B.E. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

MECHANICAL ENGINEERING BRANCH

FOURTH SEMESTER

ML 9255 – SOLID STATE PHYSICS

(REGULATIONS 2008)

Time : 3 hr Max Mark : 100

Answer ALL Questions

Part – A (10 × 2 = 20 Mark)

1. What are matter waves?
2. What is Heisenberg's uncertainity principle?.
3. Write the expression for Fermi distribution function F(E) and Plot the Fermi distribution function F(E) as a function of E for temperatures T1, T2 and T3. Here T1 = 0 K and T3 > T2 > T1.
4. What is effective mass?.
5. Name the different types of polarization processes.
6. What is Claussius – Mosotti relation?
7. What are domains?
8. What is Bhor magneton?.
9. What is coherence length?
10. What is Meissner effect?

(P.T.O)

Part – B (5 × 16 = 80 Mark)

11 Derive Schrodinger's time dependent and independent equations. **(16 marks)**

12 a) Derive the expression for density of states **(16 marks)**

(OR)

b) i) Explain Bloch theorem **(6 marks)**

ii) Explain Hall effect? **(10 marks)**

13. a) Derive clausius – Mosotti relationship **(16 marks)**

(OR)

b) Derive the expression for electronic, ionic and orientational polarizability of moleculaes. **(16 marks)**

14. a) Explain classical theory of Diamagnetism **(16 marks)**

(OR)

b) Explain the theory of Nuclear Magnetic Resonance. **(16 marks)**

15. a) i) Explain BCS theory **(12 marks)**

ii) Explain Josephson effect **(4 marks)**

(OR)

b) Briefly write about the following

i) Specific heat of Superconductors **(4 marks)**

ii) Gaiver tunneling **(4 marks)**

ii) Energy gap **(4 marks)**

iii) Write London's equations **(4 marks)**