

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

(2-06/9) B-5197

P.T.O.

- (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 melting point is raised to a temperature of  $40^{\circ}\text{C}$ . Given melting point for mercury is  $-39^{\circ}\text{C}$ ; 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. 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 thermodynamical equations. 5



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