

## UNIT – IV

8. (a) What are paramagnetic materials ? Discuss Langevin's theory for paramagnetism in detail. 15
- (b) The magnetic field strength in silicon is 1500 amp/m. If the magnetic susceptibility is  $-0.6 \times 10^{-5}$ . Calculate its magnetization. 5
9. (a) Describe the Weiss molecular theory of ferromagnetism and derive the Curie-Weiss law. 15
- (b) A paramagnetic salt contains  $10^{29}$  ions/m<sup>3</sup> with magnetic moment of one Bohr magneton. Calculate the paramagnetic susceptibility and the magnetization produced in a magnetic field of  $4 \times 10^6$  amp/m when the temperature is 27°C. 5

Roll No. ....

**24019**

**B. Tech. 2nd Semester  
(Common for All Branches)  
Examination – May, 2017**

**PHYSICS - II**

**Paper : Phy-102-F**

***Time : Three Hours ] [ Maximum Marks : 100***

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting at least *one* question from each Unit. Question No. 1 is *compulsory*.

1. (a) Define space lattice, primitive and non-primitive cells and coordination number. 4
- (b) Define Fermi energy and thermionic work function. 4

- (c) Define Schottky and Frenkel defects. 4
- (d) Define atomic magnetic moment. Also give its value. 4
- (e) Define the term wave function, eigen value and eigen function. 4

**UNIT - I**

- 2. (a) What do you understand by Bravais lattices ? Explain different types of Bravais lattice in *two* and three dimensions. 9
- (b) Explain X-ray diffraction and derive an expression for Bragg's law. 6
- (c) Derive formula for distance between two adjacent planes in a body centered lattice. 5
- 3. (a) Differentiate between group velocity and phase velocity. 10
- (b) Prove that (i) group velocity is less than phase velocity in a dispersive medium and (ii) for a non relativistic free particle, the phase velocity is 50% of the group velocity. 10

**UNIT - II**

- 4. Discuss important features of nanosystems. What are quantum dots and discuss their important applications. Also discuss quantum size effect. 20
- 5. What is free electron theory of metals ? Derive the expression for conductivity of metals on the basis of Drude-Lorentz theory. 20

**UNIT - III**

- 6. (a) Discuss the origin of energy bands in solids. How can you distinguish between metals, semiconductors and insulators on the basis of energy bands. 10
- (b) Explain E-K diagram and Brillouin zones. 10
- 7. Define photoconductivity. What are traps ? Discuss a simple model to show the effect of traps on the photoconductivity. Also discuss the factors which effect photoconductivity. 20