GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: PG

Branch: Mechanical Engineering

Course / Subject Code:ME01000511

Course / Subject Name : Advance Casting Technology

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PEC

Prerequisite:	
Rationale:	This course provides the knowledge and practice regarding different Foundry processes and their industrial importance. Also focused on efficient design of casting runner, riser and gating system with minimal casting defects and solidification process.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Understand the casting systems fundamentally	Understanding
2	Design the gating and riser system & analyze the metallurgical aspects of the solidified metals,	Analyze
3	Performing Inspection and Testing of Different Castings	Evaluate
4	Design for castability-process friendly design	Evaluate
5	To Identify casting defects and remedial action	Understanding

Teaching and Examination Scheme:

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

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Casting Processes: Classification, characteristics of sand casting processes, metal mould casting processes and casting processes using other mould/core materials, Pattern materials, types of patterns, Mould and core making materials and their characteristics.	07	16
2.	Casting Technology: Technology of Selected Casting Processes, clay bonded,	07	16

	oil bonded, synthetic resin bonded, inorganic material bonded mould and core making processes. Sand additives and mould coatings. Metal mould casting processes, centrifugal and continuous casting processes.		
3.	Casting for heterogeneous materials-FRP, quick casting, full mould casting, evaporative pattern casting	07	15
4.	Solidification, Gating and Riser design & analysis, Nucleation and grain growth, Solidification of pure metals, short and long freezing range alloys. Rate of solidification, macrostructure and microstructure. Solidification contraction; Fluidity and its measurement. Mould-metal interface reactions.	10	24
5.	Melting and quality control of various steels and non-ferrous alloys - casting defects - fettling, inspection and testing of castings	07	15
6.	Design for castability, process friendly design, castability analysis and collaborative engineering	07	14
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**20**	**20**	**10**

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. Scrope Kalpakjian,, "Manufacturing processes for Engineering Materials", Addison, Wesley, 1997.
2. Fundamentals of metal casting technology - P.C. Mukherjee, Oxford and IBH.
3. Mechanical Metallurgy, Dieter, Me Graw Hill, Kogakusha
4. Casting properties of metals and alloys - V. Korolkove.
5. Metal casting-B.Ravi-PHI

(b) Open-source software and website:

1. PRO- CAST DESIGN SOFTWARE
2. Free online learning resources in Casting Design and Simulation: http://efoundry.iitb.ac.in/Academy/index.jsp

Suggested Course Practical List:

1. To Study and Performance on Metal mould casting
2. To Study and performance on Continuous casting
3. To Study and performance on Squeeze casting
4. To Study and performance on Vacuum mould casting
5. To Study and Performance on Evaporative pattern casting
6. To Study and Performance on Ceramic shell casting
7. Review on any metal casting technology for research paper

List of Laboratory/Learning Resources Required:

1. Ferrous Foundry
2. Foundry Equipment
3. Pattern Makers

Suggested Activities for Students: Any activity based on above syllabus content

- Case study Research and Analysis on Casting Technology

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