17/05/19

B.E/B.Tech (Full-Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY2019

MATERIALS SCIENCE AND ENGINEERING BRANCH
REGULATION 2012

ML8502 HEAT TREATMENT OF METALS AND ALLOYS

Time: 3Hr Max.Mark:100

Answer ALL Questions

Part –A (10x2=20 Marks)

1. TTT diagram is a type of phase diagram- True or false: Justify your answer
2. Why steels undergo phase transformation during heating-cooling?
3. What is the heat treatment recommended for high carbon steel wire?
4. What is the annealing and normalizing temperature for hypereutectoid steel
5. State the disadvantages of cyaniding.
6. What is sooting?
7. State the advantages of vacuum heat treatment?
8. What are the types of furnaces used for tempering?
9. What is the heat treatment employed in Nickel alloys?
10. What are maraging steels?

Part – B (5x16 = 80 Marks)

11 (i) Explain the procedure to construct TTT diagram and also discuss the effect of different alloying addition on TTT diagram. (10)

(ii) Discuss the mechanism of bainite formation (6)

12a (i) Explain the microstructural changes in medium carbon steel when the quenching after .homogenization is done with polymer, oil and cryogenic medium (10)

(ii) Explain the microstructure formation mechanism in tempering. Discuss about the importance of the Hollomon and Jaffe parameter (6)

OR

12b (i) Explain the different thermomechanical treatment cycles applied on steel (10)

(ii) What is hardenability? How do you measure it? (6)

13a (i) What is boronizing? How boronizing is done and also explain the changes in the surface structure and mechanical properties due to boronizing (10)

(ii) Discuss the principle of induction hardening and flame hardening and also the microstructural changes in medium carbon steel due to the process. (6)

OR

13b	(i)	Explain the principle of carbonitriding. And also explain the microstructural changes in medium carbon steel due to this treatment.	(10)
	(ii)	Explain different methods used for measuring the case depth	(6)
14a	(i)	Explain the methods to control carburizing atmosphere and also explain the methods to measure the carbon potential	(10)
	(ii)	Explain the different Stages of Quenching	(6)

OR

14b	(i)	Explain the constructional features of fluidized bed furnaces,	(8)
	(ii)	Explain how the heat treatment process are controlled by Process control systems	(8)
15a	(i)	Explain the heat treatment process recommended for tool steel and HSLA steel and also discuss the microstructural changes.	(16)

OR

15b	(i)	Explain austempering of S.G.Iron and describe the microstructural changes after the heat treatment.	(10)
	(ii)	Discuss the different defects in heat treated parts and also discuss the causes and remedies	(6)