



## **SECOND SEMESTER 2020-2021**

### **Course Handout (Part II)**

In addition to the part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

**Course No.:** MF F222

**Course Title:** Casting, Forming and Welding

**Instructor-in-Charge:** Radha Raman Mishra

### **1. Course Description**

Study of quantitative and qualitative analyses of manufacturing processes enables engineers to understand the design requirements of an industrial component for possible manufacturing. The present course acquaints students with the manufacturing processes such as Casting (pattern, mould and gating system design, casting processes, defects and inspection), Forming (mechanics of forming processes; forming operations, friction and lubrication, forming defects), Welding (principles of solid-phase welding and liquid phase welding, soldering, brazing and adhesive bonding; newer welding processes, welding and additive manufacturing, weld defects and inspection), Plastic processing (types of plastics, processing methods, advantages, limitations and applications) and Powder metallurgy (introduction, need, powder preparation, compaction, sintering, advantages, limitations and applications).

### **2. Scope and Objective of the Course**

This course provides theoretical, analytical and practical exposure to the students about the manufacturing processes such as casting, forming, welding, and powder metallurgy. Moreover, it enables learners to understand process design requirements for possible manufacturing of the industrial components.

### **3. Text Books**

- A. Ghosh and A. K. Mallik, Manufacturing Science, East-West Press Private Limited. **(T1)**
- S. Kalpakjian and S.R. Schmid, Manufacturing Processes for Engineering Materials, Pearson Publications. **(T2)**

### **4. Reference Books**

- R. Heine, C. Loper, P. Rosenthal, Principles of Metal Casting, TMH Publications. **(R1)**
- G. E. Dieter, Mechanical Metallurgy, McGraw Hill. Inc. **(R2)**
- B. L. Juneja, Fundamentals of Metal forming processes, New age international publishers. **(R3)**
- R. S. Parmar, Welding Processes and Technology, Khanna Publishers, New Delhi. **(R4)**
- Mikell P. Groover, Fundamentals of Modern Manufacturing John Wiley & Sons, Inc. **(R5)**





## 5. Course Plan

Module No.	Lecture Session	Reference	Learning outcomes
M1	<b>L (1):</b> Fundamentals of the casting process	T1 and R1	<ul style="list-style-type: none"> <li>To understand the basic concepts of casting processes, pattern, mould and gating design.</li> <li>To learn principles of different casting techniques, methods, defects and inspection techniques</li> </ul>
	<b>L (2-3):</b> Pattern, mould and gating system design	T1 and R1	
	<b>L (4-6):</b> Casting processes – principles and method	T2 and R1	
	<b>L (7):</b> Casting defects and inspections techniques	T2 and R1	
M2	<b>L (8):</b> Fundamentals of the forming processes	T1, R2 and R3	<ul style="list-style-type: none"> <li>To know various forming processes, forming defects</li> <li>To analyse the mechanics of different forming processes for understanding the effect of various parameters, friction and lubrication</li> </ul>
	<b>L(9-11):</b> Forming operations	T1, R2 and R3	
	<b>L (12-22):</b> Mechanics of forming processes	T1, R2 and R3	
	<b>L (23):</b> Friction and lubrication	T1, R2 and R3	
	<b>L (24):</b> Forming defects	T2, R2 and R3	
M3	<b>L (25):</b> Fundamentals of the welding	T1 and R4	<ul style="list-style-type: none"> <li>To learn the basics of welding processes and welding defects</li> <li>To know various new welding processes and additive manufacturing techniques which are based on welding principles</li> </ul>
	<b>L (26):</b> Principles of solid-phase welding and liquid phase welding	T1 and R4	
	<b>L (27):</b> Soldering, brazing and adhesive bonding	T1 and R4	
	<b>L (28-30):</b> Newer welding processes	T2 and R4	
	<b>L (31):</b> Welding and additive manufacturing	Class Notes	
	<b>L (32):</b> Weld defects and inspection	T2 and R4	
M4	<b>L (33):</b> Types of plastics	T2 and R5	<ul style="list-style-type: none"> <li>To understand various plastics, processing methods and their uses</li> </ul>
	<b>L (34-35):</b> Processing methods of plastics	T2	





	<b>L (36):</b> Advantages, limitations and applications of plastics	T2	in industrial applications
M5	<b>L (37):</b> Fundamentals of Powder metallurgy: introduction and need	T2 and R5	<ul style="list-style-type: none"><li>To understand the basics of powder metallurgy process and various steps involved to develop an industrial component</li></ul>
	<b>L (38)</b> Powder preparation methods	T2 and R5	
	<b>L (39):</b> Compaction and sintering	T2 and R5	
	<b>L (40):</b> Advantages, limitations and applications of powder metallurgy process	T2 and R5	

## 6. Lab Practical

Various experimentations based on casting, metal forming and welding will be demonstrated through virtual mode.

## 7. Evaluation Scheme

Components	Duration (minutes)	Weightage (%)	Date	Remarks
Mid Semester Test	90	25	Will be announced by AUGSD-AGSRD	OB
Assignments/Projects/Seminars/Quiz	-	15	To be announced in the class	OB
Lab quiz/viva	-	20	To be announced in the class	OB
Comprehensive Examination	120	40	Will be announced by AUGSD-AGSRD	CB/OB

## 8. Chamber Consultation Hour

To be announced in the first class.

## 9. Notices

All notices regarding the course will be sent through the email/Nalanda/Google classroom.

## 10. Make-up Policy

Make-up will be granted **ONLY in genuine cases** with PRIOR permission as per the institute rules.

Instructor-in-Charge  
MF F222

