ANNEXURE I

MINING ENGINEERING

(APECET 2026)

1. ELEMENTS OF MINING:

1. Introduction and stages of Mining Contribution of Mining activities of civilization-Definitions of terms –Mining Industries in the state and in the country. – Pre mining, mining and post-mining – ancillary mining operations, Types of entries to mineral deposits – Shaft, Incline, Adit –applicable conditions- limitations, compare shaft vs incline. 2. Concepts and Definition of terms commonly used in coal and non-coal mining Classification of the mineral deposits basing on various factors, shallow, deep, very deep, steeply inclined, moderately inclined, inclined vein, massive deposits. Classification of coal seams- Thick, moderately thick, thin seams, I, II, III-degree gassy seams. Classification of methods of working coal opencast, underground-Bord and Pillar/ longwall-Advancing and retreating. 3. Drilling methods Use of drill holes – (Classification) methods – applicable conditions – tools used for drilling percussive and rotary, feed mechanism – Screw feed and hydraulic feed mechanism – mud flushing sludge and core, core recovery methods of core recovery – reasons for deviation of bore holes. 4. Explosives Uses of explosives in mining industry, characteristics classification basing on strength, speed and application, low and high explosives, their composition, properties – explosives used in underground in opencast workings including LOX, slurries, boosters, primer – their composition application permitted explosives – tools, applicability, examples with their composition. Selection of explosives – factors, Initiation of explosives – fuses – safety fuse, cortex fuse. Detonators – types, composition, constructional details and applications. 5. Blasting practice in mines Solid blasting- rules and provisions related-induced blasting-different types of blasting practice different types of drill bits- tools –Reconditioning-Dangers and precaution measures of blasting, fuse and electric blasting and misfire dealing. 6. Shaft Sinking Uses, factors for selection of site, different stages of sinking through subsoil, special methods. Purpose of widening and deepening- special methods-modern trends

2. FUNDAMENTALS OF GEOLOGY:

1. Introduction: Definition, Scope, Classification & Uses of Geology in Mining field, Origin of Earth, Nebular hypothesis of Kant and Laplace, Age of earth, its determination internal structure of earth. 2. Physical Geology: Definition, weathering, erosion denudation, Attrition, Erosion – Geological work of wind, river and their products, Earth quakes, volcanoes.3. Mineralogy: Terms-Minerals-Mineralogy-Important Minerals- Quartzite-Olivine, Amphiboles, Pyroxenes, Feldspar, Mica Group. Megascopic Properties of minerals, Form, Colour, Streak, Clearage, Lustre, Fracture, Specific Gravity, Hardness. Industrial Uses of Metallic Minerals: Corundum, Chromite, Hematite, Magnetite, Bauxite, Barites Chalcopyrite, Malachite, Kyanite. Industrial uses of Non-Metallic Minerals: Mica, Graphite, Calcite, Gypsum, Apatite, Ball clay, China clay, Fire clay, Quartz. Industrial uses of Precious and Atomic Minerals viz.,Diamond, Topaz, Uranium, Zirconium Monazite, and Beryllium. Occurrence and Distributions of Minerals in Andhra Pradesh. Minerals based industries in A.P. Occurrence and Distributions of Minerals India. Minerals based industries in India. 4. Petrology: Lava, Magma, Petrology. Classification of Rocks-Igneous, Sedimentary and Metamorphic .Forms, textures and structures of Igneous Rocks-Granite, Rhyolite, Gabbros, Basalt, Dolomite, Pegmatite. Formation of Sedimentary Rocks – Classification – Breccia, Conglomeration, Sandstone, 5. Shale, Limestone,

Dolomite- Metamorphosis – Metamorphic Rocks – Gneiss, Schist, Phyllite, Slate, Quartzite, Charnockite Structural Geology: Primary and secondary structure of rock formation, terms-bedding, Dip, True Dip, Apparent Dip, Strike, Overlap, Inlier, and Outlier. Fold and its components.Types of Folds.Different Kinds of faults, joints, Unconformities and their types.

