

| WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION   |  |             |           |          |           |                    |           |            |            |            |                |
|--|--|-------------|-----------|----------|-----------|--------------------|-----------|------------|------------|------------|----------------|
| TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES   |  |             |           |          |           |                    |           |            |            |            |                |
| COURSE NAME: DIPLOMA IN MINING   |  |             |           |          |           |                    |           |            |            |            |                |
| DURATION OF COURSE: 6 SEMESTERS  |  |             |           |          |           |                    |           |            |            |            |                |
| SEMESTER: SIXTH  |  |             |           |          |           |                    |           |            |            |            |                |
| BRANCH: MINING   |  |             |           |          |           |                    |           |            |            |            |                |
| SR.<br>NO  | SUBJECT  | CREDIT<br>S | PERIODS   |          |           | EVALUATION SCHEME  |           |            |            |            |                |
|  |  |             | L         | TU       | PR        | INTERNAL<br>SCHEME |           |            | ESE        | PR         | Total<br>Marks |
|  |  |             |           |          |           | TA                 | CT        | Total      |            |            |                |
| 1.   | MINE MANAGEMENT,<br>LEGISLATION & GENERAL<br>SAFETY - II | 4           | 4         |          |           | 10                 | 20        | 30         | 70         |            | 100            |
| 2.   | MINING MACHINERY - I                                     | 5           | 4         |          | 2         | 10                 | 20        | 30         | 70         | 50         | 150            |
| 3.   | MINING MACHINERY - II                                    | 5           | 3         | 1        | 2         | 10                 | 20        | 30         | 70         | 50         | 150            |
| 4.   | MINE VENTILATION - II                                    | 4           | 3         |          | 2         | 5                  | 10        | 15         | 35         | 50         | 100            |
| 5.   | MINE SURVEYING - II                                      | 4           | 3         |          | 3         | 10                 | 20        | 30         | 70         | 100        | 200            |
| 6.   | PROJECT WORK & SEMINAR                                   | 2           |           |          | 4         |                    |           |            |            | 100        | 100            |
| 7.   | GRAND VIVA   | 1           |           |          | 2         |                    |           |            |            | 100        | 100            |
| <b>Total:</b>  |  | <b>25</b>   | <b>17</b> | <b>1</b> | <b>15</b> | <b>45</b>          | <b>90</b> | <b>135</b> | <b>315</b> | <b>450</b> | <b>900</b>     |
| STUDENT CONTACT HOURS PER WEEK:33 hrs  |  |             |           |          |           |                    |           |            |            |            |                |
| Theory and Practical Period of 60 Minutes each.  |  |             |           |          |           |                    |           |            |            |            |                |
| L- Lecture, TU- Tutorials, PR- Practical, TA- Teachers Assessment, CT- Class Test, ESE- End Semester Exam. |  |             |           |          |           |                    |           |            |            |            |                |

**Syllabus for: MINE MANAGEMENT, LEGISLATION & GENERAL SAFETY - II**

|  |   |
|--|---|
| <b>Name of the Course: MINE MANAGEMENT, LEGISLATION &amp; GENERAL SAFETY - II<br/>( Part III – 2nd semester, Mining Engineering)</b> |   |
| <b>Course Code:</b>  | <b>Semester: SIXTH</b>  |
| <b>Duration: : 17 weeks</b>  | <b>Maximum Marks: 100</b>   |
| <b>Teaching Scheme</b>   | <b>Examination Scheme</b>   |
| <b>Theory: 4 hrs./week</b>   | <b>Class Test.:20 Marks</b>   |
| <b>Tutorial: NIL</b>   | <b>Teacher’s Assessment : 10 Marks</b>  |
| <b>Practical: Nil</b>  | <b>End Semester Exam.:70 Marks</b>  |
| <b>Credit: 4</b>   |   |
| <b>Aim:</b>  |   |
| <b>Sl. No.</b>   |   |
| 1.   | To make familiar with the work study & Time study in Mining operations.   |
| 2.   | To Impart basic knowledge about Govt. rules and Regulations related to Mining Industry.   |
| 3.   | To make familiar with general safety aspects in the field of Mining.  |
| <b>Objective:</b>  |   |
| <b>Sl. No.</b>   | <b>The Students will be able to:</b>  |
| 1.   | Learn Time study, Motion study, Human relation in Industry.   |
| 2.   | Learn about different Mining operations as well as preventive measures from dangers in compliance with the Mine's Act, Rules, Regulations and orders there under. |
|  |   |
| <b>Pre-Requisite:</b>  |   |
| <b>Sl. No.</b>   |   |
|  | Knowledge in general Mining practices ,Mathematics and Engg. Drawing.   |

