Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	**NMNC509**	**Mine Surveying Techniques**	3	1	0	4

Course Objective

The course will give a brief overview of application of modern tools and techniques in mine surveying. The course will also give an insight into the best surveying practices in mines including legislation requirements. The course has been designed taking into the need of capturing 3D data for mine modelling, planning and visualization.

Learning Outcomes

Upon successful completion of this course, students will:

- have a broad understanding of the traditional and modern methods of computation of mine surveying techniques.
- learn the present legislation requirements for best mine practices
- be able to successfully understand the concept of controlling the directions and fixing the gradient in drifts
- able to properly understand the duties and responsibilities of surveyors in field

Unit No.	Topics to be Covered	Lecture Hours +Tutorial	Learning Outcome
1	**Surveying:** Definition, Objective, Classification and principles, Errors	5L+0T	Student will understand the requirement of the good surveying practice and errors associated with field measurements
2	**Measurements:** Linear Measurements, Angular Measurements, Levelling.	8L+4T	To understand the linear and angular measurements of area in the mines along with conducting levelling
3	**Contouring:** Concepts, Characteristics, Contour Interval, Methods of contouring and uses of contours Total Station: Principle of electronic measurement of distance and angles, Construction and working with Total Station, Applications and Recent Developments	7L+2T	The students will learn the use of plotting contours and methods associated with it and electronic measurement of distances and angles in the mines using Total station
4	**Underground Traversing and Leveling:** Underground mining conditions, underground traversing and underground levelling, Survey requirements in underground mines	4L+0T	Students will learn the how to conduct underground traversing and levelling
5	**Digital Mine Plans, area and volume calculation:** Data Processing, Representation and Earthwork Calculations	4L+2T	Gather understanding about digital mine plan preparation and earthwork calculation
6	**Mine Surveying – Statutory Requirements:** General requirements about mine plans and sections, Types of plans and sections, Specification of Limits of Error. Duties and Responsibilities of Surveyors Correlation and Alignment: Principle, Methods, Determination of Gyro-north, Modern Gyro-Laser combination Correlation; Shaft depth measurement.	7L+3T	Students will learn different types of plans and sections, different specifications about errors limitation in the mine and acquire knowledge about Gyro-north and shaft depth measurement for mine correlation survey.

7	**Monitoring of Open Pit Slopes and Subsidence through Advanced Surveying Techniques:** Geodetic approaches in slope monitoring	4L+2T	Students will learn the subsidence and related problems in mines and their monitoring
8	**Development and Stope Surveying:** Control of direction and gradient in drifts, tunnels, raises, winzes, Methods of survey in moderately and steeply inclined ore bodies, flat and vertical ore bodies/seams	2L+1T	Students will learn the basic understanding of the stope surveying and how to extract ores in different inclined slope conditions
	Total	42L+14T (56)	

Text Books:

1. Punmia, B. C. (2005), Surveying Vol. 1 and II
2. Schofield, W. and Breach M. (2006), Engineering Surveying

Reference Book

1. Advances in Surveying Technology: Lecture Notes by faculty