1.0 Stratigraphy: Definition –objectives of stratigraphy – Geological time scale – Physiographic divisions of India - major Stratigraphical divisions of India – Archaean- Dharwar - Cuddapah – Vindhyan – Gondwana systems – Stratigraphy of A.P state. 2.0 Economic Geology: Definition of terms – ore – gauge, tenor, associated mineral, resources, proved – probable, possible reserves – different process of Mineralisation – important economic minerals associated with each process. 3.0 Prospecting Techniques: Objectives – Guides for location of mineral deposits –Geophysical methods–Electrical, Gravity, Seismic, and Radiometric. 4.0 Know about the Coal Geology: State the periods of coal formation, mention the different stages of coal formation, explain the origin of coal seams, and explain the in situ theory and drift theory. Describe the structural features of coal seams. Give the classification of Coal. List the world coal fields. Describe the coalfields of India 5.0 Know about the Petroleum Geology: know the importance of Petroleum as Fuel. State the Origin of Petroleum. State the Migration and Accumulation of Petroleum. State the distribution of Oil fields in the world. State the distribution of Oil fields in India. 6.0 Hydro Geology : Introduction, Occurrence and source of ground water. Vertical distribution of ground water. Water Table and Types of Ground water. Hydrological cycle. Types of Precipitation- Rain fall measurements and records. Evaporation – Factors controlling evapo-transpiration. Runoff. Infiltration and factors affecting infiltration. Zone of Saturation and Zone of Aeration. Water bearing properties of rocks: Porosity and Permeability of Rocks Aquifer, Aquifuge and Aquiclude.

3. UNDERGROUND COAL MINING METHODS:

1.0 Bord and Pillar – Development Bord and pillar system – applicability – merits – demerits – caving & stowing – panel - applicability of panel system – types of panels –merits – demerits -local fall, main fall – air blast, dangers, precautions – factors influencing the size of panel system – factors influencing the no. of openings of panel – factors governing the selection of development method – factors governed while opening of a district – development stage – panel development with three headings and – different methods of development systems along dip, along strike, side discharge loader, and load haul dumpers – percentage of extraction calculation. 2.0 Bord and Pillar – Depillaring Depillaring methods – preparatory arrangements – different terms – Pillarextraction under weak roof condition -local fall, main fall – air blast, dangers, precautions – percentage of extraction calculation– methodof stowing conditions required for adopting stowing – preparation arrangement for stowing – contiguous seams extraction- depillaring LHD- SDL- Air blast –precautions 3.0 Longwall mining Longwall –Related Terms –Applicability, merits, demerits, limitations – Gate roads development – classification of Longwall methods –Longwall advancing indicating its applicability- machinery employed on a mechanised Longwall face – different factors governing the length of longwall face – Longwall advancing with caving and stowing – Longwall retreating and its applicability – merits and demerits – Longwall retreating with caving and stowing – single unit and double unit layouts – differences – comparison between Longwall advancing and Longwall retreating- Longwall-push sumping –inclined sumping methods.4.0 Thick seam mining Difficulties with thick seams – classification of thick seam working – principles – slicing methods – applicability – inclinedslicing with caving and stowing – Horizontalslicing – applicability merits and demerits – Horizontalslicing with caving and stowing – sub-level caving – applicability merits and demerits – Room and pillar – applicability merits and demerits – Horizon mining – applicability merits and demerits - Blasting Gallery method -applicability merits and demerits. 5.0 Special methods

Applicability merits and demerits of hydraulic mining of coal – hydraulicbreaking of coal – hydraulictransport – layoutof hydraulic mining – applicable conditions of underground gasification of coal – meritsdemerits of gasification of coal – principles and process underground gasification – openingup of coal seams for underground gasification – establishing linkages between bore holes – Hydraulic mining- thick seam- steep seam

