* J B - 3 1 6 0 *

JB-3160

B. Sc. (Sem. IV) Examination

April/May – 2013

Applied Physics : Paper - V

(Crystallography & Material Science) (New Course)

Time : Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. SC. (SEM. 4)

Name of the Subject :

☛ APPLIED PHYSICS : PAPER - 5 (NEW)

☛ Subject Code No. : 3 1 6 0 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Question one is compulsory.

(3) Figures to the right indicate the total marks carried by the question.

(4) Symbols used in the question paper have their usual meanings.

(5) Students can use non-programmable scientific calculator.

1 Answer the following in brief : (any eight) **8**

(i) What is meant by crystallography ?

(ii) Define the terms Unit cell, Primitive cell and Lattice parameters.

(iii) What are crystal planes ?

(iv) What are Bravais lattices ?

(v) What is drift velocity ?

(vi) What are magnetic materials ?

(vii) Write the uses of Hall effect.

(viii) Define the term electrical conductivity.

(ix) What is dielectric loss ?

(x) Write the name - types of SMAs.

2 (a) Explain a simple cubic unit cell and hence find the packing density of a simple cubic unit cell. **10**

(b) Calculate the interplanar spacing for (1 0 1) and (2 2 1) planes in a simple cubic lattice whose lattice constant is 0.42 nm. **4**

OR

2 (a) Explain a FCC unit cell and hence find the packing density of a FCC unit cell. **10**

(b) Sketch the following crystallographic planes for the cubic system (0 $\bar{1}$ 0), ($\bar{1}$ 0 0), (0 0 $\bar{1}$) and (2 1 1). **4**

3 (a) Describe with neat sketch the following unit cells. **10**
(i) NaCl
(ii) Graphite.

(b) For a simple cubic lattice, lattice parameter is 2.04 $\mathring{A}$, calculate the spacing of the lattice plane (2 1 2). **4**

OR

3 (a) What is meant by allotrophy ? Describe the allotrophy of carbon. **10**

(b) The interplanar distance between the planes ($\bar{1}$ 1 1) in A1 (FCC structure) is 0.2388 nm. What is the lattice constant ? **4**

4 Write short notes on : (any **two**) **14**
(i) Frequency dependence of polarization
(ii) Application of SMAs
(iii) Ferromagnetic materials
(iv) Isotropy and Non-isotropy.
