**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

SECOND SEMESTER PAPERS/SUBJECTS

1. APPLIED MECHANICS

**SEMESTER : II**

**COURSE TITLE : APPLIED MECHANICS**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | 3 | 2 | 3 | 80 | 20 | 100 | 100 | 200 |  |

DETAILED COURSE CONTENT

1. Fundamental Concepts

Definition of Mechanics, Statics, Dynamics, Kinetics, Kinematics. Concept of space, mass, particle, body, rigid body, Scalar, vector, fundamental units, derived units.

1. Composition & Resolution of Forces

Force- concept, definition, unit, graphical representation, Concept of system of forces- non-coplanar, coplanar, concurrent, non-concurrent & parallel forces.

Composition & Resolution of forces: Free body diagrams, law of parallelogram, Varigonon's theorems, Equilibrium of Coplanar concurrent forces, parallel forces & non-concurrent forces, Lami’s Theorem, Moment of a force and Couple.

1. Centroid & Moment of Inertia

Location of centroid and center of gravity., Centroid of regular plane and compound areas, Center of gravity of simple solids, Moment of Inertia of plane areas, Perpendicular & Parallel. Axes theorems.

1. Friction

Rough & Smooth surfaces, concept of friction, Types of friction, Coloumb's law of friction, Co-efficient of friction, angle of friction, angle of repose.

Friction on inclined plane, Screw and Nut friction, Ladder and wedge friction, Friction in Journal bearings, Method of reducing friction.

1. Work, Power & Energy

Definition and unit of Work done, Power and Energy, Forms of Energy- Kinetic and Potential Energy, Principle of Conservation of power and energy, Power of engine and pumps, mean effective pressure, power measurement, Relation between Heat & Mechanical work, relation between Electrical & Mechanical energy.

1. Kinematics

Kinematics in Cartesian and polar coordinates, Concept of speed, velocity, acceleration, radial and transverse velocity, particle under uniform and non-uniform acceleration, tangential and normal acceleration, Angular displacement, Angular Velocity, Angular Acceleration, Motion under gravity.

1. Kinetics

Kinetics of particle, motion under constant force, Newton’s Laws of Motion, Momentum and energy principles, Impulses and angular momentum, D' Alemberts principle, Motion under constant torque, Flywheel.

1. SIMPLE LIFTING MACHINE

Load, Effort, Mechanical advantage, Velocity ratio, Efficiency and relation between them, Law of Machine, Reversibility of Lifting machine, Study of Machines- Differential wheel & axel, Weston differential pulley block, Simple Screw Jack, Worm & Wheel, Single and Double purchase Winch, System of pulleys, Cranes, Over-head electric cranes, Tyre handlers and Cherry pickers.

1. TRANSMISSION OF POWER

Transmission of power through Belt, Rope and Gears, Ratio of tension on tight and slack sides, Spur, Helical & Bevel gear, Rack and Pinion gear, Gear Trains- Simple, Compound, Reverted.

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## SUGGESTED INSTRUCTIONAL STRATEGIES:

Lecture Method, Industrial visits, Expert Lecture and Demonstration.

The course shall be taught using the laboratory side by side. Underpinning laws and principles should be explained using desktop models. Special emphasis should be given on Laboratory experiments.

## SUGGESTED LEARNING RESOURCES:

* 1. **Reference Books :**

|  |  |  |
| --- | --- | --- |
| **Sl.**  **No.** | **Title** | **Author and Publisher** |
| 1 | A Text Book of Applied  Mechanics | R.S. Khurmi, S. Chand & Company Ltd., New Delhi |
| 2 | Applied Mechanics | I. B. Prasad, Khanna Publisher, New Delhi |
| 3 | Applied Mechanics | Ramanathsn, Dhanpat Rai and Sons, New Delhi |
| 4 | Engineering Mechanics | Timoshenko & Young, Mc Garawhills Publication |
| 5. | Engineering Mechanics | S. Rajshekaran & G. Sankarsubramaniam, Vikas Publishing House Pvt. Ltd. New Delhi |
| 5 | Strength of Material and  Mechanics of Structure | Punamia, Standard Publisher Distributor New Delhi |

Applied mechanics lab

LIST OF PRACTICALS:

Verification of law of triangle of forces.

Verification of law of Parallelogram of forces.

Verification of law of Polygon of forces.

Verification of Lami’s Theorem by Jib crane method.

