



AC-3060

B. Sc. (Sem. IV) Examination

April / May - 2015

Applied Physics : Paper - V

(Crystallography & Material Science)

Time : Hours]

[Total Marks : 50

Instructions :

(1)

नीचे दर्शायेव निशानीवाणी विगतो उत्तरवडी पर अवश्य कपनी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
B. SC. (SEM. IV)	<input type="text"/>
Name of the Subject :	<input type="text"/>
APPLIED PHYSICS : PAPER - V	<input type="text"/>
Subject Code No. : <input type="text"/> 3 <input type="text"/> 0 <input type="text"/> 6 <input type="text"/> 0	<input type="text"/>
Section No. (1, 2,.....): Nil	
Student's Signature	

- (2) Draw neat and clean diagram wherever necessary.
- (3) Symbols used in the paper have their usual meaning.
- (4) Figures to right indicate full mark.
- (5) Constants :

Rest mass of electron $m_e = 9.1 \times 10^{-31}$ kg

Charge of electron $e = 1.6 \times 10^{-19}$ C

Speed of light $C = 3 \times 10^8$ m/s

Planck's constant $h = 6.062 \times 10^{-34}$ Js.

1. Answer the following questions in short. Each question carries **one** marks. (08)

- (1) Define lattice and basis in crystal structure.
- (2) How does the Fermi level vary with temperature in intrinsic.
- (3) Give examples of pentavalent impurity.
- (4) What are acceptor levels.
- (5) What do you mean by energy band gap ?
- (6) Give an expression for Hall coefficient.
- (7) Give the difference between crystal and glassy form
- (8) Define antiferromagnetic material and give its example.

2. (a) Explain SC and HCP structure and find its packing density, And show which structure is more strong. (10)

OR

2. (a) Explain Crystal planes and Miller indices with examples. (10)
2. (b) What is Polymorphism and allotropy. (04)
- OR
2. (b) Calculate the conductivity of pure silicon at room temperature when the concentration of the carrier is 1.6×10^{10} per cm^{-3} (electron mobility is $1500 \text{ cm}^2 / \text{Volt-sec}$, and hole mobility $500 \text{ cm}^2 / \text{Volt-sec}$ at room temperature). (4)
3. (a) Explain frequency dependence and temperature dependence polarization. (10)
- OR
3. (a) Explain the various class of magnetic materials. (10)
3. (b) Calculate the interplaner spacing for (111) plane in simple cubic lattice where lattice constant is $4.2 \times 10^{-10} \text{ m}$ density. (04)
- OR
3. (b) A silicon wafer is doped with 10^{21} phosphorus atoms/ m^3 , Calculate (a) the majority carrier concentration, (b) and the minority carrier concentration. (ionisation of the dopant atom = $1.5 \times 10^{16} \text{ m}^{-3}$) (04)
4. Write short note : (Any two) (14)
- (1) Synthesis and properties of Ni-Ti alloys .
 - (2) FCC crystal structure.
 - (3) Application of dielectric materials.
 - (4) Metallic Glasses.
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