**B.E. (Met) Part-IU 6* Semester Examination, 2010** 5 *2*

# HEAT TREATMENT TECHNOLOGY (MT-605)

**Time: 3 hours** **F"** [11] [70]

Use only One answer book
Marks in the margin indicate full marks
2 (two) marks are kept for neatness
All parts of a question must be written at one place
Give neat sketches wherever necessary

## Group A

Answer any **Four** questions

1 (a) Between T-T-T and C-C-T diagram which one is more important from the view of heat-treatment of steels? Explain
(b) What kind of microstructural changes occur during tempering of steels? [5+7]

2. (a) What do you understand by the term 'severity of quench'? Identify the media having the maximum and the minimum severity of quench.
(b) What is the difference between hardness and hardenability of steels?
(c) How hardenability of steel is influenced by its chemistry and prior austenite grain size? [(2+1J+3+6]

3. (a) Name the different stages of heat removal during quenching and compare their cooling rate.
(b) Compare the characteristics of water and oil as quenching media on the basis of factors that contribute to effective cooling rate of the samples during quenching treatment. [5+7]

4. Name three common defects, their causes and remedies in heat-treated steel components. [12]

5 (a) What is the importance of carburization treatment of steels?
(b) What is the importance of post carburization heat treatment?
(c) What is the necessity of inspection of heat-treated products? [3+4+5]

6. Write a typical composition of the followings, corresponding heat treatment schedule and expected properties (any Three): [4 x 3]
(a) Austenitic stainless steel
(b) Ball bearing steel
(c) Standard Ni-hard cast iron
(d) Heavy duty spring steel
(e) Mar aging steel

## Group B

Answer any **two** questions

7. (a) Explain the precipitation hardening characteristics of Al - 4.5wt.% Cu alloy,
(b) A heat treatment schedule developed in laboratory scale cannot always be transferred to industrial practice - explain. [5+5]

8 Briefly describe the black heart process of malleabilization of white cast iron. [10]

9. (a) Write the composition and heat treatment schedule of 18-4-1 grade of Steel? Explain with special emphasize on the properties and microstructure.
(b) Identify the applications and corresponding heat treatment schedule of Ti-6A1-4V alloy. [6+4]

10 Write technical notes on (any two): [5 x 2]
(a) Patenting
(b) Laser beam hardening
(c) Pollution in heat treatment plants