

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 02

Paper ID [A0803]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 3rd/4th)

ENGINEERING MATERIALS & METALLURGY (ME - 205)

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) (10 × 2 = 20)

- a) What is polymorphism? Give one example.
- b) Differentiate between recovery and recrystallization.
- c) What influence does grain size have on the mechanical properties of metals?
- d) What do you understand by a slip system? Explain with the help of an example.
- e) Distinguish between engineering stress and true stress.
- f) What is the difference between thermal conductivity and specific heat?
- g) What is cementite?
- h) What effect does chromium have on the properties of tool steels?
- i) What are hyperentectic cast irons?
- j) Explain Gibbs Phase Rule.

Section - B

(4 × 5 = 20)

Q2) What are the important alloying elements in HSS tools? Discuss the effect of each alloying element on the properties of these tools.

- Q3) List down some important heat treatment defects. Discuss their causes and suggest suitable remedies.
- Q4) Differentiate between bainite and martensite. Explain the effect of these microstructures on the properties of steels.
- Q5) Draw the equilibrium diagram of a binary system whose components undergo allotropic change. Explain the various phases of this diagram.
- Q6) What is quenching? Name some methods of quenching and discuss their relative advantages and disadvantages.

Section - C

(2 × 10 = 20)

- Q7) (a) What is hardenability? Describe a suitable method for its measurement.
(b) List down the various surface hardening processes. Discuss one of them in detail with the help of a suitable diagram.
- Q8) Draw a neat sketch of Iron, carbon equilibrium diagram and label the various phase fields. Explain the three invariant transformations taking place in it.
- Q9) (a) Explain the elastic and plastic behaviour of materials. Describe the role of various crystal imperfections in plastic deformation.
(b) Differentiate between brittle and ductile fracture. What are the conditions that induce brittle fracture in an otherwise ductile material.