



B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV– DEC 2013

MECHANICAL ENGINEERING BRANCH

FOURTH SEMESTER - (REGULATION 2004/2008)

MN281/ME 282/ME 9252 – ENGINEERING MATERIALS AND METALLURGY

Time: 3 hr

Max. Mark: 100

PART- A (10X2 = 20 Marks)

1. Name two methods of construction of phase diagrams.
2. What is the principle of zone refining?
3. What are the differences between sintering and casting?
4. What is meant mean by pinning effect during recrystallization?
5. Mention the compositions of any two Super alloys.
6. Name a modifier and its role in production of spheroidal graphite iron.
7. What is glass transition temperature?
8. Why whiskers possess high strength?
9. What is the difference between anelastic and viscoelastic behaviour?
10. How ductile brittle transition temperature is determined?

PART- B (5 X16 = 80 Marks)

11. (a) (i) Draw Iron–Iron Carbide equilibrium diagram, name the various region, lines and the invariant reactions. (8)
 - (ii) Calculate the percentage of pro-ferrite, pearlite, ferrite and cementite below eutectoid temperature for steel with 0.6% C content. (8)
 12. (a) (i) Compare pearlitic and martensitic transformation. (8)
 - (ii) Brief on the age hardening of Al-4.5%Cu alloy. (8)
- (OR)**
- (b)(i) Brief on Jominy end quench test and interpretation of results. (8)
 - (ii) Brief on the types of carburizing and need for post-carburizing heat treatments. (8)
13. (a) (i) List the effect of alloying Si and Cr on properties and structure of steel. (4)
 - (ii) Classify stainless steels, and list their composition, properties and applications. (12)
- (OR)**
- (b) (i) Brief on Tool steel, their types and typical heat treatment cycle. (10)
 - (ii) List the typical applications of Bronze, Ti-6Al-4V and Magnesium alloy. (6)

14. (a). List the properties and applications of the following materials.

- (i) Nanomaterials (4)
- (ii) PMMA (4)
- (iii) HDPE (4)
- (iv) Silicon Carbide (4)

(OR)

(b) (i) Tabulate the properties and application of different types of composites with suitable example.

15. (a) (i) Brief on the mechanism of creep. (8)

(ii) Draw a typical S-N curve and brief on the influence of any TWO design parameter and metallurgical properties. (8)

(OR)

(b) Brief on any FOUR type of strengthening mechanisms.