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W—93—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS Pattern)

PHYSICS

Paper III (CCP-II)

(Heat and Thermodynamics)

(MCQ & Theory)

(Monday, 22-10-2018)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

N.B. :— (i) Attempt All questions.

(ii) Use separate answer-sheets for MCQ and descriptive.

(iii) Negative marking system is applicable to MCQ examination.

MCQ

1. Attempt *all* Multiple Choice Questions : 10

(i) Viscosity of gas is due to transport of :

- (a) Momentum (b) Energy
(c) Mass (d) None of these

(ii) In diffusion the transport of the following occurs :

- (a) Momentum (b) Mass
(c) Energy (d) None of these

(iii) The dimensions of the constant b in van der Waals' gas equation is that of :

- (a) Pressure (b) Volume
(c) Both (a) and (b) (d) None of these

P.T.O.

- (iv) The critical temperature of CO_2 gas is :
- (a) 13.1°C (b) 21.5°C
 (c) 31.1°C (d) 48.1°C
- (v) The first law of thermodynamics is :
- (a) $dV = dP + PdV$ (b) $dQ = dU + pV$
 (c) $dQ = TdS$ (d) $dQ = dU + dPV$
- (vi) The second law of thermodynamics in terms of entropy is :
- (a) $dS = dQT$ (b) $dQ = PdS$
 (c) $dQ = TdS$ (d) $dS = PdV$
- (vii) The Helmholtz function in thermodynamics is given by :
- (a) $F = Q + TS$ (b) $F = U + TS$
 (c) $F = U - TS$ (d) $F = P + TS$
- (viii) The enthalpy of the system is defined as :
- (a) $H = U + PV$ (b) $H = U - PV$
 (c) $H = U + dS$ (d) $H = U - dS$
- (ix) A perfectly black body is that which :
- (a) is black in colour
 (b) radiates all energy
 (c) does not absorb energy
 (d) absorbs all radiations incident on it
- (x) For a perfectly black body, the absorptive power is :
- (a) 1 (b) 0.5
 (c) 0 (d) ∞

Theory

2. Attempt any *five* of the following questions : 10

- (a) Define mean free path.
- (b) Define critical temperature.
- (c) State first law of thermodynamics.
- (d) Define entropy of the system.
- (e) State and explain enthalpy.
- (f) Define black body.
- (g) State Stefan-Boltzmann law.

3. Attempt any *two* of the following questions : 10

- (a) Describe Joule-Thomson porous plug experiment.
- (b) Prove the following TdS equation :

$$TdS = C_p dT - T \left(\frac{\partial V}{\partial T} \right)_P dP.$$

- (c) Derive the relations between coefficient of thermal conductivity, viscosity and diffusion.
- (d) Write a note on deduction of Wien's distribution law.

4. Attempt any *one* of the following questions : 10

- (a) Give an expression for coefficient of thermal conductivity of gas.
- (b) Derive van der Waals' equation of state for a gas.