**MODULAR DIVISION OF THE SYLLABUS**

| MODULE | TOPIC                        | LECTURE PERIODS | TUTORIAL PERIODS |
|--------|------------------------------|-----------------|------------------|
| 1 & 2  | WORK STUDY & HUMAN RELATIONS | 22              | 0                |
| 3      | LEGISLATION                  | 22              | 0                |
| 4      | GENERAL SAFETY               | 22              | 0                |

LECTURE PERIODS: 66      TUTORIAL PERIODS: 0      INTERNAL ASSESSMENT: 2      68

**EXAMINATION SCHEME**

| GROUP | MODULE | OBJECTIVE QUESTIONS |                |                    |             | SUBJECTIVE QUESTIONS |   |                    |             |
|-------|--------|---------------------|----------------|--------------------|-------------|----------------------|---|--------------------|-------------|
|       |        | TO BE SET           | TO BE ANSWERED | MARKS PER QUESTION | TOTAL MARKS | TO BE SET            | TO BE ANSWERED                            | MARKS PER QUESTION | TOTAL MARKS |
| A     | 1 & 2  | 6                   | ANY TWENTY     | 1                  | 1 x 20 = 20 | THREE                | FIVE, TAKING AT LEAST ONE FROM EACH GROUP | 10                 | 10X 5 = 50  |
| B     | 3      | 10                  |                |                    |             | THREE                |   |                    |             |
| C     | 4      | 7                   |                |                    |             | FOUR                 |   |                    |             |

## DETAIL COURSE CONTENT

### GROUP -A

1. Work study and PERT & CPM.

Work study – meaning of the term time study and motion study, basic concepts and procedures and advantages.

Programme Evaluation & Review Technique (PERT) -& Critical Path Method (CPM ). Origin of network techniques. Merits of network techniques- different terminology like activity, dummy or redundant activity, precedent activity, concurrent activity, subsequent activity, event/node-successor, predecessor, merge, burst events, earliest expected time, least allowable time, optimistic time , likely time, pessimistic time. Slack- positive slack, negative slack, zero slack, critical path, and critical activities etc.- network errors- number sequence in a network- D.R. Fulkerson's rule- application of critical path analysis.

2. Human relations in industry.

Importance of Human relation in industry. Effects of bad morale, measures of improving human relation, industrial psychology.

Labour turn over – cause of labour turn over in mining industry, effects and remedies.

Absenteeism – causes of absenteeism among mine workers- effects and measures to be taken.

Industrial leadership – characteristics required for leadership – leadership styles, functions of a leader.

Personnel management – objectives - Selection, Training & development of human resources for Mining Industry.

Motivation – Basic concepts, Importance & types, how to motivate- motivational technique.

Elementary concepts of Indian Trade Union act 47.

## **GROUP - B**

### 3. Mine legislation:

Mines Act'52 & Mines Rules'55

Inspectors and certifying surgeons, health and safety

Coal Mines Regulation '57, Metalliferous Mines Regulations'61 :

Mine workings, mine ventilation, fire, dust, gas, water, explosives, lighting and safety lamps.

Mines rescue rules 1985.- main provisions.

Elementary concepts of Industrial Dispute act 1956. Main provisions for vocational training rule-'66. Indian electricity Rules'56- chapter-I(preliminary) & chapter -X (additional precautions to be taken in mines) (Applicable to mines only)

## **GROUP -C**

### 4. General Safety:

Basic concept of safety, safety & productivity, safety consciousness, safety campaign, safety organisation, safety audit, role of safety committee, Workers' participation in safety management, workmen's inspectors, mechanisation and safety, illumination and safety.

