

Nepal Engineering Council Registration Examination  
***Mining Engineering Syllabus (AMiE)***

Chapters 1-4 are fundamentals/principles of concepts in mining engineering; chapters 5-9 are related to application of mining engineering principles in practice; and the last (10th) chapter is related to project planning, design and implementation.

- 1. Mineralogy and Petrology** **(AMiE01)**
  - 1.1. **Identification and Study of Minerals:** Definitions, Identifications by aid of crystals, physical tests, testing with blow pipe, X-ray Method, Polished surface of Metallic Ores, Examination of thin Sections **(AMiE0101)**
  - 1.2. **Occurrences and Associations of Minerals:** Minerals of Rocks and Veins, Minerals of Saline Residue, Minerals of Gravels, Clays and Marls, Contact minerals, Minerals of Metamorphic rocks. **(AMiE0102)**
  - 1.3. **The Uses of Minerals:** Uses of Minerals in their Natural State, Product extracted or manufactured form minerals. **(AMiE0103)**
  - 1.4. **Descriptive and Determinative Table:** Minerals of Metallic or Sub-metallic luster, (Black or nearly black, tin white, silver white, lead grey or steel gray, metallic yellow, bronze or red in color), Minerals of Non-metallic luster, Minerals substances not easily determinable. **(AMiE0104)**
  - 1.5. **Petrology:** Definition, Branches of Petrology, Formations of Sedimentary Deposits, Various Types of Sedimentary rocks based on origin and compositions, Properties, Depositional Environment. **(AMiE0105)**
  - 1.6. **Igneous rocks:** Geological significance, Geological settings (Intrusive and Extrusive), Classifications, Magma Originations, Dating. Metamorphic Rocks: Foliations, Types of Metamorphism (Contact and Regional), Rock Textures. **(AMiE0106)**
  
- 2. Geology and Mineral Deposits** **(AMiE02)**
  - 2.1. Geological processes of Mineral Formation (Conceptual knowledge about Magmatic, Pegmatitic, Hydrothermal, Weathering, Sedimentation, Metamorphic). **(AMiE0201)**
  - 2.2. Chemical Formation of Rock Forming Minerals, Igneous Rocks, Sedimentary Rocks, Metamorphic rocks, Classifications and forms of Igneous, Sedimentary and Metamorphic Rocks. **(AMiE0202)**
  - 2.3. **Rock Disturbances:** Folds, monoclines, anticlines and synclines, Unsymmetrical Folds, Dip and Strikes, Classifications of faults, fault breccias, Drag, Slickensides, Horses, Shear Zones, Fault Scarp, Joint, Unconformities, Outcrops, Erosions. **(AMiE0203)**
  - 2.4. **Metallic Mineral Deposits:** Ores, Metals in Earth Crust, Cavities, ground waters, Minerals and Classification and Localization of Ore Deposits (Primary Magmatic origin, Deposits by emissions from cooling and solidifying magmas, deposited by circulating ground waters, deposited or concentrated by aid of surface waters). **(AMiE0204)**

2.5. **Non-metallic Mineral Deposits:** Formation and classifications of Abrasive, Asbestos, Asphalt, Building stones, clay, calcareous stones, Carbon minerals (coal, petroleum, natural gases), miscellaneous non-metallic minerals (gems, phosphates, salines, borax, sulphur). (AMiE0205)

2.6. **Stratigraphic Geology:** Definite periods of time, Era, Period, Epoch, Age, Phase, Pre-cambrian, Paleozoic, Mesozoic, Cenozoic(Tertiary) and Quaternary. (AMiE0206)

### 3. **Prospecting, Development and Exploitation of Mineral Deposits (AMinE03)**

3.1. **Guides to Prospecting:** Geological (Physiographic, Stratigraphic, Lithological, Structural and Mineralogical Guides), Geophysical, Geo-chemical and Geo-botanical Guides. (AMiE0301)

3.2. **Methods of Prospecting:** Geological Methods (Reconnaissance maps, Detailed Geological Maps), Geophysical Methods (Magnetic, Gravitational, Seismic, Electrical Methods), Geochemical Methods. (AMiE0302)

