DIPLOMA IN MINING ENGINEERING

Total Marks:100

1. Mine Environment and Ventilation. (20 MARKS)

Cooling power and the instrument to find cooling power. Normal air composition, Physical, Chemical and Physiological effects of following gases: Oxygen, Nitrogen, Carbon dioxide, Black damp, White damp, Stink damp, Firedamp. Different gas detectors and detector tubes. Down cast, up cast, Homotropal, Antitropal, and Assentional and Discentional ventilation. Flame safety lamp (FSL) and its safety aspects. The procedure of finding accumulation and percentage of methane by using a FSL. Barometer, Aneroid barometer, Manometer and inclined manometer and Pitot tube. The procedure of using the following velocity measuring instruments (a) Smoke and dust method. (b) Anemometer. Self-contained breathing apparatus, Gas mask, Self-rescuer used in mines, Portable type Fire fighting equipments.

2. Geology and Rock Mechanics (20 MARKS)

Definition of Geology and its branches. Weathering and its types. Physical properties of Minerals. Folds, Faults & Joints. Igneous, Sedimentary and Metamorphic Rocks. Textures, Structures. Maps & its types. Ore Mineral, Gangue Mineral & tenor of Ore. Process of formation- Magmatic, Hydrothermal & Mechanical Concentration. Hydrology: Zone of Saturation, Zone of Aeration. Aquifer, Aquifuge & Aquiclude.

Importance of Rock Mechanics: Problems and application of rock mechanics.

Physical properties of rocks: Porosity, Density, Water content, Permeability, Thermal and electrical properties, Anisotropy and durability. Mechanical properties of rocks: Compressive, Tensile, Shear, point load and Flexural strength. Elasticity, Plasticity, Poisson's ratio, Young's modulus, Deformability, Stress strain graph, Hardness, Mohr's scale of Hardness. Ground vibration: Prediction and control measures. Improvement of rock mass properties**:** Grouting, Methods of grouting, Rock bolts and types, Rock mass classification and slope stability

3. Mine Legislation and General Safety; (20 MARKS)

Mine Act 1952: Meaning of the terms, Mine Act, Regulations, Rules, Bye-laws, standing orders, and situations under which act does not apply. Provisions of Mines Act in respect of Drinking water health and hygiene conservancy, Medical appliances, hours and limitation of employment - Leave with wage

Mines Rules 1955: Mine rules related to drinking water, lavatories, and urinals with on surface and in Underground first aid.

Coal Mines Regulations 1957/ Metalliferous Mines Regulations 1961:

Regulations related to motive of accidents, Duties of managers, Asst/under Managers, Overman, foreman and surveyor, Mine plans and Sections, Means of Access and egress, ladder and ladder ways, Transport of men and material-winding in shafts, Haulage, Mine working, Precautions against dangers from fires dust, gas and water.

General Safety in Mines: Classification of accidents causes for accidents, accident preventive measures, Inspection of accidents, Investigation of accidents, Accident enquiry

reports. Notified miner's diseases, occupational health survey, preventive measures, permissible Standard of dusts and threshold values (T.L.V.)

4. Method of Working-Opencast and Underground (20 MARKS)

Quarriable limits, design of benches (Manuel and mechanised). Slope stability. Common drilling and blasting methods used in open cast mining. Explosives used in open cast mining such as ANFO, LOX, slurry and emulsion. Magazine. Bucket wheel excavator, Dipper shovel, ripper, bulldozer, dragline and scrapper.

Underground Mining; Shaft, adit, drive, crosscut, bin, and stope , shapes of shafts: Vertical shaft, Incline shaft, compound shaft and Adit. Reef drive, Foot wall drive. Sub level stoping , cut and fill, shrinkage stoping. Special method of shaft sinking: Piling method of shaft sinking, Caisson method of shaft sinking, Cementation method, Freezing method of shaft sinking. Dome's theory, Prediction of rock burst, The measures to control rock burst.

Coal Mining: Definition of terms Galleries, Pillar, Goaf, Drift, Heading, Face, Cross- Cut, Panel, Barrier. Height of Gallery, width, position, shape, pillar size and panel. Long wall mining method (advancing and retreating). Basic terminology of long wall face like Face, Gate, Tailgate, Goaf line. Subsidence; subsidence factor, angle of draw, critical width, Critical area, sub critical area, super critical area factors affect the subsidence. General principles of underground coal gasification. Definition of Feed .

5. Mine surveying; (20 MARKS)

Compass Surveying: Introduction and purpose, Bearing & its type, Problems on bearings, Compass and its type, Dip and declination, Open and closed traverse, checks,

Levelling: Terms used in levelling, Bench marks, Temporary adjustments of level , Concept of B.S, I.S, F.S, C.P, H.I, Simple levelling and differential levelling. Levelling application: Different types of levelling – fly levelling, check levelling, profile levelling, cross sectioning, plotting of longitudinal and cross section, Contouring: Concepts of contour and terms used in contouring, characteristics of contour, uses of contours, Methods of contouring, Interpolation by arithmetical method, calculation of capacity of the reservoir

Theodolite surveying: Component parts, different terms, Temporary adjustment of Theodolite. Measurement of horizontal angles and vertical angles, Traversing with theodolite . Checks for closed and open traverse. Traverse computation-latitude, departure, closing error, balancing the traverse by Bowditch's rule and Transit rule.

Triangulation survey: well-conditioned triangle, consideration for the selection of Triangulations station, Corrections required in the base line measurement.

Tachometry: Principles of Tachometry- Determination of stadia constants, elevations and distances by stadia Tachometry with staff held vertical and line of collimation horizontal and inclined, Tangential Tachometry – finding the elevations and distances all the three cases.

Modern Surveying Instruments: Global Positioning System (GPS) - Fundamentals, GPS receivers, GPS observations, transformation of GPS results, working principles of GPS navigator. Modern Surveying Instruments- Principles and uses of (i) Electronic Theodolite (ii) EDM (iii) Total station.