

## **MSE-213 –Metals and Alloys-1 (3 CH)**

**Pre-requisites:** MSE-101 (Fundamentals of Engineering Materials)

### **Course Objectives**

1. The course is designed to study the unique properties and structure of metals and alloys. The basic goals are:
  - a. To introduce the rudimentary concepts about ferrous metals and alloys.
  - b. To introduce the manufacturing and processing methods of steels.

### **Course Contents**

2. Raw materials of iron making, Natural occurrence, Minerals and Ores, ferrous metal extraction, Iron-making processing, direct and indirect reduction, blast furnace process and its design, charge and energy calculations in blast furnace, blast furnace products and their treatments, developments in blast furnace process. Production of cast iron, Description and properties of the types of cast iron (Gray, White, Malleable and Ductile cast irons), Iron-Carbon (Fe-C) and Iron-Cementite (Fe-Fe<sub>3</sub>C) Systems, Raw materials for steel-making and its processes, pneumatic steel-making processes: Open hearth steel making processes, electric steel making processes, Duplex and triplex processes of steel making, Prospects of iron and steel making in Pakistan.

### **Course Outcome:**

- 3 The student should be able to,
  - a. Understand primary extraction processes involved in iron making from its raw materials.
  - b. Understand the principles and practice of pneumatic, open-hearth, electric, duplex and triplex steel making processes.

### **Suggested Books:**

1. Donald R. Askeland, The Science and Engineering of Materials, 7<sup>th</sup> Edition, Global Engineering, (2015)
2. R.H. Tupkary and V.R. Tupkary, An introduction to modern steel making, 6<sup>th</sup> Edition, Khanna Publisher, (1998)