2/4 B.Tech. FOURTH SEMESTER

ME4T5 **PRODUCTION TECHNOLOGY** **Credits: 4**

Lecture:- -4 periods/week **Internal assessment: 30marks**
Tutorial: - - **Semester end examination: 70 marks**

Objectives:

1. Specify various casting processes.
2. Select different types of welding processes like brazing, soldering etc.
3. Demonstrate resistance welding principles, welding defects, causes and remedies, testing of welds.
4. State various metal working and rolling processes.
5. Study various metal forming processes.
6. Familiarize the process of plastics by blow and injection molding.

Learning outcomes:

At the end of course the students will be able to:

1. Describe pattern making, mould and casting.
2. Explain various casting processes and melting methods in industry.
3. Evaluate the role of metal joining processes, welding principles, welding defects, causes and remedies.
4. Illustrate the necessity of metal working and forming processes, rolling mills.
5. Discuss the extrusion and forging processes on metals and also develop the components for making engineering parts using plastics as raw material.

Pre-Requisites:

Work shop Practice

UNIT – I

CASTING:

Steps involved in making a casting, Advantage of casting and its applications. Patterns and Pattern making: Types of patterns, Materials used for patterns, pattern allowances and their construction.

MOLDING: Basic steps in mold preparation, materials used for mould, types of molds, sand tests as per AFS. Principles of Gating: Gating ratio and design of gating systems

UNIT – II

SOLIDIFICATION OF CASTING:

Concept, Solidification of pure metal and alloys, short & long freezing range alloys.

Risers: Types, function and design, casting design considerations.

Special casting processes: 1) Centrifugal 2) Die 3) Investment.

Methods of Melting: Crucible melting and cupola operation and charge calculations.

UNIT – III

A) WELDING:

Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding-sub merged , electron beam welding, solid state welding process, Forge welding, resistance welding, Thermit welding and Plasma welding.

B) CUTTING OF METALS: Oxy – Acetylene Gas cutting, plasma cutting. Cutting of ferrous, non-ferrous metals.

UNIT – IV

INERT GAS WELDING:

TIG & MIG, MAG /CO2 welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing.

Heat affected zones in welding, weld ability of metals welding defects: causes and remedies, destructive nondestructive testing of welds.

UNIT – V

METAL FORMING:

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts.

Rolling fundamentals: Theory of rolling, types of Rolling mills and products.

Forces in rolling and power requirements.

UNIT - VI

STAMPING, FORMING AND OTHER COLD WORKING PROCESSES:

Blanking and piercing, Bending and forming. Drawing and its types: wire drawing and Tube drawing. Coining, Hot and cold spinning, Types of presses and press tools. Forces and power requirement in the above operations.

UNIT- VII

EXTRUSION OF METALS:

Basic extrusion process and its characteristics. Hot extrusion and cold extrusion, Forward extrusion and backward extrusion, Impact extrusion Hydrostatic extrusion.

FORGING PROCESSES: Principles of forging, Tools and dies, Types Forging: Smith forging, Drop Forging, and Roll forging. Forging hammers: Rotary forging, forging defects.

UNIT – VIII

PROCESSING OF PLASTICS:

Types of Plastics, Properties, applications and their Processing methods & Equipment (blow &injection modeling)

Learning resources

Text books:

1. Manufacturing Engineering and Technology, by Kalpakjin S, Pearson Edu.
2. Manufacturing Technology, by P. N. Rao, , TMH Publications.

Reference books:

1. Production Technology, by R. K. Jain, Khanna Publishers
2. Fundamentals of Modern Manufacturing, by Mikell P. Groover, Materials, Processes, and Systems", Wiley publications.
3. Principles of Metal Castings, by Richard Heine, Carl Loper, Philip Rosenthal, McGrawhill.