

# 16ME201

# MANUFACTURING TECHNOLOGY



Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSB	CS	SA	S	BS
10	20	4	6	-	2

### Course Description and Objective:

This course offers basic theoretical concepts of operations and applications of manufacturing processes. The objective of this course is to explore basic manufacturing processes such as casting, metal forming, welding and sheet metal processes.

### Course Outcomes:

The student will be able to:

- understand various types of manufacturing processes.
- select the processes which are used for manufacturing a particular product.
- identify the advantages and disadvantages of various manufacturing processes.
- differentiate between the hot and cold working processes of metals.

### SKILLS:

- Identify processes that are suitable for manufacturing different products.*
- Design mould cavities for casting of different shapes.*
- Distinguish bulk and sheet metal forming.*
- Perform welding and other joining operations.*

**ACTIVITIES:**

- *Design patterns with allowances for a few sample products.*
- *Gating system design and product development using two piece pattern.*
- *Analysis of foundry defects for quality improvement of sand casting.*
- *Joining of metals using TIG and spot resistance welding.*
- *Fabrication of few sample products by using sheet metal operations.*

**UNIT - 1****L-9**

**CASTING:** Casting terminology, Sand moulding process - Types of moulding sands, Moulding sand composition and its properties; Patterns - Pattern materials, Types of patterns, Pattern allowances and simple problems on allowances; Cores, Elements of gating system - Types of gates, Design of Gating system and Simple problems on Riser and Sprue design.

**UNIT - 2****L-9**

**SPECIAL CASTING PROCESSES:** Investment casting, Die casting, Centrifugal casting, Shell moulding, Continuous casting, Stir casting, Casting defects, Metal Melting - Cupola, Crucible furnaces, Electric resistance furnace.

**UNIT - 3****L-9**

**METAL FORMING PROCESS:** Hot, Cold and Warm working, Workability, Work hardening, Recrystallization, Annealing, Rolling - Theory of rolling, Roll mills, Simple problems on Maximum draft possible, Contact length, Defects of Rolling; Forging - Smith forging, Drop forging, Press and Machine forging, Forging defects, Power hammers; Extrusion - Hot and cold extrusion, Direct and indirect extrusion, Hydrostatic extrusion, Impact extrusion.

**UNIT - 4****L-9**

**SHEET METAL OPERATIONS:** Shearing - Blanking, Piercing and problems on energy requirement for shearing operations considering shear; Spinning, Dies - Progressive dies, Combination dies, Compound dies; Coining, Embossing, Stretch forming, Drawing - Deep drawing, Wire drawing, Tube drawing; Bending - Theory of bending and Types of bending.

**UNIT - 5****L-9**

**WELDING:** Classification of welding, Gas welding, Arc welding - Manual metal arc welding, Submerged arc welding, TIG and MIG welding; Thermit welding, Resistance welding - Spot, Butt, Projection and Seam welding; Welding defects, Introduction to Soldering and **Brazing**.

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

Total hours: 30

**1. METAL CASTING:**

- a) Pattern Design and making for one casting drawing
- b) Testing of sand Properties
- c) Moulding - Melting and Casting - Single piece
- d) Moulding - Melting and Casting - Two piece pattern
- e) Stir-Casting

**2. WELDING:**

- a) ARC Welding Lap and Butt Joint.
- b) Spot Welding
- c) TIG welding
- d) Brazing
- e) Gas welding

**3. METAL FORMING:**

- a) Blanking and Piercing operation and study of simple, Compound and Progressive press tool
- b) Hydraulic Press - Deep drawing and Extrusion
- c) Roll Mill

**4. PROCESSING OF PLASTICS**

- a) Injection moulding
- b) Blow moulding

**TEXT BOOKS:**

- 1. P.N. Rao, "Manufacturing Technology", 2<sup>nd</sup> edition, Tata McGrahill, 2008.
- 2. S.K. Hajra Chowdary, "Elements of Workshop Technology", 11<sup>th</sup> edition, Media Promoters, 1997.

**REFERENCE BOOKS:**

- 1. R.K. Jain, "Production Technology", 6<sup>th</sup> edition, Khanna Publishers, New Delhi, 2005.
- 2. Sarma P.C, "Production Technology", 3<sup>rd</sup> edition, S.Chand and Co, 2008.