KUMARAGURU
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Register Number: ……..

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2013)

Third Semester

MECHANICAL ENGINEERING

U13MET302:Engineering Materials and Metallurgy

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The coordination number of a face centered cubic space lattice is
   a) Six b) Twelve
   c) Eighteen d) Twenty
2. The defect which takes place due to imperfect packing of atoms during crystallization is known as _____
3. In a unit cell of a body centered cubic space lattice, there are…….atoms
   a) 6 b) 9
   c) 14 d) 16
4. A solid phase results in a solid plus another solid phase, up on heating during _____ reaction.
5. The temperature and carbon content at which eutectoid reaction occurs in Fe C equilibrium diagram are
   a) 723°C and 0.02 %C b) 723°C and 0.08 %C
   c) 758°C and 0.02 %C d) 758°C and 0.08 %C
6. Relative amounts of phases in a region can be deduced using _____ rule.
7. Annealing is generally done to impart
   a) Toughness to the material b) Softness to the material
   c) Brittleness to the material d) Conductivity to the material
8. The property of a material by which it can be drawn into wires is known as _____

9. HSLA is also called as

a) Macro alloyed steel b) Micro alloyed steel

c) Hyper alloyed steel d) Hypo alloyed steel

10. Cyaniding diffuses _____ atoms onto the surface of the material

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. State the eutectic and peritectic reactions. Give equations
12. Differentiate between the substitutional and interstitial solid solutions with examples.
13. What are the significance of "TTT" Diagram?
14. Define flame and induction hardening.
15. Differentiate between the ferrous and non ferrous metals.
16. Give the importance of copper alloys.
17. Classify the steel alloys.
18. What are the required properties of a tool steel?
19. What is the use of impact testing?
20. Draw engineering stress strain curve**.**

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. a) Draw and explain a $FeFe_3C$ diagram and mark all the phases.

22. a) Describe the method of surface hardening of steel by nitriding. What is the hardness obtained in a nitride case? List the applications.

(OR)

b) (i) Give the process details of hardened and tempered steels. (7)

(ii) What are the advantages of hardened and tempered steels? (7)

23. a) (i) Discuss fatigue test for a metallic material. What is S-N diagram? (7)

(ii) Why destructive test is important to materials? Explain any one test (7)

(OR)

b) Explain the annealing and normalizing process with phase diagram.

24. a) Describe the molecular structure, properties and application of the following polymers.

(i) Polyvinyl chloride (PVC) (4)

(ii) Polystyrene (PS) (4)

(iii) Polyethylene terephthalate (PET) (3)

(iv) Poly carbonate (3)

(OR)

b) Write short notes on Al_2O_3, SiC, Si_3-N_4 properties and applications

25. a) Discuss the properties and applications of the following four ceramics.

(i) Silica (4)

(ii) Zirconia (4)

(iii) SiC (3)

(iv) Cubic boron nitride. (3)

(OR)

b) (i) Explain the mechanism of plastic deformation of metals by slip and twinning (7)

(ii) Explain the testing procedure for Fatigue test of any one material. (7)

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