GUJARAT TECHNOLOGICAL UNIVERSITY

PRODUCTION ENGINEERING

FOUNDRY TECHNOLOGY

SUBJECT CODE: 2152506

B.E. 5th SEMESTER

Type of course: Core

Prerequisite: Nil

Rationale: Production engineers need to know different types of Foundry processes for production of intricate part in combination with the accuracy, tolerance & surface finish. The hands on skill as regards to Foundry Technology are must be it at a scale of mass, batch, or unit production. The present course intends to give the exposure of various Foundry processes for a product whose scale ranges from miniature to extra-large.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs.	Wodule Weightage
1	**Introduction and types of foundries:** Basic steps in the process of metal casting; comparison of casting with metal joining.	02	05
2	**Pattern and Pattern Making:** Patterns: Materials, types and design of Patterns, Pattern, Pattern allowances, Pattern colors	06	10
3	**Mould and Mould Making:** Introduction, Moulding Sand – Types and Properties, Moulding Tools and Equipments- Moulding Machines and Hand Moulding tools, Function of Core, Types of Cores, Core Prints, Core Venting and Baking, Core Shifting and Chaplets, Moulding Processes- Bench Moulding, Floor Moulding, Pit Moulding, Stack Moulding, Green Sand Moulding, Dry Sand Moulding, Loam Moulding, Core Moulding, Machine Moulding.	12	15
4	**Foundry Furnaces:** Types of Foundry Furnaces- Cupola Furnace, Electric Arc Furnace, Induction Furnace.	05	10
5	**Gating Systems:**	05	15

	Gating System- types of Gates and Risers, Gating Ratios and chills, Riser location & design in actual casting, Directional Solidification in Casting, Physical Behavior of Metals during Solidification.		
6	**Finishing & Heat Treatment Processes:** Various Fettling, Finishing and Heat Treatment of Casting	08	10
7	**Advance Casting Processes:** Investment Casting, Centrifugal Casting, Shell Moulding, Gravity die/ permanent mold, casting, Continuous Casting, pressure die casting, Slush Casting, Non metal Molding /Ceramic Molding.	12	20
8	**Inspection and Testing of Casting:** Defects in Casting, its causes and remedies, Inspection and Nondestructive Testing of Casting	04	10
9	**Modernization and Mechanization of Foundry:** Material Handling, Pollution Control in Foundry, Application of Computers in Casting Processes.	02	05

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
7	**7**	**21**	**21**	**14**	**--**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. A Text Book of Foundry Technology by O.P. Khanna & M. Lal, Dhanpat Rai.
2. Manufacturing Technology Foundry Forming & Welding by P.N. Rao – TMH.
3. Foundry Technology by P.L. Jain.
4. Production Technology by P.C.Sharma – S Chand.
5. Process and Materials of Manufacture By Lindberg – PHI.
6. Casting Technology by Chakravarty – New Age.
7. Metal Casting by Ravi, PHI.
8. Metal Casting by Ramarao- New Age Publication.
9. Principles of Foundry Technology by R.K.Jain.
10. Principle of Metal Casting by Hein.

Course Outcome:

1. After learning the course the students should be able to:
2. Indicate which types of Foundry Technologies are suited for producing different intricate shapes of the product.
3. Identify and measure Foundry Technology variables in Foundry Industries and make technical inference about the process.
4. Indentify various advances casting processes and gating system.
5. Determine various furnaces used in foundry technology

6. Determine the process to make the cast product.
7. Indentify the various defects in foundry with preventive actions.
8. Determine different softwares used for the foundry technology

List of Experiments:

1. To Study about Pattern and Pattern Making.
2. To Study about Mould and Mould Making
3. To Study about Melting Furnaces
4. To Study about Gating Systems
5. To Study about Finishing Processes
6. To Study about Advance Casting Processes
7. To Study about Inspection and Testing of Casting
8. To Study about Modernization and Mechanization of Foundry
9. Foundry Industries Industrial Visit with student's individual report

Design based Problems (DP)/Open Ended Problem:

Design & Draw assembly & detailed drawing of pattern, core & Mould of any of the following component:

1. Flat belt/ V-belt pulley.
2. Flywheel.
3. Gear Box.
4. Piston rod/ Push rod/ Connecting rod.

Major Equipments:

E- Foundry by IIT Bombay with student's individual login (Freely Available) or AutoCAST Software

List of Open Source Software/learning website:

1. **http://nptel.ac.in/**
2. **E-Foundry, IIT Bombay**

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.