Roll No. ....

(01/22-II)

5197

B. Sc. EXAMINATION

(Third Semester)

PHYSICS

PH-301

Computer Programming and Thermodynamics

Time : *Three Hours*   *Maximum Marks* : 40

Note : There are nine questions in all. Q. No. **1** is compulsory containing 6 parts. Attempt *four* more questions, selecting *one* question from each Unit. All questions carry equal marks.

1. (a) Convert the following decimal numbers into their binary equivalents :

    18, 424.   2

   (b) What do you mean by Algorithm ?   1

   (c) Define Enthalpy of a thermodynamical system.   1

(d) Define transition temperature. 1

(e) Find the efficiency of a Carnot reversible heat engine working between the temperatures of steam and melting ice. 2

(f) Define second law of thermodynamics. 1

Unit I

2. Define an array. Explain one-dimensional and two-dimensional arrays by giving examples. 8

3. (a) Explain 'IF' statement. 4

   (b) Define Flowchart. What are various symbols available in drawing a flowchart ? Describe the function of each symbol. 4

Unit II

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

(b) Develop an algorithm and write a FORTRAN program for the multiplication of two matrices of same order. 4

5. Write a program to evaluate the finite integral by Simpson's $\frac{1}{3}$ rule using proper algorithm and flowchart. 8

Unit III

6. (a) State and explain adiabatic demagnetisation. 4

(b) Explain internal energy of a thermodynamic system. 4

7. Define entroy. What is its physical significance ? Derive an expression for the change in entropy of a perfect gas in terms of pressure, volume and specific heat, viz.

$$\Delta S = S_2 - S_1 = \left[C_v \log \frac{P_2}{P_1} + C_p \log \frac{V_2}{V_1} \right]. \quad 8$$

Unit IV

8. (a) Derive Clapeyron's latent heat equation.

   4

   (b) Define the four thermodynamical functions.

   4

9. From the Maxwell's relation, derive the relation between C_p and C_v for (i) perfect gas (ii) a gas obeying van der Waals' equation.

   8