Demonstration of Non-concurrent, Non-Parallel forces (Funicular diagram)

Verification of Law of Moments.

Determination of C.G. of a given lamina.

Determination of coefficient of friction for surfaces of different materials on-

* + 1. Horizontal Plane
    2. Inclined Plane

S Draw – V-T diagram’s for different combinations of-

1. Velocities
2. Uniform accelerations

Find-out Mechanical advantage, Velocity Ratio and Efficiency for following machines-

1. Simple Screw
2. Differential Wheel & Axle
3. Simple Purchase Crab
4. Differential Pulley Block

Demonstration of use of inclined plane as a lifting machine.

**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

1. APPLIED GEOLOGY

**SEMESTER : II**

**COURSE TITLE : APPLIED GEOLOGY**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | 3 | 2 | 3 | 80 | 20 | 100 | 100 | 200 |  |

DETAILED COURSE CONTENT

RATIONALE:

1. PHYSICAL GEOLOGY
   1. Solar system, origin of the earth, various hypotheses related to origin of earth.
   2. Age of the earth, various methods of age determination, radioactive methods and their advantages.
   3. Interior of the earth –crust, mantle and core.
   4. Weathering - physical weathering and chemical weathering. Exfoliation and spheroidal weathering.
   5. Work of wind – Erosion, Transport and Deposition ventifacts, Pedestal rocks, Sand dunes and Loess.
   6. Work of Rivers: Erosion Transport and Deposition, waterfalls, Menders, oxbow lakes, Alluvial, fans, flood plains, Delta.
   7. Earth quakes: Seismograph, earthquake waves, classification of earthquakes, elastic rebound theory, Richter scale of earthquake intensity, Distribution of earthquakes
   8. Volcano: Types of volcanoes, volcanic products, volcanic cones, distribution of volcanoes.
2. MINERALOGY:

2.1 Definition, Physical properties of minerals – Color, Streak, Luster, Hardness, Habit, Cleavage, Fracture.

2.2 Identification of common minerals- Orthoclase, Plagioclase, Augite, Hornblende, Biotite, Muscovite, Olivine, Quartz, Asbestos, Calcite, Dolomite, Corundum, Gypsum, Talc.

1. PETROLOGY:
   1. Classification of Rocks- Igneous, Sedimentary and Metamorphic.

3.2

Igneous

rocks

– Acid

and

basic

rocks,

Textures of

Igneous

rocks-

Glassy,

Vesicular,

Prophyritic,

Coarse

grained,

Medium

grained,

Fine

grained

and

Cryptocrystalline.

Classification

– Plutonic,

Hypabyssal

and

volcanic

rocks.

Tabular Classification Igneous bodies- Batholithic, Laccolith, sill and Dyke, Lava flows, Common Igneous rocks – Granite, Syenite, Gabbro, Basalt, Trachyte and Rhyolite.

3.3 Sedimentary rocks - definition , Classification, mechanically formed, Organically

formed

and

chemically

formed

rocks,

Sedimentary

structures,

Stratification,

Lamination,

graded

bedding.

Current

bedding

and

ripple

marks,

common

Sedimentary rocks- Conglomerate Sandstone, Shale, Mine stone and Breaccia.

3.4

Metamorphic

rock –

Definition,

Agents

of metamorphism-

Heat,

Uniform

pressure, Directed Pressure, Chemically active fluids and gases. Structures and textures of Metamorphic rocks – Slaty, Schistose, Gheissose and Granulose . Common Metamorphic rocks – Slate, Schist, Gneiss, Quartzite and Marble.

CHAPTER – 4: STRUCTURAL GEOLOGY

* 1. Dip and Strike, Apparent dip and True dip.
  2. Folds- Elements of folds, Anticline and Syncline, Limbs, Axial of folds, Types of

folds-

Symmetrical,

Asymmetrical,

Overturned,

Recumbent,

Isoclinal,

Plunging

folds, Anticlinorium, Synclinorium , Open fold, Close fold ,Dome and Basin.

* 1. Faults – Fault Terminology, Fault- Plan, Hade, Dip and strike, Throw, Heave, Slip, Hanging wall and foot wall. Classification of faults- Normal and reverse faults, Dip fault, strike fault and Oblique faults, High and low angle faults , Parallel faults, Steps- faults, Graben, Horst, Radial faults, Peripheral faults.
  2. 4.4

Unconformities- Nonconformity.

definition,

Types

* Angular

unconformity,

Disconformity,

* 1. 4.5

Joints-

Classification-

Strike

joints,

Dip

joints,

Oblique

joints,

Bedding

joints,

Master Joints, Sheet Joints and columnar joints.

