Course Type	Course Code	Name of Course	L	T	P	Credit
DC6	MNC 207	UNDERGROUND METAL MINING	3	0	0	9

Course Objective
To develop an indepth knowledge on various underground metal mining methods including development, extraction, evacuation and associated mechanization for productive and safe mining
Learning Outcomes
The students will be able to select a suitable method of metal mining and design its layout, equipment/manpower deployment for a given geomining condition and production requirement

Sl. No.	Major Topics	No. of Lectures	Learning outcomes
1	Scenario of underground metal mines in India. Scope and Limitations of underground mining.	1	Understanding the recent developments and future of metal mining.
2	**Development of underground metal mines entries** Decline Development, High Speed Shaft Sinking, Sinking in difficult formation, Shaft Equipping, choice of level interval, block length, shape, size, position, widening and deepening of shaft, station / plat, grizzly, ore pass, waste pass, ore bin, main ore pass system, underground crushing system, loading station, underground chambers, underground maintenance bay, arrangement for dumping in to ore pass, underground crushing, loading and hoisting, special sinking method, pit bottom & pit top layout, railway siding.	10	Understanding of latest shaft sinking method as well as future high-speed shaft sinking
3	**Development of entries to stope and ancillary facilities** Crosscut and drifts, their shape, size, position. Ground excavation, drive drift, cross cut, mucking in different conditions, different type of mucking and blasting, High speed development with help of track less machinery Drill Jumbo, LHD. LPDT. Modern use of locomotive in underground mine. use of modern drilling and loading arrangements, modern method of raising - Raise boring system, Alimac, Manual, , Jora lift, long hole method, vertical crater retreat method of raising, and detail, modern method of winzing, Different method of secondary rock breaking. **Trackless mine Development**	8	Understanding of fast mechanized drive development with automation.
4	**Stoping** Selection of stoping methods, Cut & Fill method, Room & Pillar, sublevel stoping, sublevel caving, block caving, shrinkage, vertical crater retreat method, Resuing, square set, other minor stoping methods,	14	understanding the present stoping method, future trend of stoping with automation and reduced human exposure.
5	**Mine Support** Different type of timber support, their properties and application, rock bolt, cable bolt, rock support, Mechanized Rock Bolting System, shotcrete, Back fill support. Paste filling – basics and plant layout, Preparation of filling material. Fore poling, piling, bulkhead.Steel support, Steel set - rigid and yielding type, tubing, wire mesh, improvised steel props, cement support	9	Understanding of present mine support, mechanization in mine support and redesigning mine support for higher productivity and low dilution.
	Total no of Lectures	42	

Text Books

1. Introduction to Mining Engineering by Ratan Raj Tatia.
2. Introductory Mining Engineering by Howard L Hartman
3. SME Mining Engineering Hand Book by Howard L Hartman.

Reference Book

1. Underground Mining Methods by W.Hustrulid and Richard L. Bullock, SME 2001