



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3152111

Semester – V

Subject Name: Iron Making & Steel Making Technology

Type of course: Science & Engineering

Prerequisite: Knowledge of Materials Thermodynamics, Introduction of Transportation Phenomena & Phase Transformations.

Rationale: Iron and Steel are the most important engineering materials used abundantly in wrought or cast form in variety of applications as material of construction of components, fabrications, equipment of power sectors, engineering machine components, dairy equipment, pharmaceutical equipment, constructions etc., apparently demanding different sets of physical/mechanical /electrical & magnetic properties. The aim of this course is to gain an understanding the process of iron and steel making. Students should understand the different types of iron and steelmaking processes associated merits & demerits of iron & steel produced in terms of quality & productivity, process parameters, underlying metallurgical principles of reactions, Practice of Melting-Treating-Refining technologies & quality control aspects. The student explores the knowledge of the state-of-the art practices of iron and steelmaking such as- Blast Furnace Technology, Primary Steel Making, Ladle Metallurgy and Secondary Steel Making & Continuous Casting Process.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hours	% Weightage
1	Principles of Iron Making and Steel Making.	06	05
2	Feasibility of reactions and chemical kinetics.	08	15
3	Iron making through blast furnace route, steady state heat and material balance in blast furnace.	07	13
4	Effect of different process parameters on the productivity and quality of pig iron.	07	12
5	Alternate methods for reduction of iron.	06	10
6	Steel making primary processes - pneumatic and hearth, secondary steel making, quality steelmaking, deoxidation, inclusions.	12	30
7	Control of composition and quality of steel using slags - ferrous slags, physical chemistry of slag-metal reactions.	10	15
	Total	56	100



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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	35	20	15	00	00

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 first course in iron and steel making, Dipak Mazumdar, Orient Blackswan Pvt. Ltd., (2015)
2. Ironmaking and steelmaking: Theory and Practice, Ghosh Ahindra, Chatterjee Amit, PhiLearning Private Limited, (2001)
3. Extractive Metallurgy 1: Basic Thermodynamics and Kinetics, Alain Vignes (ISTE Ltd.,)
4. Extractive Metallurgy 2: Metallurgical Reaction Processes, Alain Vignes (ISTE Ltd.,)
5. Extractive Metallurgy 3: Processing Operations and Routes, Alain Vignes (ISTE Ltd.,)
6. An introduction to modern steel making, R. H. Tupkary, Khanna Publishers (2000)
7. An introduction to modern iron making, R. H. Tupkary, Khanna Publishers (2004)

Course Outcomes:

Sr. No.	CO statement	Marks % Weightage
CO-1	Describe the physical and chemical processes take place during iron making and steelmaking.	35
CO-2	Analyse the effect of change in process parameters in iron making and steelmaking processes.	25
CO-3	Describe the methods for control of quality in iron and steel production.	30
CO-4	Solve numerical problems involving reaction kinetics and composition control.	15

List of Open Source Software/learning website:

1. <https://nptel.ac.in/courses/113104059/>
2. www.ocw.mit.edu