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B.E. / B. Tech (Full Time) DEGREE EXAMINATION, APRIL/ MAY2014.

MATERIALS SCIENCE ENGINEERING BRANCH

THIRD SEMESTER

ML 8302 SOLID STATE PHYSICS
(Regulation 2012)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A – (10 x 2 = 20 Marks)

1. Explain the uncertainty principle?
2. What is the physical significance of wave function?
3. What is Fermi energy?
4. What is hall effect?
5. What are the applications of dielectric materials?
6. What is ferroelectric materials?
7. What are magnetic dipoles?
8. What is nuclear magnetic resonance?
9. What is Meissner effect?
10. What is Josephson effect?

PART B – (5 x 16 = 80 Marks)

11. Derive the time independent Schrödinger wave equation.
12. (a) Explain in detail the Kronig-Penny model for the behavior of the electrons in periodic potentials.

OR

- (b) Discuss in detail how the band theory of solids leads to the classification of solids with conductors, semiconductors and insulators.

13. (a) What is meant by local field in a dielectric? Deduce the Clausius-Mosotti relation.

OR

(b) Give the theory of Ferroelectrics and mention the various applications of ferroelectrics.

14. (a) Explain in detail the Domain theory in the development of soft and hard magnetic materials.

OR

(b) Discuss in detail the dia, para, ferro and ferromagnetic materials. Mention their properties and applications.

15. (a) Discuss in detail about the type I and type II superconductivity. What are the applications?

OR

(b) Explain in detail the BCS theory of superconductivity.