

Roll No. 

Total No. of Pages : 2

Total No. of Questions : 09

B.Tech.(AE) (Sem.-3)

**AUTOMOTIVE MATERIALS AND METALLURGY**

Subject Code : AE-207

Paper ID : [A0705]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

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

**SECTION-A****I. Write briefly :**

- a) Explain the term crystal imperfections.
- b) What are Miller Indices? Explain with the help of an example.
- c) How phase diagrams are classified?
- d) Name any two commercial alloys of copper.
- e) What are the main objectives of heat treatment ?
- f) Why aluminium is highly corrosion resistant in many environments?
- g) What is the significance of surface coating for automotive components?
- h) What are different types of surface hardening techniques used for automotive components?
- i) What are the most important factors affecting selection of materials for cylinder block of an automobile?
- j) What is the specific use of polymer materials in automobiles?

### SECTION-B

2. What is plastic deformation of metals? Explain the process of plastic deformation of metals by twinning.
3. Plot and explain an equilibrium diagram for alloys having unlimited mutual solubility of components A and B in the solid state.
4. What are the common alloying elements used for stainless steel and explain their effect on the properties of stainless steel?
5. Why is normalising done? Explain the process of normalising for automotive components.
6. a) What type of materials are used for piston and piston ring?  
b) Enumerate the main applications of ceramic materials in automobile.

### SECTION-C

7. Explain the process of recovery, recrystallisation and grain growth with respect to plastic deformation of metals.
8. Construct a neat Iron-Carbon equilibrium diagram and explain its interpretation with the help of suitable examples.
9. Write notes on the following
  - a) Thermal spray coating.
  - b) Hard facing.