Name:

Enrolment No:

UPES

End Semester Examination, May 2023

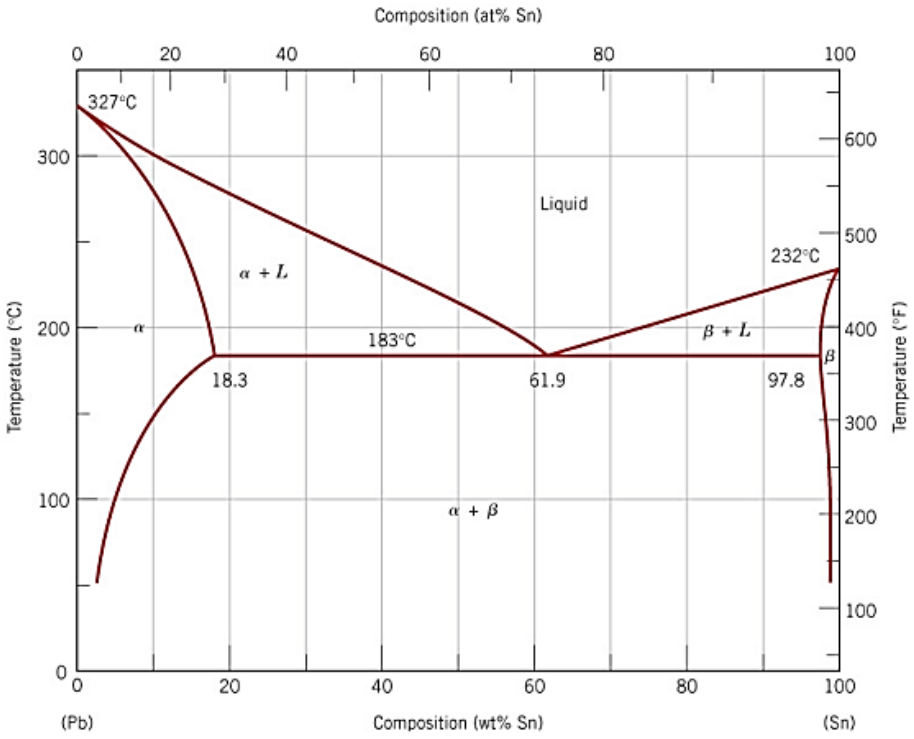
Course: Physics of Materials **Semester: IV**

Program: B.Tech AMNT **Time : 03 hrs.**

Course Code: MEMA 2006 **Max. Marks: 100**

Instructions: 1) Attempt all questions.
2) Attempt all questions of one section in one place.
3) Read the questions carefully

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Discuss Physical Vapor Deposition method for thin film preparation.	**4**	**CO1**
Q 2	 For above phase diagram of Pb-Sn system, calculate the amount of each phase present in 1 kg of 50%-Pb and 50%-Sn at 100°C and 300°C.	**4**	**CO1**
Q 3	Define and explain the relationship between electrical conductivity (σ) and electron concentration (n).	**4**	**CO2**

Q 4	How can sol-gel method be used for nanoparticle synthesis, use a chemical reaction to support your answer.	**4**	**CO1**
Q 5	Discuss isotope effect in superconductors	**4**	**CO2**
SECTION B (4Qx10M= 40 Marks)			
Q 6	Discuss the role of Pauli's exclusion principle when discussing Sommerfeld's quantum theory.	**10**	**CO2**
Q 7	What is the Hall effect? Derive the relation for Hall coefficient. Mention how this effect can be used in studying semiconductors. Or Discuss the working of a Light Emitting Diode using diagrams. Provide example of a Red, Green, and Blue LED material.	**10**	**CO3**
Q 8	a) Electron and hole mobilities in a Si sample are 0.135 and 0.048 m^2/V-s, respectively. Determine the conductivity of intrinsic Si at 300 K if the intrinsic carrier concentration is 1.5×10^{16} atoms/m^3. The sample is then doped with 10^{23} phosphorous atoms/m^3. b) Discuss the current and voltage graph for a junction diode.	**5 + 5**	**CO3**
Q 9	What are ceramics? Mention their types and provide two examples.	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
Q 10	Schematically present hysteresis loop for Ferroelectric materials. Explain the process by including diagrams showing changes observed in the arrangement of polarity at the different stages.	**10**	**CO4**
Q 11	A) Discuss Hydroxyapatite as biomaterial, also mention its application. B) Differentiate between soft and hard magnets. C) Schematically discuss dielectric loss. D) What do you understand by dielectric breakdown, mention types of dielectric breakdown. Or A) Differentiate between dielectric and insulating materials. B) Define Magnetoresistance materials. Give two examples. C) Give two examples of bio-sensors used in our day-to-day life. D) Discuss ballistic transport in graphene.	**5 + 5 + 5 + 5** **Or** **5 + 5 + 5 + 5**	**CO4**