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SUGGESTED INSTRUCTIONAL STRATEGIES :

Lecture method, Industrial visits, Expert lecture and Demonstration

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##### Reference Books:

|  |  |  |
| --- | --- | --- |
| **Sl.No.** | **Title** | **Author, Publisher, Edition & Year** |
| 1 | A Text book of Geology | K.M. Banger |
| 2 | Engineering and General Geology | Prabin Singh |
| 3 | Laboratory Manual of Geology | Ajay Kumar Sen. |
| 4 | Sedimentary rocks | Pettijohn |
| 5 | Elements of Mineralogy | Rutley’s |
| 6 | Introduction to Physical Geology | A.K. Dutta |
| 7 | Structural Geology | P. Billings |
| 8 | The Principal of Petrology | Tyrrel |
| 9 | A Text book of Geology | P.K. Mukharjee |
| 10 | A Text book of Mineralogy | Dana |
| 11 | HkkSfrd Hkw foKku | eqdqy ?kks"k |
| 12 | Hkkjr oiZ dh Hkw oSKkfud leh{kk | vfEcdk izlkn vxzoky |
| 13 | ’kSfydh ds fl}kUr | Vjsy ,oa f>axju |

**Others -**

* + VCDs
  + Video Cassettes
  + Learning Packages

APPLIED GEOLOGY LAB

LIST OF PRACTICAL / TUTORIALS:

* 1. Identification of Minerals in hand specimen -Asbestos, Augite, Biotite, Calcite, Corundum, Dolomite, Gypsum, Hornblende, Muscovite , Kaolinite Orthoclase, Plagioclase, Quartz, Talc.
  2. Identification of Rocks –
     1. Granite, Rhyolite, Syenite, Gabbro, Basalt, Trachyte.
     2. Conglomerate, Sandstone, Shale, Limestone.
     3. Slate, Schist, Gneiss, Quartzite, Marble.
  3. Geological map reading and drawing simple Geological section -
     1. Geological maps of inclined beds.
     2. Geological maps of Unconformity
     3. Geological maps of Folds

**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

3. ELEMENTS OF MINING TECHNILOGY

**SEMESTER : II**

**COURSE TITLE : APPLIED GEOLOGY**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | 3 | - | 3 | 80 | 20 | 100 | - | 100 |  |

RATIONALE:

DETAILED COURSE CONTENT

1. INTRODUCTION:
   1. History of mining Industry and mineral wealth of India. Specially related to Rajasthan.
   2. Selection of site for opening a mine.
2. MODES OF ENTRY
   1. Different types of modes of entry. inclined, shaft, adit.
   2. Condition suitable to selection of a suitable mode of entry.
   3. Factors governing site of modes of entry, its’ shape, size and Comparisons, suitability and advantages of each type of mode of entry.
3. SINKING OPERATIONS:
   1. Sinking of shaft in a normal coal strata.
   2. Marking of centre of shaft.
   3. Temporary supports/lining permanent lining.
   4. Firing shots in sinking shaft.
   5. Introduction of special methods of shaft sinking.

Hazards and precautions in shaft sinking

1. DRIFTING AND TUNNELING
   1. Introduction about drifting and tunneling.
   2. Methods of drifting and tunneling.
   3. Manual methods of drifting and tunneling
   4. Mechanized methods of drifting and tunneling.
   5. Ventilation drilling , blasting and mucking.
   6. Transportation systems in drifts and tunnels.
   7. Hazards and precautions in tunneling
   8. Road Headers, Tunnel Borers
   9. Vertical excavation by Raise Borers
2. INTRODUCTION TO METHODS OF WORKING:
   1. Overview of Methods of mining – Opencast, Underground, Applications, Comparisons

5.1 Open cast mining condition suitable for limit of quarrying advantage and disadvantage

* 1. Manual Quarrying, lay outs,

5.3 Semi mechanized and machines used, layouts, and related regulations.

THE ABOVE TOPIC SR NO.5 IN RED IS REPEATED IN SURFACE MINING PAPER IN THE SAME II SEMESTER, CAN BE DELETED HERE.