4. UNDERGROUND METAL MINING METHODS:

1.0 Metal Mining – Basics and Development Metal mining terminology – definitions – mine development – division of ore body along dip and strike – factors for level interval – drives, winzes, raises and haulage inclines – shaft station – ore pass – ore bin – ore chute – tunnel boring – applications, merits and demerits. 2.0 Raising methods Up-reaming, down reaming and drop raising - conventional methods of raising - applicability - open raising – two compartmental and three compartmental raising method- applicability - merits - demerits - mechanised methods of raising- - Jora raising - Alimak raise climber - applicability - Long hole raising method-reaming – applicability – raise boring applicabilities.3.0 Stoping Methods Stoping- preparatory arrangements stope development - classifications of Stoping methods- factors governing the selection of stoping methods. Classification of stoping methods with respect to its attack - Breast stoping with a sketch- applicability- merits - demerits - method underhand stopping with a sketch- Applicability - merits - demerits - limitations - method of Overhand stoping with sketch- Applicability - limitations –merits-demerits-Comparison. 4.0 Advanced Stoping Methods Open stopes - applicability, merits demerits and limitations - Cut and fill stoping - applicability - merits –demerits-limitations - Shrinkage - Applicability - merits – demerits-limitations - Sub-level stoping – applicability – merits – demerits - limitations - vertical crater method – Applicability – 164 merits – demerits – limitations - caving methods - applicability - comparison between coal Mining and Metal Mining.5.0 Deep mining – Problems Deep mining – difficulties associated – Heat and humidity and dust in deep mines – effects and remedial measures – difficulties with strata control – rock burst – causes and preventive measures – raise in body temperature – causes – heat stroke – causes, effects and treatment – change in cardiovascular system –mental fatigue and fall of working efficiency. a) Vapour pressure, b) Saturation deficit, c) Relative humidity, d) Dew point, e) Specific humidity, f) Mixing ratio, g) Absolute humidity.

5. MINE ENVIRONMENTAL ENGINEERING :

1. Introduction and Systems of ventilation Know the Ventilation- purpose- types-Down cast and up cast shafts-Natural ventilation and Mechanical Ventilation-Conditions suitable for Natural Ventilation, factors influencing the production of Natural ventilation-Definition of N.V.P and motive column and their derivations and its applications in related calculations limitations of N.V.P. 2. Mechanical Ventilation Classification of Mechanical ventilation, classification of centrifugal fan, constructional details of backward bladed fan Principle of working off air screw fan controlling the quantity of air delivered, fittings of mine fan, loss relating to quantity water gauge etc.-Definition of terms – Manometric 169 170 efficiency, theoretical depression, effective depression, mechanical efficiency, overall efficiency, Factors for selection of mine fans. 3. Distribution of mine air Objects of distribution and coursing the air, ventilation devices – its construction, location, application regulators- Ascentional- Descensional ventilation Homotropal and Antitropal ventilation systems, leakage of air, air lock, computer basis analysis of mine air distribution. 4. Auxiliary ventilation and booster ventilation Auxiliary ventilation methods, conditions required for the system and different methods location of auxiliary fan Booster fan location, neutral line, effects of installation off booster fans. 5. Ventilation survey Objectives of ventilation survey, different methods of pressure, quality, quantity surveys – precautions, accessories etc., Kata thermo meter. 6. Mine Gases Atmospheric and

mine air – composition, changes, reasons Classification of mine –poisonous, inflammable and noxious, their physical and chemical properties physiological effects, occurrence. Testing for the presence of mine gases, flames safety lamp-Principle constructional details, transfer of heat in the lamp, Accumulation and percentage tests- Listing of detectors.

