreases with increasing pressure.
  - iii) The velocity of sound increases with increasing pressure of the medium.
- D) Answer the following in one or two sentences:
  - i) State third law of thermodynamics.
  - ii) What happens to the entropy during reversible process?
  - iii) What are heats?
  - iv) Define over tones.

## SECTION-II

 $(4 \times 4 = 16)$ 

(9+4=13)

- 2. What is mean free path? Obtain an expression for it.
- 3. Obtain an expression for work done in an isothermal process.
- 4. Describe Linde's process for the liquefaction of air.
- 5. Write a note on pressure exerted by the radiation.
- 6. Explain Sabine's reverbation formula and define Reverbation.
- 7. Derive an expression for velocity of transverse waves along a stretched string.

## SECTION - III

- 8. a) Describe the working of Carnot engine and derive an expression for efficiency of heat engine.
  - b) A carnot engine whose law temperature reservoir is at 7°C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temperature of high temperature reservoir be increased. (9+4=13)
- a) Deduce Clausius-Clapeyron latent heat equation and discuss the effect of change of pressure on the melting and boiling point of the substance.
  - b) Calculate the change in temperature of boiling water, when the pressure is increased by 27.12 mm of Hg? The normal boiling point of water at atmospheric pressure is 100°C.

Given: Latent heat of Steam = 537 Cal/gm and specific volume of steam =  $1674 \text{ cm}^3$ .



- 10. a) Give the theory of porous plug experiment. Discuss the experimental results.
  - b) At what temperature will the oxygen molecular have the same R.M.S. velocity as that of hydrogen molecule at 0°C.

Given: Molecular weight of oxygen = 32

Molecular weight of hydrogen = 2.

(9+4=13)

- 11. a) Derive Planck's law of radiation.
  - b) Calculate the energy radiated per minute from the filament of an incandescent lamp at 2000 K if the surface area is  $5 \times 10^{-5}$  m<sup>2</sup> and its relative emittance is 0.85. (9+4=13)
- 12. a) Define free, damped and forced vibrations. Give the theory of damped vibrations.
  - b) At what temperature will the speed of sound in air becomes double its speed at 0°C. (9+4=13)
- 13. a) What are Lissajous figures? Find the resultant of two S.H.M. of equal period, when they act at right angles to each other. Discuss the cases.
  - b) When a simple harmonic wave is propagated through a medium the displacement of a particle in cm at any instant of time is given by

 $y = 10 \sin \frac{2\pi}{100}$  (36,000t – 20), calculate the wavelength and frequency of the vibrating particle. (9+4=13)