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#### REFERENCE BOOKS :

|  |  |  |
| --- | --- | --- |
| **Sl.No.** | **Title** | **Author, Publisher,**  **Edition & Year** |
| 1. | Mining Environment and Ventilation | G.B. Mishra |
| 2. | Selection Installation & Maintenance of mine pumps. | Rakesh & Lal |
| 3. | Elements of Mining Technology Vol I & II | D.J. Deshmukh |
| 4. | izkjafEHkd [kfudeZ | ch0ds0 flag |

OTHERS:

* VCDs
* Video cassettes
* Learning packages
* Industrial Training

**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

* 1. DRILLING AND BLASTING PRACTICES IN MINES

**SEMESTER : II**

**COURSE TITLE : DRILLING AND BLASTING PRACTICES**

**IN MINES**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
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|  | 3 | 2 | 3 | 80 | 20 | 100 | 100 | 200 |  |

RATIONALE: Working knowledge of drilling and blasting practice carried out in mines is very important for mining supervisor. This subject aims at providing useful practical information and practices adopted in mines.

DETAILED COURSE CONTENT

1. DRILLING:

Introduction to drilling in underground and opencast mines. Types of drilling machines – rotary, percussion, rotary-percussion, pneumatic, electric and hydraulic. Jack Hammers, Air Legs, Boomers, Simba drills, DTH, ITH & Blast Hole Drills.

1. EXPLOSIVE ENERGY AND BREAKAGE MECHANISM
   1. Explosive energy, work energy, waste energy. breakage mechanism, various theories of rock breakage
   2. Type of explosive ,- low explosive, high explosive, Permitted explosive .
   3. Detonators, types of detonators, detonating fuses, Electric detonator, advantage, precautions in handling.
   4. Misfires, precautions, statutory provisions related to shot firing

Electronic blasting, wireless initiation system.

Storage, use, transport and disposal of explosives. Testing of explosives and detonators before use.

1. SURFACE BLASTING:
   1. Factors affecting blast design, selection of various blast parameters, Burden, Spacing, Stemming distance, Sub grade drilling, depth of hole, bench height, diameter of hole, Inclination, Sub-drilling
   2. Different types of explosives used in o/c mines, Liquid Oxygen, ANFO, O.C.G., Slurries, SMS, Emulsion explosive
   3. Deck charging and column loading, calculation of charge per hole and powder factor, controlled blasting, special blasting technique.
   4. Secondary blasting – Pop shooting and Plaster shooting
   5. Ground vibration measurement – its limitations, Geophones
   6. Hazards and precautions during blasting in opencast mines.
2. UNDERGROUND BLASTING:

Various cuts, burden, spacing, depth of hole, stemming of hole, precautions during blasting, solid blasting practice. Mechanized transport of explosives in underground mines and equipment.

1. ROCK FRAGMENTATION:
   1. Mechanism of rock fragmentation,
   2. Factors affecting rock fragmentation,
   3. Techniques to improve rock fragmentation
2. ENVIRONMENTAL IMPACT OF BLASTING:

Back break, Over break, fly rock, Ground vibration- measurement,

Prediction & control measures, air blast, noise.

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DRILLING AND BLASTING PRACTICES IN MINES LAB

LIST OF PRACTICALS:

1. Preparation of sketch showing various mining terms.
2. Study, sketch and operate the feed mechanism of the given drilling machine and accessories.
3. Study and sketch hydraulic feed mechanism of drilling machine.
4. Study, sketch and use of boring and fishing hole.
5. Study and sketch various types of detonators relays and exploders.
6. Study and sketch firing circuits, their laying and checking.
7. Different types of pattern, drilling, charging and blasting of explosives.
8. Study and sketch approved types of explosive magazines.
9. Study and sketch different types of drilling patterns used in underground mines.
10. Study and sketch a wagon drill.

