Name: **Enrolment No:**	

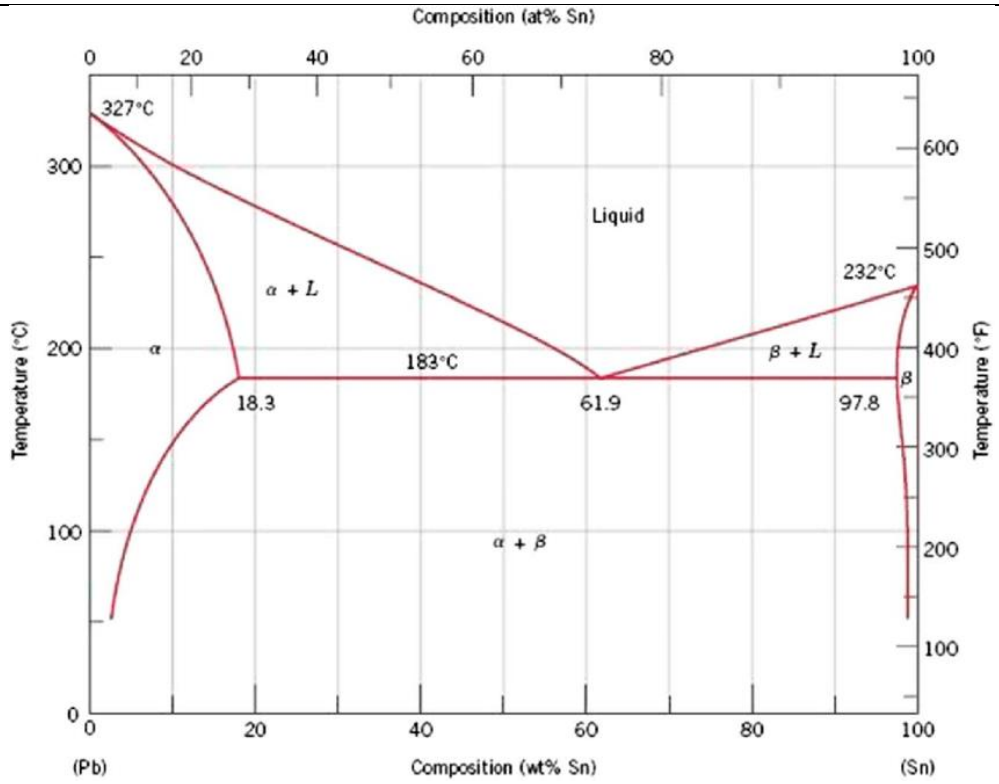
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Programme Name : B. Tech (ADE) Semester : III
Course Name: Automotive Materials and Manufacturing Processes Time : 03 hrs.
Course Code : MECH 2039 Max. Marks : 100
Nos. of page(s) : 2

Instructions: Attempt all questions. One question from section B and C have an internal Choice. Assume any missing data if required.

SECTION A

S. No.		Marks	CO
Q1	Define phase and phase diagram.	4	**CO1**
Q2	Give an example of natural and man-made composite materials and mentioned their matrix and reinforcement phase.	4	**CO1**
Q3	Draw the scheme of a eutectoid phase diagram	4	**CO2**
Q4	List out the common machining processes done conventionally.	4	**CO3**
Q5	Classify composite material based on matrix phase.	4	**CO4**
	SECTION B		
Q6	(a) Define homogeneous and heterogeneous nucleation. (b) Write the coordination number for BCC, FCC, and HCP unit cell. (c) Define heat treatment process and mentioned its purposes.	3 3 4	**CO1**
Q7	Explain the mechanism of chip formation in conventional machining of ductile materials.	10	**CO2**
Q8	Develop microstructure evolution for a Cu-Ni all alloy at 60% Ni.	10	**CO3**
Q9	**A.** Describe longitudinal elastic modulus of fiber reinforced composites. Or **B.** (a) Explain the harmful effects of Built-up-Edge formation during machining. (b) Summarize the condition for the various types of chip formation during conventional machining.	10 5 5	**CO2**
	SECTION-C		
Q10	**A.** Analyze the Pb-Sn Phase diagram and answer the following questions: (i) Write the solubility limit and temperature of eutectic composition. (ii) Write the invariant reaction with phase composition. (iii) Sketch and explain the microstructure evolution of 20% Pb-80% Sn alloy.	 2 2 10	**CO4**

	 **B.** Compare here the eutectic, hypo eutectic and hyper eutectic alloy composition.	6	
Q11	**A.** (i) Classify heat treatment process (ii) Describe full annealing, Recrystallization Annealing, Stress Relief Annealing, and Spheroidization Annealing. (iii) Discuss Cyaniding and nitriding processes. Or **B.** (i) Write a note on materials used in chassis and body components of the Vehicle. (ii) Explain metal matrix composites and identify their applications in automobile. (iii) Explain the utility of magnesium alloy in automotive sector.	6 8 6 6 8 6	**CO3**