

COURSE CODE 1152ME126	ADVANCED METAL CASTING TECHNOLOGY	L	T	P	C
		3	0	0	3

1. Preamble

This course will help the students understand the advanced metal casting techniques and their applications.

2. Pre-Requisite

Manufacturing Technology

3. Links to other courses

Project work

4. Course Educational Objectives

Students undergoing this course will able

- To understand the basic principles of metal casting
- To know the various types of melting practices
- To broaden the understanding of casting design principles
- To know about casting defects and remedial measures

5. Course Outcomes

After the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describe methods of Moulding Processes.	K2
CO2	Understand the various types of melting practices & furnaces.	K2
CO3	Understand the working principles of Special Casting processes.	K2
CO4	Describe the Basics of casting Design.	K2
CO5	Understand the causes & remedies of castings defects and Quality Control Systems.	K2

6. Correlation of COs with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H						L					L	H	
CO2	H						L					L	H	
CO3	H						L					L	H	
CO4	H						L					L	H	
CO5	H						L					L	H	

H- High; M-Medium; L-Low

7. Course Content

UNIT I MOULDING PRACTICES

L-9

Basic principles of casting processes- patterns- Pattern design- materials and construction. Moulding: Materials for moulding- Foundry sand control- Different types of cores- Core making processes- Materials for core making- Moulding and core making machines. Recent developments in core mould making- Cold set process

UNIT II MELTING PRACTICES

L-9

Foundry furnaces - Selection of furnaces - Crucibles oil fired furnaces - Electric furnaces - Cupola furnace, melting practice for cast iron, aluminum alloys, copper alloys and magnesium alloys- - fluxing, degassing.-safety considerations

UNIT III RECENT TRENDS IN CASTING

L-9

Pressure die casting - Permanent mould casting - Centrifugal casting - Precision investment casting - Shell moulding - CO₂ moulding, continuous casting - Squeeze casting – Electro slag casting - Near Net Techniques. Introduction to Rapid prototyping applications in casting process.

UNIT IV CASTING DESIGN

L-9

Concept of solidification, directional solidification, role of chilling, Casting design -principles of gating- functions of riser, types of riser, bottom pouring and top pouring. Introduction to Design considerations for Castings, Casting design softwares.

UNIT V CASTING DEFECTS AND QUALITY CONTROL

L-9

Defects in castings and its remedies- - inspection of castings- Quality control and quality assurances, Non Destructive testing – Dye penetrant – magnetic particle – X-ray, ultrasonic-Statistical quality control in foundry.

Total: 45 periods

8. Text Books

1. Richard W Heine, 2003, Principles of Metal Casting, Tata McGraw Hill Education Private Limited, Park ohio USA,
2. Ramana Rao T. V, Metal Casting: Principles and Practice, New Age International, 2010

9. References

1. Metal Casting Principles and Techniques, Yury . S. Lerner, Nageswara Rao Posinasetti, American Foundry Society, December 2013.
2. Foundry Technology, Peter R. Beeley, Butterworth-Heinemann, 2001 - Technology & Engineering
3. Jain, P.L., "Principles of Foundry Technology", 4th Edition, Tata McGraw Hill Pub., Co. Ltd., 2008.
4. Heine, R.W., Carl Loper, and Rosenthal, P.C., "Principles of Metal Casting", 2nd Edition, Tata McGraw Hill Pub. Co. Ltd., 2008