

Roll No. ....

Total No. of Pages : 02

Total No. of Questions : 09

**B. Tech. (AE) (Sem.-3)**  
**AUTOMOTIVE MATERIALS & METALLURGY**  
**Subject Code : AE-207**  
**Paper ID : [A0705]**

Time : 3 Hrs.

Max. 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**

**(10 × 2 = 20 Marks)**

1. (a) Define what is crystallization process ?  
(b) Discuss what are dislocations present in the structure of an alloy system .  
(c) Discuss the significance of phase rule.  
(d) Why are entectic systems referred so ?  
(e) Discuss the role of chromium in steels.  
(f) List the characteristic properties required in die steels.  
(g) What are the advantages of isothermal annealing process over full annealing ?  
(h) For what purpose hot dipping process is used ?  
(i) What is meant by cryogenic wear ?  
(j) List two applications of ceramics in automotive parts.

**SECTION-B**

**(4 × 5 = 20 Marks)**

2. Bring out the main points of difference between the phenomenon of slip and twinning.

3. Draw a neat and labeled iron-cementite equilibrium diagram. Discuss the significance of each critical temperature line on this diagram.
4. What are stainless steels ? Why do they get their name ? Discuss the role of nickel as an alloying element in these steels.
5. What are the various objectives for which normalizing treatment is given to steels ? Discuss the procedural steps of providing this treatment to hypoeutectoid steels.
6. Which materials are generally used for the construction of
  - (i) Cylinder Block
  - (ii) Piston RingsAlso justify your answer.

**SECTION-C****(2 × 10 = 20 Marks)**

7. Discuss the general form of peritectic and eutectoid reactions. Also show these reactions for iron-carbon systems. What is the difference between ledeburite and Pearlite ?
8. Taking example of a gear, explain the need of surface hardening of steels. What is the major difference in surface hardening given to low carbon steels and to medium carbon steels?
9. Enumerate the main points of difference between white cast iron and grey cast iron. Discuss their properties and specific applications.