

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII(OLD) • EXAMINATION – WINTER 2016**

**Subject Code: 172101****Date: 29/11/2016****Subject Name: Physical Metallurgy - II****Time: 10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Differentiate between upper and lower bainite. **07**  
(b) Discuss briefly Hull – Mehl model of pearlitic transformation. **07**
- Q.2** (a) Draw Time - Temperature -Transformation (T T T) diagram for hypereutectoid steel and describe the effect of alloying elements on T T T diagram. **07**  
(b) Describe the mechanism of formation of austenite on heating eutectoid steel. **07**
- OR**
- (b) What is austenitic grain size? Write the method of austenitic grain size determination and give its importance. **07**
- Q.3** (a) Define heat treatment. List different types of annealing processes. Differentiate between full annealing and partial annealing. **07**  
(b) What is carburizing? Briefly discuss solid (pack) carburizing. **07**
- OR**
- Q.3** (a) Give the significance of hardenability and explain the Jominy End Quench method for hardenability measurement. **07**  
(b) Write a short note on thermo mechanical treatment. **07**
- Q.4** (a) Define the following defects in heat-treated parts and explain their causes and possible remedies: 1. Decarburization 2. Overheating 3. Burning. **07**  
(b) What is Quenching? List out different Quenchants. Discuss different Characteristics of Quenchants and explain mechanism of quenching. **07**
- OR**
- Q.4** (a) Short note on Retained Austenite. **07**  
(b) Discuss heat treatment for En:8 steel. **07**
- Q.5** (a) Discuss heat treatment cycle for tool steel. **07**  
(b) What do you understand by Diffusionless martensitic transformation? Explain the effect of applied stress on martensitic transformation. **07**
- OR**
- Q.5** (a) Discuss various Heat treatment processes of copper alloys. **07**  
(b) Explain why hardening by quenching is followed by tempering treatment? How do mechanical properties vary with tempering temperature? **07**

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