PCC-ME 303	Manufacturing Processes	3L:0T:3P	4.5 Credits

Objectives:

To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

Contents:

Module:1

Conventional Manufacturing processes: Casting and Moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses.

(Lectures6)

Module:2

Introduction to bulk and sheet metal forming, plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming (forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending) principles of powder metallurgy.

(Lectures6)

Module:3

Metal cutting: Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, Cutting tool materials, Cutting fluids, Coating; Turning, Drilling, Milling and finishing processes, Introduction to CNC machining. **(Lectures8)**

Module:4

Joining/fastening processes: Physics of welding, brazing and soldering; design considerations in welding, Solid and liquid state joining processes; Adhesive bonding.

Additive manufacturing: Rapid prototyping and rapid tooling **(Lectures5)**

Module:5

Machine Tools:

(a) Lathe : Principle, types, operations, turret/capstan, semi/automatic, Tool layout.

(b) Shaper, slotted, planer, operation, drive.

(c) Milling, Milling cutter, up & down milling, dividing head indexing, Max chip thickness, power required.

(d) Drilling and boring, reaming tools, Geometry of twist drill, Grinding, Grinding wheel, Abrasive, cutting action, grinding wheel specification, Grinding wheel wear, alterations, wear, fracture wear, dressing and trimming. Max chip thickness and guest criteria, Flat and cylindrical grinding, Centerless grinding, Super finishing, Honing lapping, Polishing

(Lectures15)

Course Outcomes:

Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products

Books & Links:

1. 'Manufacturing Technology by P.N. Rao, Tata McGraw Hill, New Delhi

2. 'Production Technology' by R K Jain, Laxmi Publisher

3. Ghosh A. and Mallik A. K., Manufacturing Science, EWP Pvt. Ltd

4. http://nptel.ac.in/courses