Preventive maintenance, noise and vibrations- its effects, protective equipment. Notified and other Miners' occupational diseases - their symptoms and preventive measures, effect of heat and humidity on miner's health, Physiological aspects of breathing in dust laden atmosphere..

Role of DGMS & CMRI.

Syllabus for: **MINING MACHINERY - I**

|  |   |
|--|---|
| <b>Name of the Course: MINING MACHINERY - I ( Part III – 2nd semester, Mining Engineering)</b> |   |
| <b>Course Code:</b>  | <b>Semester: SIXTH</b>  |
| <b>Duration: : 17 weeks</b>  | <b>Maximum Marks: 100 + 50 (Practical)</b>  |
| <b>Teaching Scheme</b>   | <b>Examination Scheme</b>   |
| <b>Theory: 4 hrs./week</b>   | <b>Class Test.:20 Marks</b>   |
| <b>Tutorial: nil</b>   | <b>Teacher’s Assessment : 10 Marks</b><br><b>End Semester Exam.:70 Marks</b>  |
| <b>Practical: 2 hrs./week</b>  | <b>Continuous Internal Assessment: 25 marks.</b>  |
|  | <b>External Assessment: 25 marks.</b>   |
| <b>Credit: 5</b>   |   |
| <b>Sl. No.</b>   | <b>Aim:</b>   |
| 1.   | To make familiar with transport system through incline and adit entry of the mine.  |
| 2.   | To make familiar with transport system through vertical shaft.  |
| 3.   | To impart knowledge rope used in mines.   |
| <b>Objective:</b>  |   |
| <b>Sl. No.</b>   | <b>The Students will be able to:</b>  |
| 1.   | Learn about every possible system of machinery to transport men, machines & minerals/coal safely and efficiently in underground roadways. |
| 2.   | Learn the use of rope, its application & maintenance used in winding purposes in mines.   |
| 3.   | Plan pit-top & pit-bottom lay out efficiently.  |
| <b>Pre-Requisite:</b>  |   |
| <b>Sl. No.</b>   |   |
|  | <b>Basic knowledge in Mining, basic Mechanical engg., Physics and Engg. Drawing.</b>  |

**MODULAR DIVISION OF THE SYLLABUS**

| MODULE | TOPIC                                       | LECTURE PERIODS | TUTORIAL PERIODS |
|--------|---|-----------------|------------------|
| 1      | UNDERGROUND MINE TRANSPORT SYSTEM           | 22              | 0                |
| 2      | WINING SYSTEM                               | 22              | 0                |
| 3 & 4  | WIRE ROPE & PIT TOP AND PIT BOTTOM LAY OUT. | 22              | 0                |

LECTURE PERIODS: 66

TUTORIAL PERIODS: 0

INTERNAL ASSESSMENT: 2

68

**EXAMINATION SCHEME**

| GROUP | MODULE | OBJECTIVE QUESTIONS |                |                    |             | SUBJECTIVE QUESTIONS |   |                    |             |
|-------|--------|---------------------|----------------|--------------------|-------------|----------------------|---|--------------------|-------------|
|       |        | TO BE SET           | TO BE ANSWERED | MARKS PER QUESTION | TOTAL MARKS | TO BE SET            | TO BE ANSWERED                            | MARKS PER QUESTION | TOTAL MARKS |
| A     | 1      | 8                   | ANY TWENTY     | 1                  | 1 x 20 = 20 | FOUR                 | FIVE, TAKING AT LEAST ONE FROM EACH GROUP | 10                 | 10X 5 = 50  |
| B     | 2      | 9                   |                |                    |             | THREE                |   |                    |             |
| C     | 3&4    | 6                   |                |                    |             | THREE                |   |                    |             |

