Reg. No. _____

Karunya University

(Karunya Institute of Technology and Science)
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

MODEL QUESTION PAPER

Subject Title: MATERIAL SCIENCE & ENGINERRING **Time : 3 hours**
Subject Code: 09ME257 **Maximum Marks: 100**

Answer All the Questions

PART – A (10x1=10 MARKS)

1. Define space lattice.
2. What is the coordination number and atomic packing factor for HCP unit cell?
3. Name the crystal defect responsible for the phenomenon of slip, which most metals deform plastically.
4. Write any one-slip system of BCC crystal structure.
5. What are the three main stages of fatigue?
6. Write Griffith's equation
7. Write Gibb's phase rule
8. List the different phases exist in Fe-C equilibrium diagram
9. List the types of annealing
10. What are different surface hardening processes used for steel?

PART – B (5x3=15 MARKS)

11. What is polymorphism? Give examples
12. Differentiate between edge and screw dislocation
13. Differentiate between sip and twinning mechanism of plastic deformation
14. Draw the phase diagram of Sn-Pb.
15. What is the purpose of normalizing?

PART – C (5x15=75 MARKS)

16. a) Derive atomic radius and atomic packing factor for the simple cubic, face centered, body centered and hexagonally close packed structure,. (10)
    b) Discuss the various steps in identifying the miller indices for planes with an example (5)

(OR)

17. a) Draw a neat sketch and explain the working of a transmission electron microscope. (8)
    b) Describe briefly the procedure for specimen for metallographic examination. (7)

18. What is meant by a defective crystal? Explain the different point defects in crystals.

(OR)

19. a) Derive the expression for the critical resolved shear stress for the plastic deformation by slip (8)
    b) Explain the plastic deformation by slip and twinning. (7) .

20. a) Define brittle fracture. Explain Griffith theory for brittle fracture. (10)
    b) Differentiate between ductile and brittle fractures (5)

(OR)

21. a) What is creep? Draw a typical creep curve and explain the stages of creep. (8)
    b) Explain the various methods to improve the fatigue strength of the material. (7)

22. (a)Explain the factors governing substitutional solubility (10)
(b)Write about the Gibbs phase rule. (5)

(OR)

23. a) Draw the iron carbon equilibrium diagram and explain the different phases present in that. (8)

b) What is cooling curve and draw cooling curve for pure and alloy metal. (7)

24. What is annealing? What are its types? Explain any four of them in detail

(OR)

25. Explain the following in detail
    a) Nitriding
    b) Induction hardening
    c) Hardenability