



INSTRUCTION DIVISION
Second Semester 2015-2016
Course Handout (Part II)

07.01.2016

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

Course No. : MF F343
Course Title : Casting and Welding
Instructor-in-Charge : Tufan Chandra Bera
Instructors (Practical) : Manikandan H., Kiran Raj

1. Course Description:

Casting processes, pattern and mould design, metal melting and handling, metallurgical aspects of casting, metal flow and heat transfer, analysis of casting defects. Injection moulding of plastics. Gas cutting and welding processes including its physics, chemistry and metallurgy, power source characteristics, different welding techniques, selection of welding processes, destructive and non-destructive testing of weldments, welding standards and codes, analysis of welded joints, brazing and soldering.

2. Scope and Objective of the Course:

In-depth comprehension of casting and welding processes is mandatory for a mechanical or manufacturing engineer as casting and welding processes are common and versatile operation in part manufacturing. The course aims at developing the theoretical and practical knowledge base about the fundamentals of casting and welding processes. Later on, it will be helpful to analyze these two broad and versatile manufacturing processes and implement them in product manufacturing or product fabrication.

3. Text Books:

- T1. **R. W. Heine, C. R. Loper and P. C. Rosenthal, "Principles of Metal casting"**, Tata McGraw-Hill Publication, II Edition, 2004.
- T2. **P. N. Rao, "Manufacturing Technology Vol-1"**, Tata McGraw-Hill Publications, III Edition, New Delhi.
- T3. **R. L. Little, "Welding and Welding Technology"**, Tata McGraw-Hill Publications, I Edition, New Delhi.

4. Reference books:

- R1. **A. Ghosh and A. K. Mallik, "Manufacturing Science"**, East-West Press Private Limited, New Delhi, 2008.
- R2. **S. Kalpakjian and S. R. Schmid, "Manufacturing Processes for Engineering Materials,"** Pearson Education, New Delhi, Fifth Edition, 2011.
- R3. **E. R. Bohnart, "Welding Principles and Practices"**, Tata McGraw-Hill Publication, Fourth Edition, 2014, New Delhi.
- R4. **J. F. Lancaster. "Metallurgy of Welding"**, Woodhead Publications, VI Edition, 1993.





5. Course Plan:

No. of Lecture	Topics	Objectives	T/R-Chapter
01-03	Introduction	Manufacturing properties of materials and their control.	T2-2, R1-1
04-06	Casting Processes	Pattern and Mould, Molding materials & their making processes and, Cores.	T1-(1-7), T2-3, R1-2
07-11	Gating Systems for Casting	Gating system design, Riser Design.	T1-9, T2-4, R1-2.4
12-13	Cooling and Solidification	Mechanism of solidification, Freezing of pure metals and alloys.	T1-8, R1-2.5
14-15	Melting and Casting Quality	Melting Practice, Casting Cleaning, Casting Defects, Inspections.	T1-24, T2-5, R1-(2.3&2.6)
16-17	Foundry Practices of Different Materials	Casting of Magnesium, Copper & its alloys, Steel alloys.	T1-(12-15)
18-20	Special Casting Processes	Shell moulding, Precision Investment, Permanent Mould, Die Casting, Vacuum die casting, Low pressure Die-casting, Centrifugal Casting	T2-6, R1-2.7, R2-5.
21-23	Welding Processes	Introduction, Principles of Solid phase welding, Principles of fusion welding, Principles of solid/liquid state joining	R1-5.2, R2-12
24-26	Gas Welding	Equipments, operations, joining processes, ferrous welding, nonferrous metals, gas cutting.	T3-1, R1-5.3, R2-12
27-29	Shield Arc Welding	Electrodes, equipments, operations, weld symbols, submerged arc welding, carbon arc welding.	T3-2, R1-5.5, R2-12
30-32	Gas Shield Arc Welding	Equipments, TIG & MIG operation.	T3-3, R1-5.5
33-36	Other Welding Processes	Plasma Arc, Resistance, Electroslag & Electrode gas welding, Solid state bonding, Electron Beam, Laser, Thermit & Explosive welding	T3-4, R1-5.5, R2-12
37-38	Weld Defects and Inspection	Weld defects, Destructive and NDT methods.	T3-5, R1-5.6, R2-12
39-40	Modern welding processes, brazing and soldering	Applications and limitations, brazing and soldering.	R2-12, R1-5





6. Evaluation Scheme:

Component	Duration	% Weightage	Date & Time	Remarks
Mid Semester Test	90 min	30	15/3 9:00 - 10:30 AM	Open book
Class Assignments & Surprise Quiz		10		Closed book
Comprehensive Examination	3 hours	35	5/5 FN	Closed book
Lab Practical	Semester long	25		Lab Experiments, Part Manufacturing.

7. Chamber Consultation Hours:

To be announced in the class.

8. Notices:

All notices related to the course will be displayed on Notice Board of Mechanical Engineering Department only.

9. Make-up Policy:

Make-up will be granted **ONLY** in genuine cases with prior permission. The request application for make-up test **MUST** be reached to the Instructor-in-charge before commencement of the scheduled test along with **DOCUMENTARY PROOF**. No make-up will be allowed for the Surprise Quiz Tests.

Instructor-in-Charge
MF F343

