NOV/DEC 20008

2008 ANNA UNIVERSITY

B.E/B.TECH DEGREE EXAMINATION

MECHANICAL ENGINEERING

ENGINEERING MATERIALS AND METALLURGY

TIME: 3 HOUR

MARK: 100

Answer ALL questions.

PART A - [10 x 2 = 20 marks]

1. Define Peritectic and Eutectoid reaction.

2. What are various allotropic forms of iron?

3. What is the principle of surface hardening in induction hardening process?

4. Distinguish between grey cast iron and spheroidal cast irons in terms of microstructure.

5. Write the composition of stainless steel.

6. Name any four applications of Maraging steels.

7. Distinguish between polymer and ceramics
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8. Write the molecular structure of phenol formaldehyde.

9. Define endurance limit in fatigue test.

10. What are the proprieties are determined from tension testing machine of metallic products?

PART B - [5 x 16 = 80 marks]

11.(a) How are solid solutions classified? Give example for each.

(b) Draw the phase diagram between A and B, if the two metals completely soluble in solid and liquid state.

OR

12.(a) Draw the iron-carbon equilibrium diagram.

(b) Discuss the microstructure of 0.8% C steel at room temperature.

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

(b) Explain the annealing heat treatment process used for steel interms of temperature of heating, method of cooling and structural transformation.

OR

14. Define isothermal cooling. Draw and explain TTT diagram for steel.

15.(a) How will you classify the brasses based on the composition of zinc? Explain the properties and application of the main types of brasses.

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

OR

16. Discuss the influence of the following alloying element on properties of steel:

(a) Chromium

(b) Vanadium

(c) Tungsten

(d) Molybdenum

(e) Manganese

(f) Titanium.

17. Describe the molecular structure, properties and applications of the following polymers:

(a) Polyvinyl chloride (PVC)

(b) Polystyrene (PS)

(c) Polyethylene tetra phthalate (PET)

(d) Polycarbonate (PC).

OR

18.(a) Explain the strengthening mechanism of fibre-reinforced composites.

(b) List the advantages, limitations and applications of composite materials.

19.(a) Explain the mechanisms of plastic deformation on metals by slip and twinning.

(b) List the types of fractures and factors influencing them.

OR

20. Explain the procedures for preparing Charpy and Izod specimen for impact testing and also explain how testing is performed.