# MINING MACHINERY-I

## DETAIL COURSE CONTENT

### GROUP - A

1. Mine Transport system.
  - 1.1 Different types of Rope Haulage - description with simple sketches.
  - 1.2 Different types of safety devices on rope haulages including Jazz rail, Back catch, Spring catch, Drop warrick, Inter-coupled stop block & runway switch, Drags, tub retarder.
  - 1.3 Different types of rope clips, tub couplings.
  - 1.4 Size of rail sleepers & rail fastening, fish plates, ballast, Jim crow, Super elevation, Transition curve, Reverse curve, Goose neck curve, Diamond crossing.
  - 1.5 Different types of conveyors- shakers conveyor, belt conveyor, scraper chain conveyor, & armoured flexible conveyor; their principles of operation, application, merits and demerits.  
Drive of Belt conveyor, loop take-up arrangement, troughed belt, carrying capacity of belt conveyor.
  - 1.6 Different types of locomotive haulage systems their application merits and demerits.  
Safety devices of Diesel locomotives including flame trap and exhaust conditioner box.

### GROUP - B

2. Winding system.
  - 2.1 Function of headgear- height of headgear - different factors , design of headgear, headgear pulley, constructional features, angle of fleet.
  - 2.2 Cage - constructional features, cage suspension gear, detaching hook and its function, safety catches at headgear, keps-props & guides used in mine shafts- rigid and flexible guides, guide shoes, guide rope suspension & tensioning arrangement , guide rope & winding rope changing.
  - 2.3 Winding Drum  
Different profile of winding drum- merits & demerits, attachment of winding rope to drum.  
  
Winding brakes - mechanical-post and caliper brake  
  
Various safety devices on winding system including automatic contrivances for overwind. Overspeed and slow banking etc.
  - 2.4 Friction winding  
principle, Ground koepe and Tower koepe, advantages and disadvantages of the system, Multirope system of winding, rope creep.
  - 2.5 Skip winding  
Skip its constructional features its difference with cage winding, operation of skip.



## **GROUP - C**

### 3. Wire Ropes and Rope Capel etc.

Wire- testing of wires of rope , contrusction of various types of rope used in mining ; factor of safety of rope; nominal and actual F.O.S. and factors influencing the F.O.S. efficiancy of rope construction, space factor, bending factor etc; laying of rope, deterioration of rope, care and mainteance of rope in use and also in storage; splicing of haulage rope; calculation of size of winding rope; examination of rope; life of rope and norms for discarding a rope.

Rope caple for haulage, winding and recapping.

### 4. Pit top & Pit Bottom Layout.

Pit top & Pit Bottom Layout for cage winding , - essencial features of the layout, different types of layout.

Pit top & Pit Bottom Layout with skip winding.

## **MINING MACHINERY – I LAB**

### **DETAIL COURSE CONTENT**

1. Study & sketching of different types of safety devices.
2. Study & sketching of coal tubs, tub-couplings, haulage clips.
3. Study of different types wire ropes used for mining purposes.
4. Study of pit top & pit bottom layouts for cage winding.
5. Study & sketching of different types of rope capels.
6. Study & sketching of winding pulley.
7. Study & sketching of cages & skip.
8. Study & sketching of safety detaching hook.
9. Study & sketching of keps-prop.
10. Study & sketching of winding drum.

