Mining and mineral processing engineering syllabus

Mining and mineral processing engineering examinations

Group A - Compulsory examinations (six required)

18-MMP-A1 General Geology and Exploration

Mineralogy, determination and identification of minerals, with emphasis on ore minerals. Structures and forms of orebodies; processes for the formation of ores; classification of ores; definition of reserves and resources. Petrology. Structural geology. Internal and external geologic processes. Structure and strategy of exploration programmes, exploration geochemistry, devising drilling/trenching programmes, surveying techniques and remote sensing.

Textbooks (most recent edition is recommended):

18-MMP-A2 Underground Mining Methods and Design

Description and usage of the following underground mining methods: room and pillar, long-hole, longwall, open stoping, shrinkage, cut and fill sub-level stoping, timbered stoping, top slicing, underhand and overhand stoping, block caving, sublevel caving, and vertical crater retreat. Requirements for development and services including: shafts, hoists, ramp and multi-level access design. Design of pumping, ventilation, compressed air and power facilities. Underground design including: stope development, haulage systems, backfill, equipment selection, and scheduling of development and operations. Capital and operating cost estimation associated with underground mining activities.

Textbooks (most recent edition is recommended):

18-MMP-A3 Mineral Processing


Textbooks (most recent edition is recommended):

18-MMP-A4 Mine Valuation and Mineral Resource Estimation

Aspects of geological conditions and control relating to mineral resource estimation. Principles of mineral resource
estimation using conventional and geostatistical methods. Aspects of mine valuation - assessment of market conditions, capital and operating cost estimation, estimation of revenue including smelter contracts, taxation, cash flow, sensitivity and risk analyses, and economic optimisation of mine development and extraction variables including cut-off grade, installed capacity utilisation and sequencing.

Textbooks (most recent edition is recommended):


18-MMP-A5 Surface Mining Methods and Design

Cyclic and continuous surface mining methods including strip mining, open pit mining, (dragline, bucketwheel excavators, truck and shovel and dozer methods), hydraulic mining and dredging. Design criteria for surface mines including scheduling, material removal and capacity-rated equipment-sizing, availability and utilization calculations, slope design, stripping ratio, materials handling, pit ramp and waste dump design, pit dewatering and land reclamation. Capital and operating cost estimation associated with surface mining activities.

Textbooks (most recent edition is recommended):


18-MMP-A6 Mining and the Environment

Overall understanding of environmental practices in mining including; waste rock and tailings disposal systems; prediction/prevention/treatment/control of acid rock drainage; control of dust/noise/gaseous emissions; environmental impact assessment (EIA) processes; environmental effects monitoring (surface water and groundwater); reclamation and decommissioning; government regulations relating to environmental protection in design/operation/closure of mines; sustainable development principles and application to mining; risk assessment and management principles with respect to the environment.

Textbooks (most recent edition is recommended):


Group B - Optional examinations (three required)

18-MMP-B1 Applied Rock Mechanics

In situ and laboratory determination of rock properties. Subsurface investigations, structural surveys and rock mass

Textbooks (most recent edition is recommended):


18-MMP-B2 Rock Fragmentation

Principles and technologies of cutting, drilling, boring, and blasting, including vibration and shock effects. Explosives, including properties and classification, selection of chemical explosives and explosive mixtures, regulations and approved procedures for handling, storing, loading, and detonating. Blasting design, including detonators, delay systems, control blasting methods. Vibrations monitoring and blasting methods for vibrations control.

Textbooks (most recent edition is recommended):


For OIQ in Quebec


18-MMP-B3 Material Handling


Textbooks (most recent edition is recommended):


18-MMP-B4 Occupational Health, Safety and Loss Management

Control and detection of hazards in surface and underground mines: rock falls, slope failures, radiation, heat, noise, dust and gas. Ventilation requirements for underground mines, air flow through mine openings, air quality and control. Workplace health and safety. Industrial hygiene in mining environment. Risk analysis, risk management, loss prevention and control.

Textbooks (most recent edition is recommended):

18-MMP-B5 Mill Design and Operations


Textbooks (most recent edition is recommended):


18-MMP-B6 Mill Process Control


Textbooks (most recent edition is recommended):


18-MMP-B7 Extractive Metallurgy (16-Chem-B7 Extractive Metallurgy)


Textbooks (most recent edition is recommended):

- C. Bodsworth, The Extraction and Refining of Metals, CRC Press

18-MMP-B8 Mine Management and Systems Analysis


Textbooks (most recent edition is recommended):
18-MMP-B9 Rock Slope Engineering


Textbooks (most recent edition is recommended):