

CODE: 196203
NOVEMBER 2020

TIME: 3Hrs
MAX. MARKS : 50
(10 x 2=20)

PART A

Answer any **TEN** questions

1. What are phonons?
2. What is brillouin zone?
3. State Weidman franz law
4. What is known as free electron gas in three dimensional box?
5. Draw the magnetization versus magnetic field plots for type -I and type -II super conductor
6. What is a Neel temperature?
7. Write down the necessary conditions for a molecules to absorb IR
8. Define Fermi Resonance
9. Differentiate between NMR and NQR
10. Give the resonance condition foe ESR
11. Define lattice heat capacity
12. What is hydrogen bonding?

PART B

Answer any **TWO** questions

(2 x 5=10)

13. Explain the debye model of lattice heat capacity
14. Describe how hall effect is experimentally proved
15. Derive first and second London equations
16. Explain the number of fundamental vibrations and their symmetry under IR spectroscopy
17. Explain the formation of hyperfine structure ESR
18. Write a short note on block theorem
19. Write an explanatory note on chemical shift applicable to NMR
20. Explain chemical isomer shift

PART C

Answer any **TWO** questions

(2x10=20)

21. (a). Explain inelastic scattering of neutrons by phonons
(b). The dispersion relation of diatomic chain is given by $m_1 m_2 \omega^4 - 2c(m_1 + m_2) \omega^2 + 2c^2(1-2\cos ka)=0$, for $ka \ll 1$. Find the frequencies of the optic acoustic modes.
22. Explain kronig penny model to explain band theory of solids.
23. Describe the BCS theory of super conductor. Write short note on high temperature super conductors
24. Explain experimental aspects of IR spectroscopy
25. With necessary block diagram and explain the principle and working of a ESR spectrograph
