BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - IV MECHANICAL :SUMMER- 2022
SUBJECT : SCIENCE OF ENGINEERING MATERIALS

Day : Monday
Date : 20-06-2022

S-24498-2022

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 **a)** With the help of neat sketch, explain that the plastic deformation also occurs by twin. **[05]**

b) Describe in brief recovery, recrystallization and grain growth stages in recrystallization process. **[05]**

OR

Q.1 **a)** Why fine grain structure shows more strength and hardness than coarse grain structure? **[05]**

b) Describe the role of grain boundary in strain hardening phenomena. **[05]**

Q.2 **a)** How fatigue test is carried out? Give the different methods to improve fatigue life of component. **[05]**

b) Comment on "Internal detect, size and shape can be analysis by ultrasonic test". **[05]**

OR

Q.2 Differentiate between: **[10]**

i) Charpy impact and Izod impact tests
ii) Magnetic flux test and radiography inspection

Q.3 Draw the equilibrium diagram from following data: **[10]**

M.P. of element 'A' is – 1010 °C
M.P. of element 'B' is – 780 °C
Solubility of element 'B' in element 'A' is 20% at 600 °C and decreases to 5% at room temperature.
Solubility of element 'A' in element 'B' is 14% at 600 °C and decreases to 2% at room temperature.
Eutectic mixture is form at 40% B, at temperature 600 °C.
Find out: **i)** Amount of alpha % at 25% B.
ii) Amount of E% at 65% B.
Also show step by step cooling of these alloy from high temperature to room temperature. Draw the microstructural phases.

OR

Q.3 **a)** With the suitable example, explain the use of lever rule and Gibb's phase rule in equilibrium diagram. **[05]**

b) What is mean by micro segregation? How it can be minimized? **[05]**

P.T.O.

Q.4 **a)** Explain the hardening heat treatment with its purposes. **[05]**

b) Describe suitable heat treatment for following purposes: **[05]**
i) Fine grain structure of pearlite and ferrite.
ii) Fully bainitic matrix.

OR

Q.4 **a)** What is meant by hardenability? On what factors does it depend? **[05]**

b) Explain any one surface hardening heat treatment. **[05]**

Q.5 **a)** How the gray cast iron is more desirable than white cast iron. Write its applications. **[05]**

b) Write the classification of tool steels. **[05]**

OR

Q.5 **a)** Give the chemical composition, properties and applications of: **[05]**
i) Martensitic stainless steel
ii) Austenitic stainless steel

b) What do you know about tool steels? **[05]**

Q.6 **a)** Write the advantages and limitations of powder metallurgy process. **[05]**

b) Explain the importance of particle size, shape on compacting and final strength of powder metallurgical component. **[05]**

OR

Q.6 **a)** Describe with neat sketch "Atomization Process". **[05]**

b) List out the advantages and limitations of liquid phase sintering. **[05]**

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