5. (a) Derive Maxwell's four thermodynamically relations. 4

(b) Explain cooling due to adiabatic demagnetisation. 4

6. (a) Explain the phenomena of Conversion of magnetic temperature to kelvin temperature (near absolute zero). How are such temperature measured. 4

(b) Using Maxwell's thermodynamically relation, Discuss the variation of intrinsic energy with volume for a perfect gas and a gas obeying vander Waal's equation. 4

Roll No. .....

41272

B. Sc. (Hons.) Physics 4th Semester Examination – May, 2019

THERMAL PHYSICS - II

Paper : Phy-402

Time : Three hours] ***[Maximum Marks : 40***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting at least ***two*** question from each Unit. Use of Scientific (non programmable)calculator is allowed

UNIT – I

1. (a) Describe carnot's cycle and deduce the efficiency of ideal heat engine. 4

(b) Enunciate the second law of thermodynamics. Deduce from this the thermodynamically scale of temperature. Discuss how this scales is related to the perfect gas scale. 4

2. (a) Derive Clapeyron's Latent heat equation $\frac{dP}{dt} = \frac{L}{T(v_1 - v_2)}$. Also Discuss how the boiling point of a liquid and melting point of a solid are affected by change of presssure. 5

(b) A Carnot's ref takes heat from water at 0°C and discards, it to a room at 27°C . 1 kg of water at 0°C is to be changed into ice at 0°C. How many calories of heat are discarded to the room ? What is the cofficient of performance of Machine. 2

(c) What are limitations of first Law of Thermodynamics. 1

3. (a) What is Joule-Thomson effect ? Obtain an expression for the cooling produced in a Vander weal gas. Explain why hydrogen show heating effect at ordinary temperature. 4

(b) Calculate the change inentropy, when 10 gm of water at 100°C is converted into steamat the same temperature. 2

(c) "Entropy is measure of disorder." Justify the statement. 2

4. (a) Define entropy. What is it plesiscal signifiacane ? Derive an expression for change in entropy of a perfect gas in terms of pressure and temperature. 5

(b) One mole of a gas expands isothermally to ... times in volume, calculate the change in ... in terms of gas constant.

(c) If the door of a working refrigerator is kept ... for a long time, will it make the room ... warm ?

UNIT – II

5. (a) Show that $C_p - C_v = TE\alpha^2 V$ where C_p & C_v ... the specific heats at constant pressure and volu... respectively; E is bulk modulus of elasticity, ... co-efficient of volume expansion and V ... specific volume.

(b) Discuss about the first order phase transition ... hence Clausius-Clapeyron's latent heat equatio... Can latent heat become zero ? If yes, under wh... condition ?

6. (a) Discuss about second order phase (with grap... transition and hence derive Ehrenfest's equations.

(b) Using Maxwell's thermodynamical relation prov... that for any substance, the ratio of the adiabati... and isothermal elasticities is equal to ratio of tw... spectic heats.