Total No. of Printed Pages: 3

(a) J/m^2sK

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

	Physics Paper-II	2/76
	Heat and Thermodynamics	66
[Time:	3 Hours] [Max.Mark	is:5(
N.B.	Please check whether you have got the right question paper. i) Attempt all questions. ii) Use of logarithm table & electronic Pocket Calculator is allowed	d.
Q.1	 a) Explain, in detail the flow of heat along the wall of a cylindrical tube. b) Derive an expression for thermal conductivity of a gas & prove that K	10 10
	 c) What is an adiabatic process? Derive an expression for work done during an adiabatic process. d) Derive the Clausius - Clapeyron's latent heat equation from maxwell's thermodynamica relation and explain the effect of pressure on (i) boiling point of liquid and (ii) melting point of solid. 	110
Q.2	 a) Write a Short note on transference of heat. b) Two thin concentric spherical shells of radii 4cm & 8cm respectively have their annular 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. b) The viscosity of a gas is 25 × 10 ⁻⁴ gm/m sec. If the free path of the gas molecule is 2 × 10 ⁻⁸ m & its density is 1 kg/m³, then calculate the R.M.S. velocity of the gas molecule. c) Define entropy. Explain change of entropy is independent of path. d) Calculate the change in temperature of boiling water, when the pressure is increased by 3.6 × 10 ⁴ dyne/cm². The normal boiling point of water at atmospheric pressure is 100°C. Latent heat of steam = 537 cal/g & specific volume of steam = 1672 cm³ (1cal = 4.2 × 10 ⁷)	05 05 05 05
Q.3	Multiple choice questions. 1. The S.L. unit of thermal conductivity is	10

(b)	Js/mK
(c)	Jk/ms

((b)	J/msK
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2.	If the density of material	'Q'	and specific heat is	'C	then its	thermal	diffusivity	is
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- (a) $h = C/\varrho K$
- (b) $h = K/\varrho C$
- (c) $h = K\varrho/C$
- (d) $h = \varrho C/K$

3. The Critical Constant of Pressure (Pc)

- (a) $a/27b^2$
- (b) $27b^2/a$
- (c) a/27b
- (d) 27b/a
- 4. The mean free path of gas raises with absolute temperature (T) as,
- (a) T
- (b) T²
- (c) 1/T
- (d) T^3
- 5. In Vander Waal's equation for real gas, Volume correction is
- (a) a/V^2
- (b) a/V
- (c) b
- (d) V/b
- 6. In Carnot's cycle, the first step is
- (a) Isothermal expansion
- (b) Adiabatic expansion
- (c) Isothermal compression
- (d) Adiabatic compression.
- 7. A Carnot engine is operating between 100°C and 50°C. Its efficiency will be
- (a) 15.2%
- (b) 13.4%
- (c) 25%
- (d) 74.4%
- 8. The efficiency of the engine is
- (a) always less than 1
- (b) always greater than 1
- (c) equal to 1
- (d) Both a & b

- 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