



Course Title: Furnaces & Heat Treatments
Date: 18 - 05 - 2015 [Re- final]

Course Code: MDP2213
Allowed time: 3 Hrs

Year: 2nd Prod Eng Dept
No. of Pages: (1)

Answer All The Following Questions With Detailed Drawing As You Can :-
[Note: Every Question carries 5 Marks]

Question (1):- (20 Marks =7+6+7)

- Define the heat treatment? what are the important principles of heat treatment?, and What are the defects of heat treatments?.
- Define the following terms:-
Phase diagram – Heating – Heatment – Hardening – Hardment – Hardness – Hardenability – Annealing – Normalizing – Tempering.
- What are the objectives of heat treatment process? Explain various heat treatment processes in brief?.

Question (2):- (20 Marks = 7+7+6)

- What the differences of equilibrium phase diagram and iron-carbon diagram? and What are the components on the iron-carbon diagram and their characteristics?.
- List the three major parameters which are considered for classification of furnaces? classify the furnaces based on material charging?.
- What do you mean by case hardening? Explain different methods of case hardening in detail?

Question (3):- (20 Marks =6+7+7)

- What does a heat treatment process consist? and What may heat treatment processes be divided into following basic types?.
- Draw a neat sketch of Fe-Fe₃C equilibrium diagram? Explain the microstructural changes that occur on cooling of hypoeutectoid steel from liquid region to room temperature?.
- What are the different microstructures of steel? Why the heat treatment of carbon steel is required? Give the elementary idea of various annealing operations.

Question (4):- (20 Marks =6+7+7)

- List out different type of heat losses in furnaces? Differentiate between furnace and oven?.
- Name at least three additional care to be taken when burners are used for proper distribution of heat in a furnace?.
- What are the instruments required for undertaking performance evaluation of the furnace? what are the disadvantages of excess air in a furnace?.

Question (5):- (20 Marks =7+7+6)

- What are the various types of annealing? and Where are they used? and What is the major difference in the purpose of annealing and normalizing?.
- Define the eutectic alloy? and What are the important characteristics of eutectics? What is the difference eutectic and eutectoid alloys?.
- What advantages does an electric heat- treating furnace have over a gas fired heat- treating furnace?.

End of Questions

...(((With My Best Wishes And Good Luck)))...

...[[Examiner: Dr Eng: Alaa A. El-Hammady]]...