

**Shantilal Shah Engineering College, Bhavnagar**

**Branch: Production Engineering**

**Sub: Material Science and Metallurgy**

**Assignment - 1**

**Unit – 1**

1. Classify the engineering materials. Explain any two of them.
2. Write a short note on material selection process for a crankshaft of an engine.
3. Explain the structure-property-performance relationship with suitable example.
4. Explain various engineering requirements of materials.
5. What do you mean by mechanical properties of materials? Define all mechanical properties. (Like hardness, toughness, Ductility, Creep, Resilience, Fatigue, Stress, Strain....)
6. What are the factors that a good engineer should consider for selection of materials for engineering application? Explain each one in details.

**Unit – 2**

1. Draw a BCC crystal structure. Define coordination no. and state Coordination no. for BCC, FCC, and HCP.
2. Define Unit cell and draw (111) and [101]
3. Explain Point defect, Line defect and Plane defect.
4. Explain solute strengthening Mechanism.
5. What is solid solution? Explain types of solid solution.

### **Unit – 3**

1. Differentiate between Edge and Screw dislocation.
2. What is twinning deformation? Explain the difference between slip and twinning mechanisms using sketch.
3. Explain strain hardening phenomena with its effects on mechanical properties of materials.
4. What is recovery, recrystallization and grain growth? Write down their effects on mechanical properties of a ductile material.

### **Unit – 14**

1. Explain in detail, the ultrasonic testing method with its benefits and limitations.
2. List various nondestructive tests. Explain general advantages and disadvantages of non-destructive tests.
3. Explain the Eddy current Method of Testing with neat sketch. Also explain its benefits and limitations.
4. For Austenitic stainless steel we cannot use MPT. Why? State reason and explain MPT method in detail
5. Explain the principle of Radiography testing. With its use in metal testing.

**Note: All the students of Semester 3 are hereby informed to submit the above mentioned assignment (in appropriate manner) to Prof. H. H. Thakar on or before 6/8/2018 (Monday) without fail.**