

**ANNEXURE – I  
SYLLABUS FOR THE EXAMINATION FOR SURVEYOR'S  
CERTIFICATE OF COMPETENCY**

**FIRST PAPER**

**Linear measurement:** Instruments for measuring distance ranging, chain surveying; errors in chaining and plotting; optical square.

**EDM :** Principles of measurements; types; correction and selection of instrument.  
**Angular measurement:** Prismatic compass; bearing of lines; local attraction; magnetic declination.

**Plan Table Surveying:** methods contouring using plane table and micro-optic alidade.

**Miners' dials and other compass instruments:** dialing; loose and fast needle surveying.

**Theodolite:** Modern micro-optic theodolites; 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, errors, adjustments and applications.

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

**Tachometry**

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

Use, care, testing, and adjustments of instruments.

MINING GYAN



## SECOND PAPER

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

**National grid:** Map projection Cassini Lambert's polyconic and universal transfers Mercator; transformation of coordinates, vertical projections; mine models.

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

**Photogrammetry:** Introduction; scale of a vertical photograph; photographs versus maps; application of photogrammetry and remote sensing in mining.

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

**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.

**Surveying of flat, moderately and steeply inclined and vertical workings:** control of direction and gradient in drifts and roadways; traversing along steep working with or without auxiliary telescopes.

**Area and volume calculation; different methods and their limitations:** earth work and building estimation; laying out of rail and haul road curves, 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.**

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

**Geological map reading.**

**Profiling of benches, highwall, dumps.**

**Dump / Highwall stability monitoring using different instruments like Laser Scanner / Continuous Real Time Monitor.**

**Application of computers in mine surveying and preparation of mine plan, 3D laser profiling of surfaces and bench / slopes.**

