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**SUBJECT CODE NO: - 2014**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.Sc. F.Y Sem. I**  
**Examination March/April-2022 (To Be Held In June/July-2022)**  
**Physics Paper-II**  
**Heat and Thermodynamics**

[Time: 1:53 Hours]

[Max.Marks:50]

Please check whether you have got the right question paper.

- N.B. i) Attempt all questions.  
 ii) Use of logarithm table & electronic Pocket Calculator is allowed.

- Q.1 a) Explain, in detail the flow of heat along the wall of a cylindrical tube. 10  
 b) Derive an expression for thermal conductivity of a gas & prove that 10  
 $K \propto \sqrt{T}$ , where K = coefficient of the thermal conductivity of a gas  
 T = absolute Temperature.

OR

- c) What is an adiabatic process? Derive an expression for work done during an adiabatic 10  
 process.  
 d) Derive the Clausius - Clapeyron's latent heat equation from maxwell's thermodynamical 10  
 relation and explain the effect of pressure on (i) boiling point of liquid and (ii) melting  
 point of solid.

- Q.2 a) Write a Short note on transference of heat. 10  
 b) Two thin concentric spherical shells of radii 4cm & 8cm respectively have their annular 10  
 cavity filled with Charcoal powder. When energy is supplied at the rate of 10.5 watt to a  
 heater at the centre, a temperature difference of 60°C is set up between the shells find the  
 thermal conductivity of Charcoal (J = 4.2 Joule/cal).  
 c) State the Second law of thermodynamics with the help of Kelvin and Clausius statement.  
 d) Find the efficiency of Carnot's enging working between 127°C and 27°C. It absorbs 80  
 Cals of heat. How much heat is rejected?

OR

- a) Define mean free path, and obtain expression for mean free path. 05  
 b) The viscosity of a gas is  $25 \times 10^{-4}$  gm/m sec. If the free path of the gas molecule is  $2 \times$  05  
 $10^{-8}$  m & its density is  $1 \text{ kg/m}^3$ , then calculate the R.M.S. velocity of the gas molecule.  
 c) Define entropy. Explain change of entropy is independent of path. 05  
 d) Calculate the change in temperature of boiling water, when the pressure is increased by 05  
 $3.6 \times 10^4$  dyne/cm<sup>2</sup>. The normal boiling point of water at atmospheric pressure is 100°C.  
 Latent heat of steam = 537 cal/g & specific volume of steam = 1672 cm<sup>3</sup> (1cal = 4.2 ×  
 $10^7$ )

- Q.3 Multiple choice questions. 10  
 1. The S.I. unit of thermal conductivity is  
 (a) J/m<sup>2</sup>sK



9. The entropy of a system in an irreversible process.
- (a) increases
  - (b) decreases
  - (c) Remain constant
  - (d) Remains zero
10. When 5kg of water heated at 100°C is converted into Steam at same temperature. The change in entropy is
- (a) 1865 cal/k
  - (b) 13 cal/k
  - (c) 1665 cal/k
  - (d) 7240 cal/k