

**Module - I (12 Lectures)**

1. Foundry :

- (a) Types of patterns, pattern materials and pattern allowances.
- (b) Molding Materials - sand molding, metal molding, investment molding, shell molding.
- (c) Composition of molding sand, Silica sand, Zircon sand, binders, additives, Binders - clay, binders for CO<sub>2</sub> sand, binder for shell molding, binders for core sand.
- (d) Properties of molding sand and sand testing.
- (e) Melting furnaces - cupola, resistance furnace, induction and arc furnace.
- (f) Solidification of castings, design of risers and runners, feeding distance, centre line freezing resistance chills and chaplets.
- (g) Degasification and inoculation of metals.
- (h) Casting methods like continuous casting, centrifugal casting, disc casting.
- (i) Casting defects.

**Module – II (12 Lectures)**

2. Welding and cutting: Introduction to gas welding, cutting, Arc welding and equipment's. TIG (GTAW) and MIG (GMAW) welding, resistance welding and Thermit welding. Weldability Modern Welding methods like plasma Arc, Laser Beam, Electron Beam, Ultrasonic, Explosive and friction Welding, edge preparation in butt welding.  
Brazing and soldering, welding defects.  
Destructive and non-destructive testing of castings and welding.
3. Brief introduction to powder metallurgy processes.

**Module – III (14 Lectures)**

4. Plastic deformation of metals: Variables in metal forming and their optimization. Dependence of stress strain diagram on Strain rate and temperature. Hot and cold working of metals, classification of metal forming processes.
5. Rolling: Pressure and Forces in rolling, types of rolling mills, Rolling defects.
6. Forging: Smith Forging, Drop and Press forging, M/c forging, Forging defects.
7. Extrusions: Direct, Indirect, Impact and Hydrostatic extrusion and their applications, Extrusion of tubes.
8. Wire drawing methods and variables in wire-drawing, Optimum dies shape for extrusion and drawing.
9. Brief introduction to sheet metal working: Bending, Forming and Deep drawing, shearing.
10. Brief introduction to explosive forming, coating and deposition methods.

**Text Books**

- 1. Manufacturing technology - by P.N.Rao, Tata McGraw Hill publication.
- 2. Welding Technology by R.A. Little, TMH
- 3. Manufacturing Science by A.Ghosh and A K Malick, EWP

**Reference Books**

- 1. Fundamentals of metal casting technology by P.C. Mukherjee, Oxford PIBI.
- 2. Mechanical Metallurgy by Dieter, Mc-Graw Hill
- 3. Processes and Materials of Manufacture by R.A Lindberg, Prentice hall (India)
- 4. A Text Book of Production Engineering by P.C.Sharma, S.Chand