Total No. of Questions : 12]

SEAT No. : ____

P4588

[Total No. of Pages : 4

[4957] - 112

S.E. (Mechanical / Mechanical S/W)

METALLURGY

(2008 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks :100***

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Draw the neat sketch whenever necessary.***

SECTION - I

Q1) a) Explain the recrystallization and Polygonisation. **[4]**

b) Explain phenomenon of strain hardening on the basis of theory of dislocation. **[4]**

c) Represent the following planes and directions in cubic system (Any Two) **[4]**

i) (111)

ii) (101)

iii) (221)

d) What is the role of dislocation in the plastic deformation of metal? **[4]**

OR

Q2) a) Differentiate between the following (Any one) **[4]**

i) Slip and Twinning

ii) hot and cold working.

b) Derive the equation for critical resolve shear stress during slip in a single crystal. **[4]**

c) How plastic deformation in polycrystalline material is different from single crystal. **[4]**

d) Why annealing is done after cold working? **[4]**

P.T.O.

Q3) a) What is creep curve? Explain the stages of creep **[4]**

b) Define the following : **[4]**

i) Toughness

ii) Malleability

iii) UTS

iv) Modulus of resilience.

c) Define fatigue. Explain the processes used to improve fatigue life. **[4]**

d) Rockwell Hardness Test with reference to load, indenter and application. **[4]**

OR

Q4) a) Differentiate between charpy and Izod impact tests. **[4]**

b) Why are impact test specimens notched? What is the effect of temperature on impact strength? **[4]**

c) Obtain the relationship between engineering stress, strain and true stress, strain. **[4]**

d) With a neat sketch explain the procedure for vickers hardness hardness test. **[4]**

Q5) a) Draw neatly labeled Fe-Fe_3C diagram and explain the three reactions associated with it. **[6]**

b) Draw and label microstructures of Mild steel, Medium steel and hypereutectoid steel. **[6]**

c) What is stainless steels ? Classification of stainless steels. **[6]**

OR

Q6) a) Differentiate between Nodular and malleable cast iron and give two applications of each type. Explain the manufacturing of one of them. **[6]**

b) What is critical temperature ? What do you understand by A_0, A_1, A_2, A_3 and A_{cm}? **[6]**

c) Classify the steels on the basis of : **[6]**

i) Carbon percentages.

ii) Degree of deoxidation.

iii) Depth of hardening.

SECTION - II

Q7) a) What are the advantages and limitations or disadvantages of nitriding over carburising? **[6]**

b) What are the Products of Austenite? **[6]**

c) What is Hardenability? How is it measured ? **[6]**

OR

Q8) a) What is the tempering of steels? Why are hardened steels tempered ? Explain the changes in properties that occur during tempering ? **[6]**

b) Differentiate between Carburising and Nitriding. **[6]**

c) What is hardenability? Explain any one method of envaluating it. Discuss the factors influencing hardenability. **[6]**

Q9) a) Explain the automization process of powder manufacturing with neat sketch. **[4]**

b) What is Sintering process? Explain in detail with continuous sintering furnace, used for large scale of production. **[4]**

c) List the powder production processes and explain any one of them. **[4]**

d) What are the properties required for the material to be bearing material. Write note on Babbitts alloys. **[4]**

OR

Q10)a) Define brass and types of brasses. Explain any one. **[4]**

b) Give composition, properties and application of the following metals **[4]**

i) Gun metal

ii) Muntz metal

c) What are the advantages and limitations of Powder Metallurgy Process. **[4]**

d) Write short note Refractory materials. **[4]**

Q11)a) Write short note on Shape Memory Alloys. **[4]**

b) Write short note on : Ferrites. **[4]**

c) Write short note on : Cryogenic materials. **[4]**

d) Explain with suitable example Nano materials. **[4]**

OR

Q12)a) Differentiate between fibre reinforced and particle reinforced composites. **[4]**

b) Write a note on dispersion strengthened composites and state the applications. **[4]**

c) Explain the effects of cryogenic temperature on mechanical properties of materials. **[4]**

d) Explain different types of biomaterials. **[4]**

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