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 -0.6×10^{-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^3 with magnetic moment of one Bohr magneton. Calculate the paramagnetic susceptibility and the magnetization produced in a magnetic field of 4×10^6 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