

Prof. Ravs Kerdan

6/12/2022

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Department of Materials Science and Engineering

Final Examination, November-December, 2022

B.Tech VII Semester

MSD-451 Advanced Functional Oxide Materials

Time: 3 hour

Total Marks:50

Note: All the questions are compulsory.

1. Explain the two fundamental length scales in superconductors: London penetration depth and Coherence lengths. On the basis of these length scales how we categorized type-I and type-II superconductors. (5)
2. What is the difference between Normal Tunneling and Josephson Tunneling. (5)
3. Write Note on:
 - (a) Superconducting Quantum Interference Devices (SQUID)
 - (b) Flux Quantization (3x2)
4. Explain the term polarization in dielectrics and explain various types of the polarizations in dielectrics. (5)
5. Explain the polarization catastrophe in ferroelectric displacive transition. (5)
6. Describe the Langevin Theory of diamagnetism and paramagnetism. (5)
7. Write the 3 Hund's rules to calculate the total spin (S), total Orbital (L) and total angular momentum (J) of cations. (4)
8. Explain the double exchange mechanism in Colossal Magneto Resistance materials. (5)
9. Write down the applications of spintronic Materials. (5)
10. What do you mean by transparent conducting oxide materials and write their applications. (5)