

--	--	--	--	--	--	--	--

B.E. / B.Tech. (Full Time) EXAMINATIONS, APRIL / MAY 2013

MATERIALS SCIENCE AND ENGINEERING BRANCH

FIFTH SEMESTER – (REGULATIONS 2008)

ML 9304 – HEAT TREATMENT OF METALS AND ALLOYS

Time : 3 hrs

Max Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

16

1. What are the purposes of heat-treatment?
2. Why austenite to bainite transformation is referred to as intermediate transformation?
3. What is inherently fine-grained steel?
4. What is diffusion annealing?
5. Write down the principle of flame hardening process.
6. Draw the cooling curve for austempering process.
7. Write down any four important characteristics of quenchants.
8. What are the common types of defects observed in heat-treated steel?
9. What are the various types of electrical furnaces?
10. What do you mean by Malleabilisation?

Part – B (5 x 16 = 80 Marks)

11. a. (i) Explain the microstructural changes on cooling from a temperature of 1000°C to room temperature for a 0.4% carbon-steel. Draw the respective microstructures. (8)
(ii) What are the differences between pearlitic, bainitic and martensitic transformation mechanisms and the final microstructures? (8)
 12. a. (i) What are the various types of annealing processes? (2)
(ii) With the help of a suitable diagram show the temperature ranges of all the above processes for plain-carbon-steel. (4)
(iii) Write short note on 'structural changes during tempering'. (6)
(iv) Differentiate between normalizing and annealing. (4)
- (OR)
12. b. (i) Describe the Jominy end-quench method of determining hardenability with neat sketches. (12)

.....2

- (ii) What are the factors that affect the hardenability? (4)
13. a. (i) What is the basic principle of the carburizing process? (2)
(ii) What are the various carburizing processes? (2)
(iii) Discuss any three of the above processes. (12)
- (OR)
- 13.b. (i) What are the various ways by which the case depth can be measured in case hardening processes? (2)
(ii) Explain the Induction Hardening and Flame Hardening with neat sketches. (14)
14. a. With suitable diagram, discuss the basic principle and operation of the followings:
(i) Optical Pyrometer and (ii) Radiation Pyrometer
- (OR)
14. b. (i) What are the different Quenching media? Write down its characteristics. (8)
(ii) Explain the different stages of Quenching. (8)
15. a. Describe about the heat treatment processes carried out for the manufacture of Gray cast iron and Spheroidal Graphite iron.
- (OR)
15. b. Explain the following Heat Treatment procedure.
(i) Austempering of SG iron.
(ii) Heat treatment of High speed steels.
