

# GUJARAT TECHNOLOGICAL UNIVERSITY

## MECHANICAL (PRODUCTION ENGINEERING) (28)

### ADVANCE CASTING TECHNOLOGY

**SUBJECT CODE:** 3712801

**SEMESTER:** I

**Type of course:** Core I

**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

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

**Content:**

Sr. No.	Topics	Teaching Hrs.	% 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.	7	16
2	Technology of Selected Casting Processes, clay bonded, 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.	7	16
3	Casting for heterogeneous materials-FRP, quick casting, full mould casting, evaporative pattern casting	6	14
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	26
5	Melting and quality control of various steels and non-ferrous alloys - casting defects - fettling, inspection and testing of castings	6	14
6	Design for castability, process friendly design, castability analysis and collaborative engineering	6	14
	Total	42	100

**Reference Books:**

1. ScropeKalpakjian,, "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

### **Course Outcome:**

After learning the course the students should be able to:

1. understand the casting systems fundamentally
2. design the gating and riser design & analyze the metallurgical aspects of the solidified metals,
3. Performing Inspection and Testing of Different Castings
4. Design for castability-process friendly design
5. To Find out Practice on Casting Defects on Product

### **List of Experiments:**

1. To Study about Metal mould casting
2. To Study about Continuous casting
3. To Study about Squeeze casting
4. To Study about Vacuum mould casting
5. To Study about Evaporative pattern casting
6. To Study about Ceramic shell casting

### **Major Equipments:**

- 1) Ferrous Foundry
- 2) Foundry Equipments
- 3) Pattern Makers

### **List of Open Source Software/learning website:**

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