

DEPARTMENT OF PHYSICS

"Examination T3, 2017-2018"

Semester: IV  
Subject: Thermal Physics  
Branch: Physics  
Course Type:  
Time: 3 Hours  
Max.Marks: 80

Date of Exam: 21/05/2018  
Subject Code: PHH217-T  
Session: II  
Course Nature: HARD  
Program: B.Sc.  
Signature: HOD/Associate HOD:

1. Explain the following:
- (a) Boyles Law
  - (b) Gay-Lussac's Law
  - (c) Charles Law
  - (d) Assumptions of Kinetics Theory of Gases (any five)
  - (e) Calculate the  $v_{rms}$  of a gas at 68.2K.

PART-A

[5 x 4 = 20]

2. Derive the four Maxwell's Thermodynamical relations
3. Derive the expression of heat capacity equation involving ( $C_p - C_v$ ) and explain why  $C_p > C_v$
4. Derive the three TdS equations

PART-B (Attempt any two)

[15]

[15]

[15]

5. (a) Using the relation of pressure exerted by an ideal gas, deduce the relation of average K.E. to the temperature
- (b) Calculate the average K.E. of a molecule at 300K and 7730K

PART-C (Attempt any two)

[10]

[5]

6. Derive the relation of Maxwell-Boltzmann law of Distribution of velocities in an ideal gas

[15]

7. (a) Explain and derive the equation for van der Waal's equation of state.
- (b) One mole of a gas occupies a volume of 0.55lts at 0°C, calculate the pressure it will exert if it behaves as (i) an ideal gas and (ii) as a van der Waal's gas. Given  $a = 0.37 \text{ Nm}^4 \text{ mol}^{-2}$ ,  $b = 43 \times 10^{-6} \text{ m}^3 \text{ mol}^{-1}$  and  $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ .

[7.5]

[7.5]

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