

Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (Physics) (2018 Batch) (Sem.-4)
SUPERCONDUCTIVITY & LOW TEMPERATURE PHYSICS

Subject Code : MSPH-543-18

M.Code : 77849

Date of Examination : 11-07-22

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying FIVE marks each and students have to attempt any SIX questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Write about Superconductivity.
- b) What do you mean by 'cooper pair'?
- c) What do you know by tunneling phenomena?
- d) What do you mean by sputtering technique?
- e) What is thickness range for the film to be considered as thin film?
- f) What is 'Throttling process'?
- g) Explain 'Dilution refrigeration'.
- h) What is temperature of inversion for helium?
- i) Discuss the crystal structure of YBCO.
- j) Discuss few applications of high-Tc superconductors in electronics.

SECTION - B

2. Discuss BCS theory of superconductivity.
3. Distinguish between type I and type II superconductors with examples.
4. Explain the principle and working of optical image furnace for single crystal growth.
5. Discuss the pulsed laser deposition technique for the growth of thin films.
6. What is adiabatic demagnetization? How will you employ the phenomenon to produce very low temperature?
7. Discuss the mechanism of superconductivity in high-T_c superconductors.
8. Explain the method for synthesis of high temperature superconducting YBCO.

SECTION - C

9.
 - a) Derive the London equations for superconductivity
 - b) Distinguish between Josephson Effect and SIS tunneling.
10. Describe the principle and working of Scanning Tunneling Microscope with neat diagram. How it is useful for thin film characterization?
11. Describe the porous plug experiment of Joule and Thomson. State and discuss, briefly the results obtained with different gases making special reference to hydrogen.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.