Roll No. .....

(011/17-I)

5197

B. Sc. EXAMINATION

(Third Semester)

PHYSICS

PH-301

Computer Programming and Thermodynamics

Time : Three Hours *Maximum Marks :* 40

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Q. No. **1** is compulsory. Use of non-programmable scientific calculator is allowed.

1. (a) Convert 12.625 into Binary nos. 2

   (b) Define Nernst heat law. 1

   (c) How does a freezing mixture cool a gas ? 1

   (d) Why a liquid gas is collected in Dewar flask ? 1

   (e) What is tripple point on a phase diagram ? 1

   (f) How will you distinguish between evaporation and boiling ? 2

Unit I

2. (a) Define flow chart. Give description of various symbols used in flow chart. Also give its merits and demerits. 6

   (b) Draw a flow chart to find the area of a circle. 2

3. (a) Define the following in FORTRAN with examples :

   (i) Built in function

   (ii) Implicit and explicit typing

   (iii) Executable and non-executable statement. 6

   (b) What is a nested Do loop ? Explain it. 2

Unit II

4. Write a program to evaluate finite integral by Simpson's 1/3rd rule using proper algorithm and flow chart. 8

5. (a) Develop and algorithm and write a FORTRAN PROGRAM to find the roots of a quadratic equation. 4

   (b) Write a Fortran program to find the maximum, minimum and range of a given set of numbers. 4

Unit III

6. (a) What is Joule-Thomson's effect ? Discuss the experimental set up and results of porous plug experiment. 6

   (b) Calculate the change in Entropy when 1 gm atom of solid mercury at its meling point is raised to a temperature of 40°C. Given melting point for mercury is –39°C; Latent heat of fusion = 3.0 calories/gm. 2

7. (a) Give principle, construction and working of k onnes method for liquification of Helium. 6

   (b) What is the difference between Joule's Thomson effect and adiabatic cooling ? 2

Unit IV

8. (a) State and explain four thermodynamical functions. https://www.cdluonline.com 6

   (b) Show that :

$$C_2 - C_1 = \frac{dL}{dT} - \frac{L}{T}$$

   where C_1 and C_2 represent the specific heat of a liquid and its saturated vapour and L is the latent heat of vapours. 2

9. (a) Derive Clausius Clapeyron latent heat equation from Maxwell's thermo-dynamical equations. 5

(b) Using Maxwell's equation Calculate under what pressure the water would boil at 100°C if the change in specific volume when 1 gm of water converts into steam is 1676 cm^3. Given latent heat of vapourisation of steam = 540 cal/gm and Atmosphere = 10^6 dyne/cm^2. 3