Reference Books

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Title** | **Author, Publisher, Edition and Year** |
| 1. | Elements of Mining Technology I & II | D.J. Deshmukh |
| 2. | Drilling Technology | Chugh |
| 3. | Elements of Mining | Arogyamswamy |
| 4. | Mining and Working Vol 1 & 2 | S. Ghatak (Lovely Prakashan Dhanbad |
| 5. | Explosive & Blasting Practice in mines | Sameer Kumar Das |
| 6. | Opencast Mining | Sameer Kumar Das |
| 7. | Explosive & Blasting Practice in Mines | B. K. Pradhan |
| 8. | Opencast Mine working | B. Ghosh |
| 9. | Engineering Rock Blast Operations | Sushil Bhandari |

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**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

* 1. SURFACE MINING

**SEMESTER : II**

**COURSE TITLE : SURFACE MINING**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

|  |  |  |  |  |  |  |  |  |  |
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| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | 3 | 2 | 3 | 80 | 20 | 100 | 100 | 200 |  |

RATIONALE:

DETAILED COURSE CONTENT

Surface Mining: General information, basic definition, surface mining, quarrying strip mining, open pit mining, open cast mining, advantages and disadvantages. Determination of main parameters, major dimensions, heights and widths of benches. Slope angles.

Opening up of mines by surface methods, driving of ingoing trenches, laying of communication routes, system of disposal of overburden, removal of cover rocks, factors influencing selection and characteristics of opencast work. Design, construction and maintenance of haul roads and equipments required for the purpose.

General surface mining method, basic layouts, choice of mining method.

Major operations in surface mining.

Ground Preparation : Bull dozing, scrapping, grading, ripping.

Drilling: Criteria for selection and performance of different types of drilling equipments, drilling patterns: inclined drilling.

Blasting: Explosives, multi-row blasting; Twin bench blasting: Coyote blasting, secondary blasting, overcasting by explosives.

Excavation and Loading: Factors influencing choice of excavating and loading machines, their performance in different condition of ground, Power shovel, Dragline, BWE, BCE, Front end loaders, backhoes, Surface miner.

Transport: Comparative study of different transport system in opencast mines, factors influencing choice of a system, optimization of load haul system, Dumpers, Coal haulers, belt conveyer, pipe line transportation.

Recent methods and techniques adopted in surface mining and sand mining.

Storage: Stock piling and re-handling, spreaders, re-claimers.

Reclamation: Planning methods of reclamation for different types of opencast mines.

Drainage: Sources of water assessment of drainage requirements drainage patterns.

Slope Stability: Factors influencing stability of slopes, mechanics of slope failures, methods of improving stability of slopes, protection and monitoring including various appliances, Influence of pit slope on mine economics.

Dust suppression and illumination in surface mines.

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## Reference Books:

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Title** | **Author, Publisher, Edition and Year** |
| 1. | Elements of mining technology Volume I | D.J. Deshmukh |
| 2. | Surface mining technology | Sameer Das |
| 3. | Explosive & Blasting practice in mines | Sameer Das |

### SURFACE MINING LAB

LIST OF PRACTICALS:

1. To study and discuss the advantages and disadvantages of open cast mining.
2. To study and describe the factors deciding the open cast mining.
3. To list the machineries used in open cast mining.
4. To study and design different types of mine entries in open cast mines.
5. To study and design layout of open cast mines for
   1. manual mines
   2. mechanized mines for the given production.
6. To study and describe different combinations of loading and transporation machines
7. To study and calculate the output with given numbers of shovel, dumpers and draglines.
8. To study and describe methods of land reclamation.

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**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

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* 1. MINE SURVEYING

**SEMESTER : II**

**COURSE TITLE : MINE SURVEYING**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
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| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | 3 | 3 | 3 | 80 | 20 | 100 | 100 | 200 |  |

RATIONALE:

developed with the theoretical and practical coaching of the following subjects –

1. Miner’s Dial
2. Leveling
3. Contouring
4. Subsidence surveying
5. Theodolite
6. Dip strike & borehole problems
7. Study of mines plans and sections.

it is expected that a student will be able to carry out underground mine surveys and prepare mine plans as required by the statutory provisions of the Coal Mines Regulations, 2017.

DETAILED COURSE CONTENT

1. MINERS DIAL:
   1. Introduction and general description.
   2. Taking bearing & observations with a dial.
   3. Method of dial Traversing -
      1. Loose or free needle method.
      2. Fast or fixed needle method.
   4. Measurement of Included angles.
   5. Fixing of underground survey stations.
   6. Transfer of survey station from floor to roof and from roof to floor.
   7. Setting of instrument under roof station.
   8. Underground traversing with a dial.
   9. Marking center line of a gallery.
   10. Marking center line in a given direction.

