Course Type	Course Code	Name of the Course	L	T	P	Credit
DP	NFMC512	Ferrous Extractive Metallurgy Lab	0	0	3	1.5

Course Objective
The main objective of the lab course is to perform different tests to deliver the technical skills andunderstanding of ferrous metallurgy.
Learning Outcomes
On completion of the course, students will be able to understand how the properties of different raw materialsaffect the different iron & steel processes

No.	Topics to be Covered	Hours	Learning Outcome
1	To determine the true density, apparent density, and bulk density of the different iron ores, coke, and limestone.	3	Knowledge about the physicalproperties of iron making rawmaterials
2	Determine the effect of iron ore particle size andshape on its bulk density.	3	Knowledge about the size, shape anddensity of iron ore
3	Determine the effect of particle size, moisturecontent, and shape (lump, pellets, and sinter) on theangle of repose.	3	Knowledge about the abrasionresistance of raw material duringcharging
4	Determine the tumbler strength and shatter strength of a given iron ore.	3	Knowledge about the strength of rawmaterials
5	Determine the effect of moisture content in the sintermix on the yield and strength keeping the cokebreeze as fixed.	3	Knowledge about the role of moisturein sintering process
6	Determine the effect of coke breeze and basicity onthe sinter yield and strength by keeping otherparameters fixed.	3	Knowledge about the role of fuel andbasicity in sintering process
7	Determine the effect of reduction time on the degreeof reduction of iron ore in the presence of differentreductants.	3	Knowledge about the kinetics of ironore reduction
8	Determination of the effect of different reductantsand raw materials on the swelling behaviour of ironore pellets.	3	Knowledge about the swellingtendency of raw materials
9	Determination of the effect of reductant reactivity onpercent reduction of iron ore (lump, pellets, sinter) atdifferent temperatures.	3	Knowledge about the effect ofreactivity on reduction
10	Determine the softening behaviour of iron ore material which is simulated with blast furnacecomposition.	3	Knowledge about the softeningproperty effect on reduction

11	To study the effect of lance nozzle height on the air flow rate needed for critical depth.	3	Knowledge about the basic oxygenlance steelmaking
12	To study the effect of DRI addition on the melt composition of high-carbon steel.	3	Knowledge about the dissolution ofimpurities
	Total	36	

Reference Book:
1. Theory and Laboratory Experiments in Ferrous Metallurgy, RC Gupta, PHI, 1st edition, 2009
2. A textbook of Metallurgical Analysis, B.C Agrawal and SP Jain, Khanna Publisher, 3rd edition, 1976