6. MINE HAZARDS AND RESCUE:

1.0 Mine fires Classification, causes, preventive measures, spontaneous heating- causes and preventive measures. Different methods of dealing with fire Permanent sealing of Fire. Collection of samples behind fire seals – Interpretation of samples – Coward's diagram, calculation of CO/O2 deficiency rations, reopening of sealed off areas Firefighting equipment and organisation- Nitrogen infusion.2.0 Mine Explosions and Inundation Types of mine explosions-Causes and preventive measures, coal dust explosion-causes and preventive measures, treating coal dust by watering and stone dust barriers – water barriers - Inundation in mines-dangers different sources of water-precautions against surface and underground water-precautions-while approaching water logged area - Burn side safety boring apparatus - purpose of dams. - Design of a dam construction of concrete dam. Accident due to Inundation. 3.0 Miner's diseases and First Aid Various forms of environmental pollution due to mining- various forms of pollution due to mining- pollution control methods- various miners' diseases- causes, symptoms. Meaning of the terms First Aid, Medical Aid, First Aider, Victim, Symptom and Sign, Scheme of First Aid in mining and its objectives, importance of First Aid Training, role and responsibility of First Aider, stages of action during emergency, procedure for CPR, Symptoms and causes of respiratory emergencies, symptoms of bone and joints injuries, symptoms of heat stroke, general poisoning. 4.0 Rescue and recovery Define the terms rescue and recovery- situations requiring rescue operations- rescue apparatus constructional details of compressed oxygen self-contained breathing apparatus (proto IV apparatus)- principle of function- tests, care and maintenance of compressed O2 apparatus- purpose of smoke helmet-constructional details --the purpose and constructional details of gas mask functions of self-rescuer-resuscitation- purpose of resuscitation apparatus- purpose of rescue station- equipment required to be kept in mine rescue station- details of rescue stations- rescue organization at mines level. 5.0 Gas Detectors Gas detectors, Uses, – principle on which designed, determination of percentage of gas with them Recent techniques of gas detection – remote sensing devices, continuous recorders, monitors, infra red spectrometers, sensors-Carbon Monoxide detection – Warm blooded birds, chemical detectors, Multi gas detector.

7. MINE SURVEYING:

1. Introduction: Definition – Objectives – Classification – Principle – Surveying. 2. Methods of Measuring Distances:- Classification – Instruments – Constructional details – Reasons for incorrect Length of Chain – Ranging – Direct – Indirect – Measuring Distances on level Ground – Sloping Ground – Sources of Errors – Corrections – Problems – Mistakes – Permissible Limits. 3. Chain Surveying:- Purpose – Principle – Steps – Reconnaissance – Factors Governing Selection of Stations – Definitions of offset – Baseline – Tie line – Reference sketch – Instruments for setting offsets – Degree of accuracy in chaining, Triangulation survey, Instruments, method of calculation of the area. 4. Compass Surveying:- Uses – Types – Sketch – Purpose of parts – Terms – True meridian – Magnetic Meridian – Arbitrary Meridian – Bearing Whole Circle – Quadrantal – F. B – B. B – Methods of Measuring Bearing- conversion W.C.B to Q.B, Q.B to W.C.B- Computes Included Angle – Local Attraction – Reasons – solves Problems on Local Attraction – Magnetic Declination and Dip – Open & Closed Traverse – Traversing with Compass and chain – Permissible errors. 5. 6. Levelling :- Definitions – Type of Instruments - Adjustments – Fundamental Lines – Relations – Principles of levelling – Methods –Effects of Curvature and Refraction Reciprocal Levelling – Merits – Applicability

– Problems – Permissible Errors Contouring and Subsidence:-. Purpose of Subsidence Levelling- Purpose of H.F.L – Contouring – Method of contouring, Interpolation of contours – Terms

1. Theodolite: Magnetic bearing of lines. Traversing – continuous Azimuth, double fore sight methods – computation of bearings of traverses check of accuracy in angular measurements – permissible error – distribution – calculation of latitude and departure – problems on rectangular coordinates – calculation of areas – Bowditch Rule 2. Setting Curves: Classification – Definitions – elements of simple curve – Method of setting out curves – by chord and offset, chard and angle. 3. Correlation survey and Triangulation surveying - Purpose – methods of correlation – Direct Traversing – Co – planning – weisbach Triangle-Definition – Principles – Different triangulation schemes – Base line measurement – Adjustments – Extension of base line 4. Tacheometry: Principles – systems – Constants Methods – Stadia method, substance method, Tangential method – merits and demerits of Tachometry – relation between stadia reading, Horizontal distance, vertical distance, solves problems. 6. Fundamentals of advanced survey: basics of Surveying with Electronic instruments- principles of surveying with Electronic instruments- Essentials- Applications of remote sensing- Fundamentals and applications of GPS in Mining- Uses and parts of Total station- measurement of angle between the given points using Total station

