Register Number.....

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

MECHANICAL ENGINEERING

U07ME301: Engineering Materials and Metallurgy

Time: Three Hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 × 1 = 10 Marks)

1 Pearlite phase in steel is made up of

a) Alternate layers of ferrite and cementite

b) Alternate layers of ferrite and martensite

c) Alternate layers of martensite and cementite

d) Alternate layers of bainite and cementite

2 Copper – silver system is

a) isomorphous b) binary eutectoid

c) etectoid d) binary isomorphous

3 The alloying element in steel which increases toughness are

a) Ni and Cr b) Ni and Si c) Ni and Mo d) Ni and V

4 Carbon content required for flame hardening in steels varies

a)from 0.3% to 0.6% b) from 0.6% to 1.0%

c) 0.20% to 0.4% d) from 0.9% to 1.3%

5 Maraging steels are basically alloys of

a)iron and copper b) iron and nickel

b) iron and Cr d) iron and Mo

6 Beryllium coppers possess the tensile strength of as high as

a)1800 MPa b) 1100 MPa c) 900 MPa d) 1400 MPa

7 Examples for cross linked polymer is

a) Rubber b) PVC c) PE d) nylon

8 Melting and glass transition temperature of PET are

a) 97° C and 327 ° b) 69° C and 265 °

c) -18° C and 175 ° d) 60° C and 365 °

9 Thermal spraying can provide thick coatings and the approximate thickness range is (b)

a) 20 micrometers to several mm b) 200 micrometers to several mm

c) 2 micrometers to several mm d) 2 mm to 10 mm

23(a)

10 Ceramic materials are

a)Organic, non-metallic materials

b) inorganic, non-metallic materials (b)

c) inorganic, metallic materials

d) organic, metallic materials

24(a)

PART B (10 x 2 = 20 Marks)

11 State Gibbs phase rule.

12 Give the peritectic reaction (b)

13 What is CCC diagram?

14 What are the applications of flame hardening

15 What is cast alloy? 25(a)

16 State the composition of Cartridge brass

17 What are PMCs? (b)

18 What are the applications of CMCs?

19 What is surface treatment?

20 What is organic coating?

PART C (5 x 14 = 70 Marks)

21(a) i) What is interstitial solid solution? Briefly discuss (

ii) Explain Copper Nickel system with neat diagrams. (

(OR)

(b) Explain various reactions in iron – carbide equilibrium system with neat illustrations? What are their significances?

22(a) Draw and explain isothermal transformation diagram for an iron – carbon alloy of eutectoid composition.

(OR)

(b) (i) Describe austempering with suitable illustrations. (7)

(ii) Explain the process of induction hardening. What are its applications? (7)

23(a) How do you classify steels? Explain their properties and applications.

(OR)

(b) (i) What are various strengthening treatments used for non ferrous metals (4)

(ii) State the composition and mechanical properties of copper alloys (10)

24(a) What are different types of polymers? Explain their properties and applications.

(OR)

(b) (i) Discuss on the properties and applications of PEEK (7)

(ii) Describe the features of fiber and particulate reinforced composites (7)

25(a) Describe various methods of surface treatment with illustrations.

(OR)

(b) (i) Describe thermal spraying process. (7)

(ii) Explain ceramic coating. (7)

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