3.3. **Methods of Exploratory Drilling:** Manual Drilling(probing by piercing with drive pipes, Wash boring with drive pipes, Hand Percussive drilling, Hand Auger Drilling), Power Drilling (Percussive Drilling, Rotary Drilling). (AMiE0303)

3.4. **Samplings:** Methods of Samplings (Grab, Chip, Channel, borehole), Sampling Procedures, Reduction of Samples, Recording of Samples, Errors in Sampling, Calculation of Average grade, Statistical Analysis of Sample Data. (AMiE0304)

3.5. **Mine Surveying:** Different methods of Surveying, Survey Standards and Procedures (Origin of coordinates, Surface baseline, Underground baseline, Traverses, Correlation of surface and underground surveys, Accuracy of levelling, Survey records and supply of survey information, Requirements when workings are to be inaccessible, Maintenance and adjustment of survey equipment). (AMiE0305)

3.6. **Grade and Reserve:** Estimation of Deposits, Procedures for Estimation of Reserves, Evaluation of Assets. Drawings of Geological and Mine Plan Maps, Compile Maps, and sectional Drawings. (AMiE0306)

### 4. **Drilling and Blasting (AMiE04)**

4.1. **Drilling:** Drilling Methods, Rotary drilling, (AMiE0401)

4.2. Diamond Drilling, Core Recovery, Wire line drilling, Water loss during drilling, Underground drilling, Bore hole deviation, Borehole Survey, Deflection. (AMiE0402)

4.3. **Explosives:** Properties of Explosives, Types of Explosives (Gunpowder, Nitroglycerine, Ammonium Nitrate, Collodion Cotton, TNT, ANFO, Slurry Explosives, Emulsion Explosive, Permitted Explosive). (AMiE0403)

4.4. **Detonators and Accessories:** Definition, Types of Detonators (Plain Detonators, Ordinary Electric detonators, Delay detonators, Electric detonators), Advantage of Delay Detonators, Accessories: Safety Fuse, Detonating Fuse, Detonating Relays, stemming rods, Circuit tester, Exploder. (AMiE0404)

- 4.5. **Handling of Explosives:** Transport and storage of Explosive, Procedures for Establishing a Magazine, Deterioration of Explosive during storage, Destruction of Unserviceable Explosives. (AMiE0405)
- 4.6. **Blasting Practices:** Underground Mines (Governing factors for blasting, Drilling Pattern, Solid Blasting, Preparation of Charge, Charging a shothole, Common causes of accidents, Misfired shots, Permissible shots. Open Cast Mines (Blasting practice in Open cast mines, Quantity of Explosive Consumption, Secondary Blasting). (AMiE0406)
5. **Mining Methods: Opencast and Underground Mining** (AMiE05)
- 5.1. **Opencast Mining:** Types of Opencast Mining, Layout and design, Disposal of overburden, layout of waste dumps, stripping ratios. (AMiE0501)
- 5.2. Designing of Open pits, height of bench, width of bench, Angle of bank, Overall pit slope. Reclamation. (AMiE0502)
- 5.3. **Underground Mining:** Types of Underground Mining, Cut and Fill, Shrinkage, Sub-level Long hole, Room and Pillar, Block Caving. Underground Development: Level, Crosscut, Drive or drift, Cross Drive or Cross Drift, Sub-level, Level Interval, Raise, Ore Pass, Draw Point, Plat or Station, Stope, Headings. (AMiE0503)
- 5.4. **Access to Underground Mining:** Incline and Audits, Pit, Shaft, Incline, Shape, Size and number of Shafts, Depth of Shafts, Shaft Pillars, Sumps, Drainage of the Main Shaft and the main sump. (AMiE0504)
- 5.5. Underground Coal Mining: Board and pillar, Longwall advancing, Longwall retreating, Horizon. (AMiE0505)
- 5.6. **Stowing:** Hand packing, Hydraulic Stowing, Stowing Pipes and their layout, Underground Stowing Arrangements and Operations, Rate of Stowing, Pneumatic and Mechanical Stowing. (AMiE0506)
6. **Rock Mechanics and Underground Supports** (AMiE06)
- 6.1. **Mineral Formation and Working Geometries:** Structural Nature of Mineral Deposits, Working Geometries and their Development (regular and irregular deposits), Analysis and Classification of Working Geometries (Excavation, Pillars, Ore blocks, Barriers, Voids). (AMiE0601)
- 6.2. **Rock Mass forming the Mining Ground:** Structural Qualification of Rocks (Mohs' Hardness Scale, Rock Quality Designation and Stability), Rock Mass Competence and Structural Stability, Other Irregularities Influencing Rock Mass in Situ Characteristics. (AMiE0602)
- 6.3. Ground Forces, Stress Fields and Stress Concentration: Empirical Concepts of Stress Concentration, Concepts of Ground Failure (Bumps, Rock Bursts, Theories of bumps and rock burst), Stress concentration around Excavations, Stress concentration in Structures. (AMiE0603)

