5th Semester	RMM5C003	**Iron Making**	L-T-P 3-0-0	3 Credits

Module I: (10 Hours)

Raw materials and their properties: Iron ores, Limestones, Agglomerates and Coke. Preparation of ores: sintering and palletizing, blast furnace burdening and distribution, testing of raw materials for blast furnace, material balance.

Module II: (10 Hours)

Design: Blast furnace profile, stove and gas cleaning units; instrumentation, refractory used in blast furnace and stove.

Reactions: Fe-C-O, Fe-O-H phase equilibria, Reactions in stack, bosh and hearth; formation of primary slag, bosh slag and hearth slag. Slag composition and its control, Metal-slag reactions, Control of hot metal composition.

Module III: (8 Hours)

Process Control: Factors affecting fuel consumption and productivity, Recent developments in Blast furnace operations like, Bell-less top charging system, High top pressure, Humidified & Oxygen enriched blast and Auxiliary fuel injection through tuyers.

Module IV: (5 Hours)

Irregularities in blast furnace operation and their remedies.

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Module V: (7 Hours)

Alternative routes of iron making: Introduction, Processes of Sponge Iron production; SL/RN, MIDREX, HyL processes. Smelting Reduction Processes; COREX, ROMELT, Hismelt.

Books:
[1]   R.H. Tupkary,V.R.Tupkary,"An Introduction to Modern Iron Making",Khana Publication
[2]   Ahindra Ghosh and Amit Chatterjee: Ironmaking and Steelmaking Theory and Practice, Prentice-Hall of India Private Limited, 2008
[3]   Ahindra Ghosh and Amit Chatterjee: Ironmaking and Steelmaking Theory and Practice, Prentice-Hall of India Private Limited, 2008
[4]   Dipak Mazumdar, A First Course in Iron and Steel Making, University Press-IIM-2015

Digital Learning Resources:

Course Name:	Iron making and steel making
Course Link:	https://swayam.gov.in/nd1_noc20_mm23/preview
Course Instructor:	Prof. Gour Gopal Roy, IIT KGP