8. MINING MACHINERY:

1.1 Wire Ropes Usage, classification of wire ropes, applicability of different ropes - selection parameters - computation of numerical problems on size - Weight and strength of wire ropes 2.0 Rope Capping Capping and recapping of wire ropes, classification - description of capping methods - splicing methods, description of splicing 3.0 Transportation in Mines -Rope Haulages Purpose of transportation, comprehensive classification of transportation - ROPE HAULAGE - direct Rope Haulage System, merits, demerits and applications - safety Devices in Direct Rope Haulage System- Endless Rope Haulage System, merits, demerits and applicability's safety devices - Laying and maintenance of track- constructional details of mine tub/car -factors of selection for rope haulage serial rope ways- computation problems for determination of H.P. rope size breaking strength, Tub capacity, number of tubs. 4.0 Transportation in Mines -Conveyors, Locomotives & Areal Rope ways Conveyor usage, classification - belt conveyor system, different types of belt constructions, safety devices merits, demerits and limitations of conveying system - Scraper chain convey or system, protective devices-merits, demerits and limitation, computation of numerical problems on size of the conveyor for a given output and computation of motor HP.Classify loco haulage systems, merits, demerits, applicability of different system – classify aerial roper ways, the applicable conditions of aerial ropeways. 5.0 Mine Pumps Pumping - Various terms of pumping, classification of pumps - centrifugal pump fittings - Turbine pump, fittings – End thrust - submersible pump –fittings merits limitation - Mono Pump-Selection of pumps - computation of numerical problems on Head, Quantity, H.P. Frictional losses.

2. Conventional Face machinery Handheld drills – electronic rotary drills - hammer rock drills - power loader – field of applications, working operation – air leg – coal cutters Longwall face machinery Principle, design and application of long wall face machinery shearer, AFC, Lump breaker – stage loader, power pack self-advancing chock shield supports- SERDS and DERDS- their applications- principle of working of AFC (Armoured Face conveyor)- principle of lump breaker- purpose of power pack. Fame proofing, Intrinsic safety, Signalling and Cables in mines Necessity of flame proofing- intrinsic safety apparatus - field of application – constructional features - methods of intrinsic safety - field or application -cables– types – constructional details – cable jointing – care and maintenance. Winding systems- Part-I Winding in shafts – purpose, equipment - types of had gear frames – shaft fittings – guides in the shafts – pit – top arrangement – keps and suspension gear – Types of drums -

head gear pulley, care skip winging-pit-top and pit-bottom arrangements – cage suspension gear-sheave -pulley Winding systems – Part –II Drum winding and skip winding, multi-deck winding and friction winding – drum and friction winding – winding engine – depth - methods of speed control – breaking in winding – types of breaks automatic contrivances – dynamic –regenerative breaking

9. SURFACE MINING AND ROCK MECHANICS:

1.1 Surface mining - Basics Define Surface Mining, different terms used in surface mining - forms of Surface mining – Geo mining situation under which surface mining adopted - major coal and metal opencasts – Limitations – merits and demerits – preparation of ground, de-vegetation – clearance – formation of OB benches – coal benches – drilling – blasting – loading – transportation – back filling-box cut, trench cut, haul roads dumps- internal and external dumps, safety berms on dumps - dividers, berms, drainage system, escape lanes on haul roads. Surface mining - Machinery Different machinery for preparing the ground for mining operation, dozer, scraper, ripper, road grader, classification of dozers - application of dozer in mines.-classification of rippers-- road graders application of road grader - classification of road rollers (compacting equipment) - classification of excavators - types of shovels - components and their functions of shovels - operating parameters of shovel - define dumping height, cutting height, dumping radius, maximum digging radius, bucket fill factor, swell factor, bucket factor, swing factor, cycle time, loading time - operation and place of application of shovels - list types of draglines - Main components and their functions, of dragline - operation and place of application of dragline - comparison of shovel vs dragline - main components and their functions, of bucket wheel excavator - operation and place of application of bucket wheel excavator- applicable conditions, merits and demerits of surface miner Surface mining – Drilling and Blasting Classify drill holes – vertical inclined drilling – merits – demerits – various parameters for drill blast holes – drill patterns – application estimation of charges for blasting round of holes – blasting tools for shot firing procedure - patterns - transportation, storage, charging of bulk explosives - use of accessories such are nonels, electronic detonators, boosters, detonating cords-- methods of giving connection and firing procedure -deck charging and its applicability - controlled blasting techniques to control of fly rocks, vibrations sound, dust generation - muffled blasting, cushion blasting - chamber blasting and deck blasting a nd their applicability - Secondary Blasting-Pop shooting, plaster blasting -Dangers due to blasting practice in open cast mines--preventive measures due to blasting practice in open cast mines. 4.0 Slope stability Slope stability and Factors influencing the slope stability of a bench - Define the terms: Slope angle, Angle of Repose, Over all slope of bench - Simple numerical problems to calculate the overall slope 183 of the bench -Types of slope failures - Parameters required for slope design - Methods of preventing slope failures - Formula to calculate the factor of safety of bench slope - Simple numerical problems to calculate the factor of safety of bench slope

