

B.E. Mechanical Engineering (CBCS Pattern) Third Semester
ME 305 - Engineering Metallurgy

P. Pages : 2

Time : Three Hours



GUG/W/18/11520

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Answer Que. 1 or Que. 2, Que. 3 or Que. 4, Que. 5 or Que. 6, Que. 7 or Que 8. Que. 9 or Que. 10.
 3. Due credit will be given to neatness.
 4. Assume suitable data wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What do you understand by 'Machinability'? What are the criterion that decides the machinability? How the machinability is calculated? What are the various ways to improve machinability? 8

b) What are the 'Miller Indices'? How they are calculated? 8

OR

2. a) Draw a neat diagram (Schematic) of optical microscope. Name various parts of it. Explain its working in brief. 8

b) Differentiate between microscopic & macroscopic examination. 8

3. a) Draw a neat diagram of 'Ingot structure'. What are the reasons for different grain size in different regions? 8

b) Write 'Hume-Rothery Rules' for the formation of substitutional solid solution. What happens when one or more Hume-Rothery rules are Violated? 8

OR

4. a) Draw a neat Fe – Fe₃C equilibrium diagram. Show all the details in it. 8

b) Write three invariant reactions in details that occur in Fe – Fe₃C equilibrium diagram. 8

5. a) Explain the classification of Plain carbon steel based on application. 8

b) What do you understand by 'Tempering'? Explain the process in detail. 8

OR

6. a) What is 'Critical cooling rate'? How it is calculated with the help of TTT curve? 8

b) Explain the recommended heat treatment cycle for maximizing case hardness with grain refinement. 8

7. a) What are the various property requirements of tool materials? Explain each of them. 8
- b) What do you understand by sensitization of stainless steel? What is the reason for sensitization? What are the remedies for sensitization? 8

OR

8. a) What are the property requirements of steam turbine blades? What could be the proposed alloy for preparation of steam turbine blades? What heat treatment is required? 8
- b) Write in detail about OHNS steel? 8
9. a) Describe white cast iron. Mention composition, production route, properties and applications. Draw microstructure of it. 8
- b) Explain in short, the various heat treatment processes for improvement of properties of cast iron. 8

OR

10. a) What are the various characteristics of Aluminum? Mention them. 8
- b) What do you understand by statuary bronze. Explain. 8
