

**ANNEXURE - I  
SYLLABUS FOR THE EXAMINATION FOR MINE SURVEYOR'S  
CERTIFICATE OF COMPETENCY  
(UNDER METALLIFEROUS MINES REGULATIONS, 1961)**

Statutory provisions of surveyor, surveying, plans & section, in Metalliferous Mines Regulations 1961.

Linear measurement: Instruments for measuring distance, ranging, chain surveying; EDM

**Angular measurement:** Miners Dial, Prismatic compass; bearing of lines; local attraction; magnetic declination.

**Theodolite:** Modern Micro-optic Theodolite; measurement of horizontal and vertical angles; theodolite traversing; traverse calculation; computation of coordinates; adjustment of traverse; temporary and permanent adjustment.

**Total Stations:** Surveying by Total stations, Downloading the co-ordinates. Procedures of use, care, calibration and servicing, errors, adjustments and applications

Tacheometry.

**Controlled surveys:** Triangulation; Trilateration; application of GPS and Total Station in mine surveying.

**Levelling:** Levelling instrument types of levelling; booking and reduction methods; temporary and permanent adjustment of levels; geometrical, trigonometric and physical levelling; characteristics and uses of contours; methods of contouring; traverse; co-ordinates and levelling problems.

**Correlation:** Method of correlation surface and underground including Gyro Laser combination.

Use, care, testing, and adjustments of instruments.

**Field astronomy:** Astronomical terms; determination of true bearing by equal altitude method; Gyro theodolite; principle and determination of Gyro north, Astronomy: astronomical triangle; conversion of time systems and precise determination of azimuth by astronomical methods.

**National grid:** Global coordinates World Geodetic System (WGS), Application of Google earth and universal transfers Mercator; transformation of coordinates, vertical projections; mine models.

**Geodesy:** Geod, spheroid and ellipsoid, geocentric, geodetic and astronomical coordinates or thometric and dynamic heights.



Photogrammetry: Introduction; scale of a vertical photograph; photographs versus maps; application of photo grammetry in mining.

**Theory of errors and adjustments:** Causes and classification of errors; inclines of precision; laws of weight propagation and adjustment of errors; adjustment of triangulation figures.

Control of direction and gradient in inclined shafts, drifts, tunnels, raises and winzes; Surveying of flat, moderately and steeply inclined, and vertical ore bodies with or without auxiliary telescopes.

Area and volume calculation; different methods and their limitations: earth work and building estimation; laying out of rail curves on surface and underground, gradients of haul roads / ramps. Measurement of depths of incline roadways and shafts; determination of azimuth latitude and longitude.

Borehole surveying and calculations, dip, strike, outcrop and fault problems.

**Development Sampling:** Channel and block averaging; Stope sampling; averaging of stope face boundaries; Valuation of block roof tonnages; milling widths; observe plans.

Types of plans, their preparation, care, storage and preservation: legislation concerning mine plans and sections; duties and responsibilities of surveyors.

Geological map reading.

Subsidence survey, Slope monitoring, Profiling of benches, highwall, dumps, slopes

Application of computers in mine surveying and preparation of mine plan, Use of Auto Cad, Surpac and Datamine

Application of modern Survey Instruments in Mine Surveying: Differential Global Positioning System (DGPS),

3D- Laser scanner, Drone, Use of 3D- Laser scanner for Profiling of benches, highwall, dumps, slopes, etc.

MINING GYAN

