

Syllabus for CEETA PG 2026 Examination

Mining Engineering

Unit-I: Exploration, Mine Development and Surveying

Mining Geology: Minerals, Rocks and their Origin, Classification; Structural Geology. Fundamentals of Marine Resources and Exploration Techniques.

Mine Development: Methods of access to deposits; Underground drivages; Drilling method and machines; Explosives and accessories, initiation systems and patterns; blast design practices; Environmental impacts due to blasting; Non-explosive techniques for rock breakage.

Mine Surveying: Levels and levelling, theodolite, tacheometry, triangulation; Contouring; Errors and adjustments; Correlation; Underground surveying; Curves; Photogrammetry; EDM, Total Station, GPS, Basics of Drone Surveying, GIS and remote sensing.

Unit-II: Rock Mechanics and Ground Control

Geomechanics: Geo technical properties of rocks; Rock mass classification; Instrumentation and in situ stress measurement techniques; Theories of rock failure; Ground vibrations; Stress distribution around mine openings; Subsidence; Slope stability in highwalls and waste dumps, stabilization measures.

Ground Control Design of pillars; Roof supporting systems; Mine filling Technology. Strata Control and Monitoring Plan.

Unit-III: Mining Methods and Machinery

Mining Methods: Surface mining - layouts, development, rock breakage, loading, transportation and mechanization, continuous surface mining systems; highwall mining; Underground coal mining - bord and pillar systems, longwall mining, thick seam mining methods. Underground metal mining - open, supported and caved stoping methods, stope mechanization, mass-blast techniques, ore handling systems. Waste Dump formation – Types, location and siting of the dump; Beach placer mining and Deep-sea mining technology of polymetallic nodules.

Mining Machinery: Generation and transmission of mechanical, hydraulic and pneumatic power; Materials handling - wire ropes, haulages, conveyors, face and development machinery, hoisting systems, pumps; Mineral Processing Plant - comminution methods and machinery. Whole body vibration of machine operators.

Unit-IV: Surface Environment, Mine Ventilation and Mine Safety

Surface Environment: Air, water and soil pollution: Standards of quality, causes and dispersion of contamination and control; Noise pollution and control; Land reclamation; EIA & EMP; Sustainability in Mining; Restoration of abandoned quarries.

Mine Ventilation: Underground atmosphere; Heat load sources and thermal environment, air cooling; Mechanics of airflow, distribution, natural and mechanical ventilation; Mine fans and usage; Auxiliary ventilation; Ventilation survey and planning; Ventilation networks.

Mine Safety: Mine Gases, Methane drainage; Underground hazards from fires, explosions, dust and inundation; Rescue apparatus and practices; Safety management plan; Safety Audit; Accident data analysis; Disaster management; Mine lighting; Mine legislation; Occupational health and safety.

Unit-V: Mineral Economics, Mine Planning, Systems Engineering

Mineral Economics: Mineral resource classification & mapping; Discounted cash flow analysis; Mine valuation; Mineral taxation. Circular economy and waste minimization.

Mine Planning: Sampling methods, practices and interpretation; Reserve estimation techniques: Basics of geostatistics and quality control; Optimization of facility location; Mine planning and its components, Determination of mine size and mine life; Ultimate pit configuration and its determination, Optimum mill cut-off grade and its determination, Stope planning, Design of haul road, Selection of mining system vis à vis equipment system.

Systems Engineering: Concepts of reliability; Reliability of simple systems; Maintainability and availability; Linear programming, transportation and assignment problems; Network analysis; Inventory models; Queuing theory; Decision trees.

Mine Digitalization and Automation, Innovative Mining Systems.