2 LEVELLING:

* 1. Introduction, purpose of leveling.
  2. Definition and terminology.
  3. Different types of levels.
  4. Principle and constructional details of Dumpy and Tilting level.
  5. Leveling staves , types of staves.
  6. Graduation and least count types of diaphragms.
  7. Adjustment of leveling instruments – Temporary and permanent.
  8. Concept of datum, Back sight, Fore sight, Station, Change point, height of instrument

Level book, Booking of levels, Reduction of level.

* 1. Height of instrument or collimation, Rise and fall, Arithmetical check.
  2. Differential leveling and check leveling.
  3. Problems on reduction of level.
  4. Balancing or equalizing of back sight and fore sight distance.
  5. Types of leveling.
  6. Errors in leveling and precaution to minimize the errors.
  7. Practical problems in leveling work as – Leveling across summits and depression, Across a wall.
  8. Degree of precision in leveling, closing error and its adjustment.
  9. Testing and adjusting of Dumpy and Tilting levels.
  10. Permanent adjustment of levels.
  11. Methods of Traversing and plotting of traverse.

3. CONTOURING:

* 1. Introduction and concept, purpose of contouring, object of contouring, Horizontal Equivalent, Contour Interval, factors affecting contour interval, characteristic of contours.
  2. Method of contouring – Direct method and Indirect method.
  3. Interpolation of contours- methods:
     1. Estimation method
     2. Arithmetical method
     3. Graphical method
  4. Plotting of contour maps, Use of contour Maps

1. SUBSIDENCE SURVEY:
   1. Definitions, fixing of survey station, transfer of colliery benchmark to the subsidence area, determination of position of a survey station ( longitudinal ) displacement, determination of reduced level of survey station, calculation of subsidence – Lateral displacement and Vertical displacement, precautions during subsidence survey, Preparation of subsidence plans and section.
2. THEODOLITE:
   1. Introduction
   2. Classification of theodolite -
      1. Transit and non-transit theodolites
      2. Vernier theodolites
      3. Micro-optic theodolites
      4. Electronic theodolites.
   3. Essential parts of the transit vernier theodolites.
   4. Definition and the terms used.
   5. Fundamental axis of theodolites and their relationship.
   6. Temporary adjustment of theodolites
3. Setting over the stations
4. Levelling up the instrument
5. Elimination of parallax and focusing of object.
   1. Method of taking readings – Vernier reading, calculation of least count
   2. Measurement of horizontal and vertical angles – General method, Repetition method, Reiteration method
   3. Booking of readings,
   4. Method of traversing, plotting survey work

6. BORE HOLE SURVEYING :

* 1. Definition of borehole surveying
  2. Purpose of borehole surveying
  3. Definition of dip, strike, true and apparent dip
  4. Relation between true dip, apparent dip and angle between them
  5. Numerical problems on dip, strike and borehole surveying

7. MINE PLANS AND SECTIONS:

General requirement of mine plans, Types of plans and their scale, Symbols used in mine plans Preparation of plans and sections, Plotting of traverse, Checking accuracy of old mine plans, Planimeter and its uses, Enlargement and reduction of plans, Mines regulations concerning above topics,

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##### Reference Books:

|  |  |  |
| --- | --- | --- |
| Sl.No. | Title | Author, Publisher, Edition & year |
| 1. | Surveying and leveling ,vol I & II | T.P. Karnetkar |
| 2. | Surveying , vol I & II | B.C. Punamia |
| 3. | Advance Surveying , Vol I & II | Alam Chand |
| 4. | Advance surveying | D.C. Clark |
| 5. | Surveying , vol I & II | Arora |

**Others -**

* VCDs
* Video Cassettes
* Learning Packages

MINE SURVEYING LAB

LIST OF PRACTICALS:

1. To take the bearing of given lines and measure the included angles by the verniers of the dial.
2. To traverse the area by loose needle method with miner’s dial.
3. To traverse a given area by fast needle method with miner’s dial.
4. To sketch and describe a dumpy level.
5. Use and application of a micro optic level.
6. Find out the reduced level of different points with a given datum.
7. To carry out differential levelling and check the work by the levelling.
8. To draw a longitudinal profile along with a chain line.
9. To draw a cross section across given chain line.
10. To draw a contour of given area by direct and indirect methods.
11. To conduct a complete subsidence survey in a given area.
12. To calculate the contours of required reduced level and to plot the subsidence work with a suitable scale.
13. To sketch and describe a transit vernier theodolite.
14. To measure the horizontal angle by repetition method with a theodolite.
15. To measure the horizontal angle by reiteration method with a theodolite.
16. Study of mine plans & sections.

