

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

METALLURGY ENGINEERING

Subject Name: **Iron Making**

Subject Code: **152101**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No.	Course Content
1.	General: History of iron making. Iron and steel industries in India. Occurrence, distribution and evaluation of raw materials (iron ore, coal and flux) for iron making.
2.	Burden: Burden preparation, Burden qualities and calculation, Agglomeration-nodulising and briquetting, Sintering-process, variables and machines.
3.	Palletization: Palletization process, Theory of bonding. Mechanism of ball formation, Disc and drum palletizer, Induration of pallets, Cold bonding technique and testing of pallets.
4.	Blast Furnace (B. F.) - Profile: Constructional features of blast furnace, Profile, Refractories, Accessories, Charging mechanism, Bell and bell-less charging systems.
5.	B.F. – Reactions: Physico-chemical principles of blast furnace. Blast furnace reactions. Reaction in stack, tuyere zone, bosh and hearth. Thermodynamics equilibria, Direct and indirect reduction. Kinetics of iron-oxide reduction, Slag-metal reactions, Desiliconization, Desulphurization.
6.	B.F. : Process Developments: RAFT (Raceway Adiabatic Flame Temperature). Fuel injection. Oxygen injection. High-top pressure. High temperature blast, their effect on coke rate and metal-impurity distribution in slag and metal.
7.	B.F. – Operations: Operational steps, Blast furnace irregularities and remedial measures, Blast furnace gas, properties, cleaning and utilization.

8.	Alternative Methods of Iron Making: Reduction smelting, Direct reduction processes, Fluidized bed process, Electro thermal process and mini blast furnace.
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Term Work:

Experiments and problems based on above syllabus.

Reference Books:

1. Introduction to Modern Iron Making, R. H. Tupkary, (Khanna Pub.)
2. Iron Making and Steel Making: Theory and Practice, A. Ghosh and A. Chatterjee, (Prentice Hall)
3. Principles of Blast Furnace Iron Making, A. K. Biswas, (SBA Pub.)
4. Making, Shaping and Treating of Steels, A. W. Cramb (Editor) (11th Edition, Vol. 1 & 2, AISE, Pittsburg)
5. Blast Furnace: Theory and Practice, J. G. Peacey and W. G. Davenport, (Pergamon Press, Oxford)
6. Introduction to Physical Chemistry of Iron and Steel Making, R. G. Ward, (ELBS)
7. Blast Furnace Iron Making, J. J. Gupta and Amit Chatterjee, (SBA Pub.)