COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	CREDIT
DP	NFMC504	Non-ferrous Extractive Metallurgy Lab	0	0	3	1.5

COURSE OBJECTIVE
To give practical knowledge of extraction and separation of non-ferrous metals from ores
LEARNING OUTCOMES
Upon successful completion of this course, students will: • Able to analyse the metals present in the ore • Able to extract metal from lean ore through hydrometallurgy route • Able to separate metals ions from the aqueous solution to produce metals

NO.	TOPICS TO BE COVERED	HOURS	LEARNING OUTCOME
1	Orientation of Non-ferrous Extractive Metallurgy Lab	3	Introduction to Non-ferrous Extractive Metallurgy Lab
2	Estimation of iron and silica content in the iron ore	3	Understanding of titration method for determination of iron and silica
3	Estimation of copper (%) in copper ore by using titration method	3	Understanding of titrationmethod for determination of copper
4	Study of chloridizing roasting at different time using NaCl as chloridizing agent	3	Understanding of chloridizing roasting
5	Study of magnetizing roasting or reduction roasting	3	Understanding of magnetizingroasting
6	Study of roasting kinetics of zinc sulphide at high temperature in oxidizing atmosphere	3	Understanding of roasting kinetics
7	Study of effect of acid concentration and time on leaching of zinc sulphide concentrate	3	Understanding of selective leaching process
8	Study the effect of pH on solvent extraction of copperions	3	Understanding of solvent extraction method
9	Study of electrowinning of copper from coppersulphate solution	3	Understanding of electrowinning process to producemetal from aqueoussolution
10	Study of cementation process to produce metal powder from aqueous solution	3	Understandingof cementationprocess
11	Preparation of metal compound from aqueous solution using precipitation method	3	Understanding of precipitationmethod to produce metalcompound

12	Demonstration of centrifuge for separation of solid and liquid	3	Understanding of working ofcentrifuge
13	Demonstration of pressure leaching for recovery of metal ions in solution	3	Understanding of pressure leaching process
14	Chemical analysis of metal ions by using atomicabsorption spectrometry (AAS)	3	Understanding of AAS working principle and steps ofanalysis along with samplepreparation method.
Total		**42**	