**GURU TEGH BAHADUR INSTITUTE OF TECHNOLOGY**

**G-8 AREA, RAJOURI GARDEN, NEW DELHI**

**B.Tech. (Common to all Branches) Semester: Ist**

**Course: Manufacturing Process Subject Code: ES119**

**Credit: 4 , Period: 4**

**Course Outcomes (CO):**

**CO1:** To understand casting process.

**CO2:** To understand joining process.

**CO3**: To understand forging and sheet metal work.

**CO4:** Basic understanding of powder metallurgy and manufacturing of plastic components.

**Programme outcomes (level)**

PO1: Engineering Knowledge

PO2: Problem Analysis

PO3: Design/Development of solutions

PO4: Conduct Investigations of complex problems

PO5: Modern Tool Usage

PO11: Project Management and Finance

PO12: Lifelong learning

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Course outcomes to Programme outcomes mapping:**  **Scale1: Low, Scale2: medium, Scale3: High.** | | | | | | | |
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO11** | **PO12** |
| **CO1** | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| **CO2** | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| **CO3** | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| **CO4** | 2 | 1 | 1 | 1 | 2 | 1 | 1 |

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**Lecture Plan**

**Course: Manufacturing Process**

**B.Tech. (Common to all Branches)**

**Semester: Ist Subject Code: ES119**

**Credit: 4, Period: 4**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Topic** | **Nos. Lect.** |
| **1** | **Definition of Manufacturing, Importance of manufacturing towards technological and social economic development, classification of manufacturing processes, properties of materials** | **02** |
| **Metal casting: Sand casting, Sand molds, Type of patterns, Pattern materials, Pattern allowances** | **02** |
| **Types of molding sand and their properties, core making. Element of gating system** | **02** |
| **Description and operation of cupola** | **01** |
| **Special Casting: Shell casting, Pressure die casting, centrifugal casting,** | **02** |
| **Casting defects** | **01** |
| **2** | **Joining Process: Welding principle, classification of welding processes,** | **01** |
| **Gas welding: Equipment used, filler and flux materials** | **01** |
| **Electric arc welding: Basic and classification,** | **01** |
| **GMAW(TIG/MIG)** | **02** |
| **SAW** | **01** |
| **ESW** | **01** |
| **Resistance welding** | **02** |
| **Welding defects** | **01** |
| **3** | **Deformation Processes: Hot working and cold working of metals, Forging processes, open and closed die forging process, Typical forging operations,** | **02** |
| **Rolling of metals, Principle of rod and wire drawing, Tube drawing** | **02** |
| **Principle of extrusion, types of extrusion, Hot and cold extrusion** | **02** |
| **Sheet metal characteristics, typical shearing operations, bending and drawing operations.** | **02** |
| **Stretch forming and metal spinning** | **02** |
| **4** | **Powder metallurgy: Introduction to PM, powder production, blending, compacting, sintering.** | **02** |
|  | **Manufacturing of plastic components: Types of plastics, characteristics of the forming and shaping process** | **01** |
|  | **Molding of thermoplastics: Injection Molding** | **01** |
|  | **Blow molding** | **01** |
|  | **Rotational molding** | **01** |
|  | **Film blowing, Extrusion, Thermoforming** | **01** |
|  | **Molding of thermosets- Compression molding,** | **01** |
|  | **Transfer molding, Bonding of Thermoplastics.** | **02** |

**Textbooks:**

1. Manufacturing Technology: Foundry, Forming and Welding Volume 1, P. N Rao, , McGrawHill, 5e, 2018.

2. Elements of Workshop Technology Vol. 1 and 2 by Hajra Choudhury, Media Promoters Pvt Ltd., 2008.

**References:**

1. Manufacturing Processes for Engineering Materials, by Serope Kalpajian and Steven R. Schmid, Pearson Education, 5e, 2014.

2. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems by Mikell P. Groover, John Wiley and Sons, 4e, 2010.

3. Production Technology by R.K.Jain and S.C. Gupta, Khanna Publishers. 16th Edition, 2001.