2.1 Dimensional Stone Quarrying Dimensional Stone Quarrying, Classification of Dimensional stone quarrying, uses of dimensional stones, merits and demerits of dimensional stone quarry, operations involved, splitting techniques, jet flame cutting, slot drilling and diamond wire sawing, problems related to dimensional stone quarrying 2.0 Dimensional Stone Quarrying - Machinery Different HEMM used in dimension stone quarry, Constructional details of wire saw cutting machine, chain saw machine, mechanical splitter, fork wheel loader, Industry 4.0 automation in quarries. 3.0 Sampling Methods Sampling- objectives - Mining situations - classification- channel sampling - Applicability - chip sampling- Applicability - Bulk sampling- Applicability different definitions - technique of coning and quartering - purpose – application- salting- preventive measures – Assaying-Assay value- Assay plan- Assay average- objectives of Assay plans- details shown on Assay plans 4.0 Environment and Ecology: Definition- Impact on environment due to opencast mining operations -

Various environment pollutions (water, air, land pollutions) due to mining operations - Prevention and control of various environment pollutions (water, air, land pollutions) due to mining operations –Ecology and impact on ecology due to OC Mining operations - Relationship between Environment & Ecology- EIA (Environmental Impact Assessment) - EMP land Reclamation operations in opencast mines

3.1 Basics, Ground Forces and stress analysis Definition of rock mechanics – scope of rock mechanics- application of Rock mechanics to mining – field and ground forces - various forces acting on block – types of Stress – Relation between vertical and lateral stresses – Stress field – hydrostatic and lithostatic stage of rock - induced stresses due to mining – stress – field, principal stress, principal strain, plane stress and plane strain - stress distribution around a mine workings. 2. Rock properties and rock classifications Rock properties – physical and mechanical properties of rocks – compressive strength – tensile strength - shear strength – strength indices of rocks – point load strength index - protodyakonov's strength index – porosity – permeability - anisotropy –RQD (Rock Quality Designation) - Mohr's Hardness scale. -RMR (Rock mass rating), factors consider for estimation of RMR – classificationof rock based on RMR. 3. Theories of Rock failure,Rock Behaviour and Measuring Devices Theories of failure of rocks - confining pressures - the effect of water, time and temperature - deformability of Rock - instruments used for measurement of stress measuring load, stress and strain - bumps and rock bursts. 4. Ground movements and subsidence Strata conditions before and after mining operations - pressure arch theory - normal theory -dome theory - rzhijaz theory -strata pressure in and around bord and pillar and longwall workings – subsidence – terminology - angle of draw-positive and negative - factors influencing angle of draw - factors effecting subsidence - effects of subsidence - protective measures on surface and underground to minimise damages due to subsidence - method of subsidence measurement. 5. Strata control Supports – necessity – materials used – classification of supporting systems – applicability of various types of supports – size, shape of supports – principle of roof bolting, stitching – merits and demerits of bolting – rigid and yield props – constructional details of friction, hydraulic props – methods of setting various supports at different situations – fore poling - safari supporting- junction supports – clearance of heavy roof collapse – withdrawal of supports.