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**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

* 1. CAD PRACTICAL

**SEMESTER : II**

**COURSE TITLE : CAD PRACTICAL**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | - | 2 | 3 | - | - | - | 100 | 100 |  |

RATIONALE:

DETAILED COURSE CONTENT

Unit: 1

STARTING AUTOCAD:

Overview of CAD, Advantages of AutoCAD over Conventional method of drafting.

System requirement, Installing Auto CAD, pointing device (Mouse, Tablet), Understanding the Auto CAD Interface (Toolbar, Menus), Cursor Menu, Command Window, Text Window. Using scripts to run command.

ORGANISING YOUR DRAWING:

Conforming to standards & using different set up methods.

IDEA OF USING COORDINATE SYSTEM:

Using a coordinate system to specify points, using direct distance entry, shifting and rotating co-ordinate system. conforming to standards & using different set up methods.

Unit: 2

IDEA ABOUT CREATING OBJECTS:

Drawing lines, drawing curved objects, creating point objects, changing the drawing order of objects, creating solid-filled areas, creating regions, hatching areas, custom objects and proxies.

IDEA OF DRAWING WITH PRECISION:

Adjusting snap and grid alignment, using ortho mode, calculating points and values,

Calculating areas, distance and angle, displaying coordinates & inquiry methods.

Unit: 3

Using zoom and pan, using aerial view using named view, using tiled view ports, turning visual elements on & off.

IDEA OF EDITING OBJECTS:

Working with named objects.

USING LAYERS, COLOURS AND LINE TYPES:

IDEA ABOUT ADDING TEXT TO DRAWINGS:

Working with text styles, using line text, and checking spelling

Unit: 4

IDEA OF DIMENSIONING AND TOLERANCING:

Dimensioning concepts, creating concepts, creating dimensions, adding dimensions, editing dimensions, creating dimensions style, idea of using style families, using style over rides. working with dimension styles, adding geometric tolerances. creating and modifying arrowheads.

Unit: 5

Plane Geometry:

Construction and use of scales including diagonal scales. enlargement and reduction of irregular plane figures. construction of triangles, quadrilaterals and polygon, similar plane figures, problems on circles, tangents and normals. loci such as the paths of points in simple link mechanism, methods of construction of ellipse including its elementary properties parabola and rectangular hyperbola,

cycloid ( sp.) and involutes curve.

Solid Geometry:

Orthographic projection (diagrams printed in the question papers may be in either first or third angle projection; the projection used will be stated, solutions in either first or third angle projection will be accepted), projection involving use of auxiliary planes, simple problems on auxiliary projection, simple problems on the intersection of prisms, pyramids, cylinders, right circular cones and spheres, determination of true length of a line in space, sections and surface developments of prisms, pyramids, cylinders and right circular cones, isometric and oblique projection without the use of isometric scale perspective view.

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**RAJASTHAN ILD SKILL UNIVERSITY (RISU) JAIPUR**

**(A State Government University)**

1. INDUSTRIAL TRAINING

**SEMESTER : II**

**COURSE TITLE : INDUSTRIAL TRAINING**

**THEORY CODE :**

**BRANCH/DISCIPLINE : MINING ENGINEERING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Periods per week** | | **HRS OF EXAM** | **scheme of examination** | | | | **TOTAL** | **CREDIT** |
| **THEORY** | **P** | **THEORY** | | | **PRACTICAL** |
| **L** | **ESE** | **CT** | **TOTAL** | **ESE** |
|  | - | 1 | 3 | - | - | - | 100 | 100 |  |

RATIONALE:

Industrial Training is one of the most essential components for a diploma graduate in Mining and Mine Surveying. The sole purpose of industrial training is to expose the students to “real life”

situations.

Different

aspect of

mining

such as

geology,

exploration,

selection of

method of

working, selection of machines for mining, environmental controls and measures, safety in mines

and

various

statutory

provisions

can

only

be understood

when

the

students

are

exposed to

different mine workings. Students will cover different coal and metal mines both underground and opencast in such a way that at the end of the completion of diploma programme, they are

conversant

withdifferent

mining

conditions.

Industrial

training

also

opens

avenues of

new

learning to the students and apply them during their project and industrial training presentations.