- 6.4. **Failure Characteristic Around Mine Workings:** Fracture Development around excavation, Fracture Development in Structures. (AMiE0604)
- 6.5. **Rock Mechanics and Experimental Techniques:** Determinable Rock Properties, Strength properties, Strength Indices, Rock Mass Hardness, Material Characteristics. (AMiE0605)
- 6.6. **Protective and Preventive Measures:** Classification of Supports, Form of Supports and Material of Construction, Protection of Excavation, Roadways, Various types of Supports, Rock Bolting, Roof Stitching, Preventive Measures (Guniting, Grouting), Face Supports. (AMiE0606)
- 7. Mine Transportation (AMiE07)**
- 7.1. **Mining Equipment:** Draglines, Excavators, Dumpers, Compressors, Loaders, Rock Drills, Wagon drill, Jack Hammers, Down the hole hammers, Road Graders, LHD, Mucker, mine car/Shuttle car, Shearers, Ploughs. (AMiE0701)
- 7.2. **Winders:** Cage shaft and fittings, Drum windings, Friction (Koepe) Winding, Steam and Electric Winders, Speed Control and Safety Devices. (AMiE0702)
- 7.3. **Conveyor system of Haulage:** Belt Conveyors, Cable Belt Conveyors, Chain Conveyors, Plate Conveyors, Disc Conveyor, Shaken Conveyor, Accessories. (AMiE0703)
- 7.4. **Locomotive:** Diesel Locomotives, Electrical Locomotive, Trolley Wire, Cable Reel, Compressed Air Locomotive, Electro-gyro Locomotive. (AMiE0704)
- 7.5. **Rope Haulage:** Direct Rope Haulage, Endless Rope Haulage, Main and Tail Rope Haulage, Gravity Haulage. (AMiE0705)
- 7.6. **Underground transports arrangements:** Main Haulage, Gathering Haulage, secondary haulage. (AMiE0706)
- 8. Mines Environment, Safety and Occupational Health (AMiE08)**
- 8.1. **Mine Air :** Composition of Mine Air, Oxygen, Physiological effects of oxygen deficiency in Air, Detection of Oxygen Deficiency, Nitrogen, Methane, Firedamp, Occurrence of Firedamp, Migration of Methane, Methane Drainage, Testing of Firedamp (Safety lamp, Automatic detectors, Non-Automatic Detectors, Recording Methanometers), Carbon Dioxide, Black Damp, Afterdamp, Detection of Carbon Dioxide, Carbon Monoxide, Detection Carbon Monoxide, Sulphuretted Hydrogen, Nitrous Fumes, Sulphur Dioxide, Sampling and Analysis of Mine Air. (AMiE0801)
- 8.2. **Mine Dust:** The Hazard of Dust, Pneumokoniosis, Silicosis, Asbestosis, Physiological Properties of Dust, Dynamics of Small particles, Sampling of Air Borne Dust, Duration and Interval of Sampling, Positioning of Sampling, Methods of Sampling, Prevention and Suppression of Dust, Prevention of the formation of Dust, Prevention of Dust Getting Airborne, Removal of Deposited Dust, Consolidation of Roadway Dust, Air Cleaning. (AMiE0802)
- 8.3. **Mine Climate:** Physical Properties of Mine Air, Pressure, Barometric Pressure, Temperature, Sources of Heat in Mine Air, Moisture Content of Mine Air, Density of Air,

