

Roll No.

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B. Tech. (Sem. – 3rd)**AUTOMOTIVE MATERIALS AND METALLURGY****SUBJECT CODE : AE – 207****Paper ID : [A0705]**

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours**Maximum Marks : 60****Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A**Q1)****(2 × 10 = 20)**

- a) What is meant by the term, 'critical nuclei'?
- b) Enumerate a few crystal imperfection.
- c) What is meant by atomic packing factor of a crystal structure?
- d) Discuss the main properties of the phase austenite.
- e) What is the difference in the properties of strength and hardness?
- f) What properties are required in a material to be used as a die steel?
- g) What is the purpose of hard facing?
- h) Describe the purpose of anodizing.
- i) Discuss the applications of polymers in automotive applications.
- j) What type of material is selected for radiators?

Section - B**(4 × 5 = 20)**

- Q2)** With the help of neat and labeled diagram, explain the phenomenon of twinning.
- Q3)** What are Type III binary alloy systems? Why are they referred to as eutectic systems. Draw a neat and labeled diagram (phase diagram) for any type III alloy system.
- Q4)** Discuss the role of alloying elements present in stainless steels.
- Q5)** Discuss the procedural steps involved in induction hardening of medium carbon steels.
- Q6)** How is selection of materials done under conditions of cryogenic wear and corrosion.

Section - C**(2 × 10 = 20)**

- Q7)** Draw a neat and labeled Iron-Iron carbide equilibrium diagram. Mark all the critical temperature lines on this diagram. Discuss the properties of phases ferrite and cementite.
- Q8)** What is the need of normalizing heat treatment. Discuss the procedure of this treatment for low carbon steels. How is this process different from full annealing.
- Q9)** Discuss the criteria for selecting materials for the following automotive components:
 - (a) Cylinder Head.
 - (b) Bearings.