



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Metallurgy Engineering

Subject Code : DI04021031

Course / Subject Name : Foundry Technology

<b>w. e. f. Academic Year:</b>	2025-26
<b>Semester:</b>	4 <sup>th</sup>
<b>Category of the Course:</b>	PCC

<b>Prerequisite:</b>	Students need a foundational understanding of basic science, mathematics, and engineering principles. Sometimes with specific requirements for subjects like Physics, Chemistry, and Mathematics.
<b>Rationale:</b>	<p>Casting is a fundamental and time-honored production method, distinguished by its simplicity and versatility across a wide range of applications. The field of foundry technology involves a diverse array of materials and processes. While traditionally labor-intensive, the industry is increasingly adopting automation to enhance production rates and reduce costs.</p> <p>Consequently, metallurgy engineers must possess a strong foundation of knowledge and practical skills in this domain. Diploma-level metallurgy engineers, in particular, are expected to competently supervise foundry operations. The curriculum for this subject is designed to equip students with a comprehensive understanding of the equipment, principles, and the relative advantages and disadvantages of various casting processes, thereby preparing them for the demands of a modern foundry environment.</p>

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain the advantages and applications of casting processes.	R
02	Explain the different types of patterns and their uses.	R
03	Prepare molds for casting processes.	U
04	Understand the function and working principles of various casting processes	A
05	Identify the causes and remedies for common casting defects.	A

\*Revised Bloom's Taxonomy (RBT)



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## Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1	<b>Introduction to Foundry</b> 1.1. Brief introduction about manufacturing processes 1.2. Principle, steps, advantages, application of metal casting 1.3. Introduction, types, different sections and layout of foundry industries. 1.4. Classification of foundry metals and alloy 1.5. Introduction, concept and types of foundry fluxes, refractories and fuels	06	14%
2.	<b>Pattern and Pattern making</b> 2.1. Introduction of pattern 2.2. Difference between pattern and casting 2.3. Introduction, function, material used for Pattern making 2.4. Types of patterns used in metal casting. 2.5. Design and allowance of pattern 2.6. Color codes of pattern.	08	18%
3.	<b>Mold making</b> 3.1. Materials used in mold making 3.2. Types and properties of molding sand. 3.3. Additives and binder used in molding sand 3.4. Introduction, function and types of core and core making 3.5. Types of mold, mold making methods 3.6. Types of gates and gating system 3.7. Introduction, Function, importance and types of riser.	12	26%
4.	<b>Melting practice and Casting processes</b> 4.1. Principle, working and applications of Cupola, Induction and Electrical furnaces. 4.2. Classifications of casting processes 4.3. Introduction, principle, operational steps, advantages, limitations and applications of ;	12	26%



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	a. Die Casting b. Investment casting c. Centrifugal casting d. Shell mold casting		
5.	<b>Quality inspection and Casting defects</b> 5.1. Primary inspection of cast products 5.2. Introduction to casting defects 5.3. Classification of casting defects 5.4. Causes and remedies of main casting defects	7	16%
<b>Total</b>		<b>45</b>	<b>100%</b>

## Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
35	35	30	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

## References/Suggested Learning Resources:

### (a) Books:

1. Foundry Technology, by O. P. Khanna, Publisher: Dhanpat rai, ISBN: 9788189928346
2. Principle of Foundry Technology, by P. L. Jain, Publisher: Tata McGraw Hill Inc., ISBN: 10.0074516981
3. Foundry Technology, by S. K. Jain, Dharmendra Kumar, Publisher: CBS, ISBN: 10.-8123902905
4. Foundry Technology, by Beeley Peter, Publisher: Elsevier Science and Technology, ISBN: 9780750645676
5. Fundamental of metal casting technology, by P. C. Mukherjee, Publisher: Oxford, ISBN: 19-539138-8,

### (b) Open source software and website:

1. [https://www.youtube.com/watch?v=hCiqoFBh\\_DA](https://www.youtube.com/watch?v=hCiqoFBh_DA)
2. <https://www.youtube.com/watch?v=IAA3kcCLVyg>
3. <https://www.youtube.com/watch?v=RoCSRpj110I>
4. [https://www.youtube.com/watch?v=wIfV0U4q\\_kw&t=422s](https://www.youtube.com/watch?v=wIfV0U4q_kw&t=422s)
5. <https://www.youtube.com/watch?v=gBK0P4ASZ0o>



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6. [https://www.youtube.com/watch?v=BG\\_J7dMFKEg](https://www.youtube.com/watch?v=BG_J7dMFKEg)

7. <https://www.youtube.com/watch?v=JjdkBKXQh6Y>

8. <https://www.youtube.com/watch?v=DuOMrOqs86s>

## Suggested Course Practical List:

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approximately Hours required
1	Prepare standard specimen of sand mold as per AFS standard for testin.	1	2
2.	Measure the sand mold strength by universal sand testing machine.	1	6
3.	Measure the permeability of sand mold	2	4
4.	To determine the clay content of foundry sand	2	4
5.	Measure the moisture content of sand mold by weight loss method	2	4
6.	Measure the mold hardness by hardness tester	3	4
7.	Demonstrate the melting practice. of casting for simple shape.	3	6
		<b>Total</b>	<b>30 hrs.</b>

## List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications
1.	Models of various types of patterns
2.	Universal sand strength testing machine
3.	Permeability meter
4.	Clay washer kit for clay content test
5.	Model of mold
6.	Mold hardness tester
7	Sand muller machine
8	Sand rammer
9	Core hardness tester
10	Rapid moisture meter
11	Shatter index tester
12	Muffle furnace



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## **Additional suggested project list:**

1. Student will visit local foundry shops and observe pattern making, sand preparation, mold making, metal melting, alloying and casting, etc. and prepare reports
2. Student will prepare report of various materials and tools being used in foundry based on observations.
3. Student will visit automated foundry and make a report.

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