Specific Heat, Enthalpy, Effect of Heat and Humidity on the Miner, Cooling of Mine Air.  
(*AMiE0803*)

8.4. **Mine Ventilation:** Natural ventilation, Causes, Amount and Direction, Artificial Aids to Natural Ventilation, Mechanical Ventilation, Centrifugal fans, Axial Flow Fans, Selection of Mine Fan, Output Control, Combinations (Parallel, Series). (*AMiE0804*)

8.5. **Ventilation Surveys and Planning:** Scope and importance of Ventilation Survey, Survey Interval, location of survey station, survey records, Measurement of quantity of flow, Measurement of Velocity, Manometers, Steps in Ventilation Planning, Desirable features of a Ventilation System, Types off Ventilation System, Air Distributions with different Mining Methods. (*AMiE0805*)

8.6. **Occupational Health:** Physical Hazards, Chemical Hazards, Biological Hazards, Psychological Hazards, Ergonomic Hazards, Precautionary and Preventives Measures.  
(*AMiE0806*)

## 9. **Geology and Mineralization of Nepal** (*AMiE09*)

9.1. **Geomorphologic Features of Nepal:** Physical Features (Terai, Siwaliks, Dun Valleys, Mahabharat, Lesser Himalaya, Higher Himalaya), Rivers of Nepal, Lakes, Gas and Oil Seepages, Glaciers. (*AMiE0901*)

9.2. **Tectonics:** Mountain Belts and New Global Tectonics, Tectonic features of Himalaya, Neo-tectonics. (*AMiE0902*)

9.3. **Stratigraphy:** Stratigraphy of Nepal, Age Determination of Rocks on the basis of Fossils, Radiometric Age Determination, Fossils records. (*AMiE0903*)

9.4. **Geological Setting of Nepal Himalaya:** Different Geological formations. (*AMiE0904*)

9.5. **Mineralization and Rocks:** Mineralization in Nepal, Stratigraphic control, Structural Control, Different mineral prospects of Nepal. (*AMiE0905*)

9.6. Importance of Geology, Mines and Minerals for Economic Development. Policies, Rules and Regulations guiding mineral resources development: (Mines and Minerals Resources Act and Regulations, Forest Act and Regulations, Environment Act and Regulation.  
(*AMiE0906*)

## 10. **Project Planning, Design and Implementation** (*AALL10*)

10.1. **Engineering drawings and its concepts:** Fundamentals of standard drawing sheets, dimensions, scale, line diagram, orthographic projection, isometric projection/view, pictorial views, and sectional drawing. (*AALL1001*)

10.2. **Engineering Economics:** understanding of project cash flow; discount rate, interest and time value of money; basic methodologies for engineering economics analysis (Discounted Payback Period, NPV, IRR & MARR); comparison of alternatives, depreciation system and taxation system in Nepal. (*AALL1002*)

- 10.3. **Project planning and scheduling:** project classifications; project life cycle phases; project planning process; project scheduling (bar chart, CPM, PERT); resources levelling and smoothing; monitoring/evaluation/controlling. (AALL1003)
- 10.4. **Project management:** Information system; project risk analysis and management; project financing, tender and its process, and contract management. (AALL1004)
- 10.5. **Engineering professional practice:** Environment and society; professional ethics; regulatory environment; contemporary issues/problems in engineering; occupational health and safety; roles/responsibilities of Nepal Engineers Association (NEA). (AALL1005)
- 10.6. **Engineering Regulatory Body:** Nepal Engineering Council (Acts & Regulations). (AALL1006)