Diploma Trainee (DT): Mine Survey

Item Grid:

Phase	Section	Topic
I	Aptitude	General English
		Quantitative aptitude &
		Reasoning ability
II	Technical - Mine Survey	Mining Legislation
		Controlled surveys
		Tachometry
		Total Station, GPS, DGPS and Auto Level
		EDM
		Field astronomy
		National grid and Coordinates system
		Geodesy
		Photogrammetry
		Theory of errors and adjustment
		Surveying of flat, moderately and steeply inclined and vertical workings
		Area and volume calculation; different methods and their limitations
		Monsoon Preparation Plan
		Borehole surveying, Coal Sampling and analysis, dip, strike, outcrop and fault problems
		Types of plans for opencast workings, their preparation, care, storage and preservation
		Application of computer in mine surveying
		Profiling of benches, highwall, dumps
		Coal Quality

Detailed syllabus provided below for PHASE I

General English

1. Reading comprehension
2. Verbal Ability
3. Antonyms
4. Synonyms
5. Grammar (sentence correction)
6. Idioms
7. Analogies

Quantitative aptitude

1. Arithmetic progression
2. Algebra
3. Permutation and combination

4. Percentages
5. Ratio & Proportions
6. Time-Speed-Distance

Reasoning ability

1. Positional/Seating arrangement
2. Directional Problem
3. Non-verbal reasoning
4. Assumption, premise, conclusion, linear and matrix arrangement
5. Clocks, calendars, binary logic
6. Coding & Decoding
7. Series

Detailed Syllabus provided for Phase II

Mining Legislation:
The Mines Act; Mines Rules; Coal Mines Regulations 2017 applicable to Opencast Coal mines, covering survey component.

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

Tachometry:
Topography and Tachometry related survey.

Total Station, GPS, DGPS and Auto Level:
Surveying by Total station, GPS, DGPS and Auto Level, errors, adjustment and applications like close traverse, bench mark establishment and shifting.

EDM:
Principle of measurement; types; correction and selection of instrument.

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 syste and precise determination of azimuth by astronomical methods.

National grid and Coordinates system:
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.

Theory of errors and adjustment:
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 drift and roadways; traversing along steep workings with or without auxiliary telescope.

Area and volume calculation; different methods and their limitations:
OB volume calculation by various methods; Coal Stock Measurement; CVC/Other government guidelines regarding Coal Stock/OB measurement; MDO Contract provisions on volumetric measurement of OB/Coal; Third party provisions for OB/Coal measurement and periodical reconciliation; Plan Contouring and cross section preparation; Earth work and building estimation; Laying out of rail and haul road curves, gradient of haul roads/ramps; measurement of depth of incline roadways and shafts; determination of azimuth latitude and longitude.

Monsoon Preparation Plan:
Sump, Drainage, Pump capacity, rainwater management plan. Preparation of Emergency Response Plan.

Borehole surveying, Coal Sampling and analysis, dip, strike, outcrop and fault problems:
Survey of Borehole locations, coal seam/parting identification, marking of fault and outcrop, Third party sampling and analysis methodology regarding Coal quality; Physico-mechanical-chemical properties of Coal and Non-Coal strata; Different grades of Coal.

Types of plans for opencast workings, their preparation, care, storage and preservation:
Legislation concerning mine plans and sections; duties and responsibilities of surveyors.
Geological map reading.

Application of computer in mine surveying:
Preparation of mine plan by using Auto Cad, LisCAD, Minex and other Mine planning related software, 3D laser profiling of surfaces and bench/slopes by using Terrestrial laser scanner (TLS).

Profiling of benches, highwall, dumps:
Dump/Highwall slope stability monitoring using different instruments like Laser Scanner/Total Station/Slope Stability Radar/ Continuous Real Time Monitoring.

Coal Quality: