



B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2009)

Fourth Semester

MECHANICAL ENGINEERING

MEC108: Engineering Materials and Metallurgy

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Carbon in iron is an example of
 - a) Substitutional solution
 - b) Interstitial solid solution
 - c) Intermetallic compounds
 - d) Solid solution
2. Mild steel belongs to the following category
 - a) Low carbon steel
 - b) Medium carbon steel
 - c) High carbon steel
 - d) Alloy steel
3. Austempering is the heat treatment process used to obtain greater
 - a) Hardness
 - b) toughness
 - c) softness
 - d) brittleness
4. Induction hardening is the process of
 - a) Hardening surface of workpiece to obtain hard and wear resistance surface
 - b) Heating and cooling rapidly
 - c) Increasing hardness throughout
 - d) Hardening core
5. Brass contains
 - a) 70% copper and 30% zinc
 - b) 90% copper and 10% zinc
 - c) 70% -75% copper and rest tin
 - d) 70% copper and 30% tin
6. Stainless steel contains
 - a) Chromium, iron and nickel
 - b) Chromium and nickel
 - c) Iron and carbon
 - d) Chromium, nickel, Iron and carbon
7. Visco elastic behavior is common in
 - a) rubber
 - b) plastics
 - c) Crystalline materials
 - d) Non crystalline organic polymers

8. Many elements exist in alternate crystalline forms depending upon the external conditions of temperature and pressure. This phenomenon is known as
- a) Polymorphism
 - b) Allotropy
 - c) Chain structure
 - d) Sheet structure
9. Expand CVD
- a) Compact vinyl deposition
 - b) Chemical vapour deposition
 - c) Closed vanadium deposition
 - d) Ceramic vapour deposition
10. Electroplating consist of
- a) Cathode and anode
 - b) Sacrificial anode and cathode
 - c) Anode and coated cathode
 - d) Sacrificial anode and sacrificial cathode

PART B (10 x 2 = 20 Marks)

- 11. What is meant by solid solution?
- 12. Draw a cooling curves for pure metal and binary solid solution.
- 13. List the purpose of the heat treatment process
- 14. What is meant by stress relieving?
- 15. Write the applications of cast iron.
- 16. What is invar? Write the applications of invar.
- 17. Distinguish between thermoplastic and thermo setting plastic
- 18. List the types of silicate structures.
- 19. What is meant by plasma spraying?
- 20. What is the use of surface treatment?

PART C (5 x 14 = 70 Marks)

21. a) Discuss the Hume –Rothery rules for the solid solubility of one element in another.

(OR)

- b) Draw the iron –iron carbide equilibrium diagram neatly and label all regions. Explain the phase reactions that takes place in the system

22. a) Explain how Jominy end quench test is used for determining the hardenability of steels.

(OR)

- b) Write short notes on (a) Flame hardening (b) induction hardening

23. a) (i) Discuss in detail the properties and application of maraging steels (10)
(ii) List the purpose of alloying. (4)

(OR)

- b) Explain the steps involved in precipitation hardening treatment.

24. a) Describe the structures, properties and applications of the following thermoset polymers (a) Phenol formaldehyde (b) Polyvinylchloride

(OR)

- b) Describe the structures, properties and applications of the following commodity thermoplastic polymers (a) Polyethylene (b) Urea formaldehyde

25. a) Discuss in detail about the diffusion coating.

(OR)

- b) Discuss about the various mechanical surface treatment methods in detail
