

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2019 – 2020 and thereafter)
SUBJECT CODE : 19PH/PC/SS34

M.Sc., DEGREE EXAMINATION NOVEMBER 2022

PHYSICS

THIRD SEMESTER

COURSE : CORE

PAPER : SOLID STATE PHYSICS

TIME : 3 HOURS

MAX. MARKS : 100

SECTION - A

ANSWER ALL QUESTIONS:

(10x3=30)

1. Define Bloch functions.
2. Intrinsic semiconductor behave like an insulator at absolute zero? Justify.
3. Define the term: Dielectric constant and dielectric loss.
4. Explain the concept of depolarization field.
5. What is meant by “Zero Splitting”?
6. Define magnetic susceptibility and relate it to the permeability.
7. Explain the hysteresis.
8. What are domains? How are they useful?
9. What are type I and type II superconductors.
10. Mention any two High T_c materials and their advantage.

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5x5=25)

11. Write short notes on free electron theory of metals.
12. Establish the Clausius-Mossotti equation for a dielectric.
13. Write a note on adiabatic demagnetization.
14. Briefly explain the quantum theory of paramagnetism.
15. Discuss the domain theory of ferromagnetism.
16. Derive an expression for London’s penetration depth.
17. Explain Bloch wall energy with suitable diagram.

SECTION – C

ANSWER ANY THREE QUESTIONS:

(3x15=45)

18. Discuss Kronig-Penney model of movement of electron in a periodic field of a crystal.
19. Derive an expression for the local field in a dielectric.
20. Discuss the origin of diamagnetism in free atom. Obtain Langevin’s diamagnetism equation for the diamagnetic susceptibility.
21. Give the classification of ferroelectric materials and explain the theory of the ferroelectric displacive transitions.
22. Explain with necessary theory
(a) AC Josephson effect (b) DC Josephson effect.
