Exam.Code:1031
Sub. Code: 7861

1129

M. Tech. (Material Science and Technology)
Third Semester
MST-301: Magnetism and Super Conductivity

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt any five of the following:-

a) Why do all metals behave as superconductors?

b) What are ferrites? How are they superior to magnetic metals?

c) Which type of materials exhibits high spin polarization? Why?

d) At what temperature superconducting energy gap vanishes and Why?

e) Do Meissner effect contradict Maxwell equation? Explain.

f) What do you mean by fluxoid quantization? (5x2)

UNIT – I

II. Give an account of quantum of quantum theory of paramagnetism and derive an expression for susceptibility. (10)

III. a) What is double exchange interaction and how it is useful in Colossal magnetoresistance?

b) What is magnetostriction? Discuss its applications. (6,4)

IV. a) With suitable schematics explain magnetic reading and writing processes.

b) What is superparamagnetism? Explain its applications. (5,5)

UNIT – II

V. a) Show that superconductors exhibit perfect diamagnetism.

b) Derive Rutgers formula for specific heat of a superconductor. Discuss its significance.

c) The critical temperature T_c for mercury with isotopic mass 199.5 is 4.185 K. Calculate its Tc when its isotopic mass changes to 203.4. (3,4,3)

P.T.O.

rief outline of BCS theory of superconductivity. Show that this theory provides ıle explanation of superconducting state. Define BSC ground state and nce length. (10)

the following terms in superconductors:

rtex states

x pinning

ıx creep

ızburg Landau parameter (10)

x-x-x