



**AB-3121**

**B. Sc. (Sem. V) Examination**

**March / April – 2015**

**Physics : Paper - XI**

**(PHY-5011 : Numerical Analysis & Material Science)**

**(New Course)**

Time : 2 Hours]

[Total Marks : 50

**Instructions :**

(1)

नीचे दशांशवैल निशानीवाणी विगतो उत्तरवडी पर अवश्य क्षभवी.  
Fillup strictly the details of signs on your answer book.

Seat No. :

Name of the Examination :

Name of the Subject :

Subject Code No. :  Section No. (1, 2.....) :

Student's Signature

- (2) Draw neat diagrams wherever necessary.
- (3) Symbols used have their usual meaning.
- (4) Figures to the right indicate full marks of the question.
- (5) Scientific calculator may be used.

1 Answer the following questions in brief : 8

- (1) State Bessel's formula for interpolation.
- (2) Define drift velocity of an electron.
- (3) What do you mean by absolute error and relative error ?
- (4) What are type-I semiconductors ?
- (5) What are Ferrites ?
- (6) What is relaxation time ?
- (7) Write two physical properties of metals.
- (8) Give the dimensions of magnetic susceptibility.

- 2 (a) Answer any one of the following : 10
- (1) Explain forward differences  $\Delta y_0, \Delta y_0^2$  and  $\Delta y_0^3$ . Obtain the Newton's forward difference interpolation formula.
  - (2) Give the sequence of steps in the Regula-Falsi method for determining a real root of the equation  $f(x)=0$ , use the method of False position to find a real root correct to three decimal places of the equation  $x^3 + x^2 + x + 7 = 0$ .
- (b) Attempt any one of the following : 4
- (1) An approximation value of  $\pi$  is given by  $x_1 = \frac{22}{7} = 3.1428571$  and its true value is  $x = 3.1415926$ . Find the absolute and relative errors.
  - (2) Find the difference  $\sqrt{6.37} - \sqrt{6.36}$  to three significant figures.
- 3 (a) Answer any one of the following : 10
- (1) Derive the relation between electrical conductivity and thermal conductivity on the basis of classical free electron theory. Hence obtain the Wiedemann-Franz law.
  - (2) Discuss in detail potential application of superconductivity.
- (b) Attempt any one of the following : 4
- (1) Explain drift velocity and relaxation time of free electron in metals.
  - (2) Write short note Superconductivity.
- 4 Discuss any two of the following in detail : 14
- (1) Newton's general interpolation formula.
  - (2) Bisection method.
  - (3) Weiss theory of paramagnetism.
  - (4) Effect of magnetic field.