10. MINING LEGISLATION, SAFETY AND MANGEMENT:

1.1 Mines Act 1952 and Mines Rules 1955 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, Hour and limitations of Employment - Leave with wages. Mine Rules related to drinking water, lavatories, urinals with on surface and in underground first aid, - Ambulance, Hours, and limitations of Employment - leave with wages - with wages and over time. Coal Mines and Metalliferrous Mines Regulations Part -I Important definitions, regulations related to notice 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 under M.M.R. Transport of men and material by Haulage mine Coal Mines and Metalliferrous Mines Regulations Part -II Working precautions against dangers from gas and water Mine ventilation, mine lighting and safety equipment and types of fences(Miscellaneous)

2.Knows about The Mines and Minerals (Development and Regulation) Act, 2015 and Mineral(Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 Define the terms- Mining Lease, Minor minerals, Prospecting license and reconnaissance permit as per MMDR Act, 2015-List the provisions related to Prospecting or mining operations to be under license or lease , Restrictions on the grant of prospecting licenses or mining leases , application of prospecting licenses or mining leases as per MMDR Act, 2015. - List the provisions related to Application for reconnaissance permit

--Application for prospecting license and its renewal Applications for grant of mining leases as per Mineral Concession Rules, 2016-Renewal of mining lease as per Mineral Concession Rules, 2016. Industrial Dispute Act-1947 and Importance of Safety in mines Industrial Dispute act-1947, causes f or Industrial Dispute adverse effects for Industrial Dispute various provisions of ID act -strike and lockout-Define the terms-safety, unsafe act, unsafe conditions, safety campaign, safety awareness.-importance of safety in mines- factors that influence safety in mines- need of vocational training to promote safety-mine safety week celebrations- pit safety committee- term of office, scope and functions of pit safety committee- safety organization at pit level-Define the term Accidents, Injury, serious bodily injury, Accidents rate- direct losses (costs) and indirect losses (costs) due to accidents-Classify accidents in mines basing on causes, responsibility, place wise, degree of severity, category wise, age wise, shift wise and time wise- Pit safety committee. Knows the provisions related to Environment Protection Act 1986 and Environment Protection Rules 1986 Meaning of terms EPA Act, Environment, Environment Pollutant, Handling, Hazardous Substances, Power of central government to Protect and improve environment, regulate environmental pollution, prevention, control, and abatement of environmental pollution, Powers of entry and inspection, Penalty for contravention of the provisions of the act and the rules. Meaning of terms, Environment Protection Rules,Central Board, Government Analyst, Person, recipient system, Standards, State Board, Standards for emissions or discharge of environmental pollutants, Ambient Air Quality and Ambient Noise Quality standards in India, procedure to take samples under EPA rules

3.1 Mine management Role of mining Industry in country's economic development, ownerships of Industries, Management, organisation, in the context of mining Industry. 2. Entrepreneurship and organisational structure Motivating factors, Risks and Rewards, requirements of entrepreneur, products selection. site solution, setting of a Mine-Theory of motivation-Leader ship-Decision making process communication process- Market survey., Demand survey techno-economic-Break even analysis. 3. Recruitments and training Recruitment and training, Methods of recruitment - Essential Quality of person different category training as per VTC Rules - Training programmes. 4. Network analysis Definition and Objectives of network analysis-construction of network diagrams-Definitions of various terms-Merits and demerits of CPM-Simple problems on CPM-PERT-Definition, methodology, time estimates –Simple problems on PERT-Compression CPM Vs PERT 5. Knows the Smart Technologies Overview of Internet of Things (IoT)-working principle - key features --components - advantages and disadvantages of IoT-applications of IoT in Mining engineering

ANNEXURE - II

MINING ENGINEERING

(APECET 2024 SYLLABUS)

DISTRIBUTION OF QUESTIONS UNIT WISE

Units	Topic	Questions
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8	**MINING MACHINERY**	**12**
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10	**MINING LEGISLATION, SAFETY AND MANGEMENT**	**10**
	TOTAL	**100**

ANNEXURE - III

MINING ENGINEERING

(APECET 2024 SYLLABUS)

MODEL QUESTIONS

1.Which of the following is used to reduce oscillation of cage in winding?

1. Safety catches
2. Guide ropes
3. Keps
4. Bell

2. Which of the following instrument is used to measure vertical angle in surveying?

1. Chain
2. Dumpy level
3. Auto level
4. Theodolite