ME403 : Primary Manufacturing Processes
Contacts : 4L
Credits : 4

Module 1. **Introduction**
Manufacturing; Definitions and broad grouping

Module 2. **Casting**
Introduction
History
Definition
Major Classification
Casting Materials

Sand mould casting
Moulding sands: composition, properties & testing
Design of gating system: sprue, runner, ingate & riser
Estimation of powering time
Foundry equipments, Furnaces
Melting, pouring and solidification
Type of patterning, use of a core
Different type of sand mould casting
Floor mould casting
Centrifugal casting
Shell mould & CO2 casting
Investment casting

Permanent mould casting
Die casting, types, methods, advantages & applications
Slush casting, principle & use

Casting defects, types, causes & remedy

Module 3. **Welding**
Introduction to metallic parts
Major grouping of joining processes, welding, brazing and
soldering
Broad classification of welding processes, types and principles

Fusion welding, types, principles, equipments, characteristics & applications
Sources of heat-chemical action,
Gas welding & thermit welding
Sources of heat-electrical energy,
Arc welding
Submerged arc welding
TIG & MIG; Plasma arc welding
Resistance welding; Spot & butt welding

Solid state welding
Principles, advantages & applications of:
Hot forge welding,
Friction welding
Pressure & percussion welding

Precision welding processes:
Ultrasonic welding
Laser beam welding
Electron beam welding

Welding defects, types, causes & remedy 1

Module 4. **Forming Processes**
Forging
Introduction, definition, classification, hot forging & cold forging, characteristics & applications
Forging material operations, equipments & tools:
Smith forging
Drop forging
Pressing or press forging
Forging dies, materials & design

Rolling
Introduction, basic principles, hot rolling & cold rolling, characteristics & applications

Rolling processes & applications, operations, equipment & roll stands

Wire drawing & extensions
Basic principles & requirements
Classification, methods & applications

Press tool works
Basic principles, systems, operations & applications
Shearing, parting, blanking, piercing & notching
Cupping(drawing), Spinning & deep drawing
Blanks & forces needed for shearing & drawing operations
Coining & embossing

Text Books:
1. Manufacturing technology, Foundry, Forming & Welding-P.N Rao.
2. Manufacturing Science-A Ghosh & A Mullick.
3. Manufacturing Engineering & Technology-S Kalpakjian; Pub:Addison Wesley.
4. Principles of manufacturing materials & processes-James & Campbell.

Reference Books:
1. Manufacturing engineering & technology-K Jain.
2. Materials & processes in manufacturing-E.P Degarmo, Black & Kohser, Pub: Wiley(10_{th} ed.)
3. Processes & materials of manufacturing-R.A Lindberg.
4. Introduction to manufacturing technology-PP Date, Pub: Jaico.
5. Manufacturing processes-S.K Sharma & S Sharma, Pub: I.K International.