Syllabus for: MINING MACHINERY - II

|   |   |
|---|---|
| <b>Name of the Course: MINING MACHINERY - II ( Part III – 2nd semester, Mining Engineering)</b> |   |
| <b>Course Code:</b>   | <b>Semester: SIXTH</b>  |
| <b>Duration: : 17 weeks</b>   | <b>Maximum Marks: 100 + 50 (Practical)</b>  |
| <b>Teaching Scheme</b>  | <b>Examination Scheme</b>   |
| <b>Theory: 3 hrs./week</b>  | <b>Class Test.:20 Marks</b>   |
| <b>Tutorial: 1 hrs./week</b>  | <b>Teacher's Assessment : 10 Marks</b>  |
|   | <b>End Semester Exam.:70 Marks</b>  |
| <b>Practical: 2 hrs./week</b>   | <b>Continuous Internal Assessment: 25 marks.</b>  |
|   | <b>External Assessment: 25 marks.</b>   |
| <b>Credit: 5</b>  |   |
| <b>Sl. No.</b>  | <b>Aim:</b>   |
| 1.  | To make familiar with electrical equipments used in underground mines.                                |
| 2.  | To make familiar with coal face machinery.  |
| 3.  | To make familiar with the system pumping in underground mines.  |
| <b>Objective:</b>   |   |
| <b>Sl. No.</b>  | <b>The Students will be able to:</b>  |
| 1.  | Learn about the applications & mode of operations of electrical equipments used in underground mines. |
| 2.  | Learn in details about different coal handling machinery in underground.                              |
| 3.  | Learn about operation of different pumps under different situation in underground mines.              |
| <b>Pre-Requisite:</b>   |   |
| <b>Sl. No.</b>  |   |
|   | Basic knowledge in Mining, basic mechanical engg., Physics and Engg. Drawing.                         |

**MODULAR DIVISION OF THE SYLLABUS**

| MODULE | TOPIC  | LECTURE PERIODS | TUTORIAL PERIODS |
|--------|--|-----------------|------------------|
| 1      | MINING CABLES &<br>COAL FACE<br>ELECTRICAL MCHINES | 17              | 5                |
| 2      | COAL FACE<br>MACHINERY                             | 16              | 6                |
| 3      | MINE PUMPS.  | 16              | 6                |

LECTURE PERIODS: 49      TUTORIAL PERIODS: 17      INTERNAL ASSESSMENT: 2      68

**EXAMINATION SCHEME**

| GROUP | MODULE | OBJECTIVE QUESTIONS |                |                    |             | SUBJECTIVE QUESTIONS |   |                    |             |
|-------|--------|---------------------|----------------|--------------------|-------------|----------------------|---|--------------------|-------------|
|       |        | TO BE SET           | TO BE ANSWERED | MARKS PER QUESTION | TOTAL MARKS | TO BE SET            | TO BE ANSWERED                            | MARKS PER QUESTION | TOTAL MARKS |
| A     | 1      | 8                   | ANY TWENTY     | 1                  | 1 x 20 = 20 | FOUR                 | FIVE, TAKING AT LEAST ONE FROM EACH GROUP | 10                 | 10X 5 = 50  |
| B     | 2      | 8                   |                |                    |             | THREE                |   |                    |             |
| C     | 3      | 7                   |                |                    |             | THREE                |   |                    |             |

# **MINING MACHINERY-II**

## **DETAIL COURSE CONTENT**

### **GROUP - A**

1. Use of electricity in Coal face machinery and equipment.

Mining cables - Classification, constructional features and use of each type - armoured, pliable armoured and trailing cable, Installation of cable in shaft & in roadways, Permissible length & care of cable, Power distribution & size of cable for underground.

General working principles of working of gate end box, various protective devices incorporated, basic remote control circuit - function of Pilot core protection & earth leakage protection. Function & operation of drill panel.

Flame proof & intrinsically safe apparatus- application, features & safety aspects.

Underground signaling arrangement- haulage signals, shaft signals and use of telephone underground.

### **GROUP - B**

2. Coal face machinery

Electric coal drills & Jumbo drill- its operation, constructional features, specifications & use , drill rod, drill bits.

Coal cutting machines- use, different types, constructional features, chain driving mechanism, haulage driving mechanism, jib, chain, pick, mounting arrangement.

Different types of Mechanical loader used in Bord & Pillar heading and Longwall faces like gathering arm loader, Duckbill loader, shearer loader and Flight loader.

Application & operation of bucket loader like scraper loader, side dump loader, load haul dumper,

Application & operation of Continuous miner.

### **GROUP - C**

3. Mine Pumps.

Sources of water in pump.

Classification of mine pumps; Basic definition of head, suction, lift, suction head, discharge head; Friction of water in pipes.

Causes of water hammer & cavitation, use of air vessels, Principle and operation of Siphon.

Ram pump- constructional features, working and use.

Constructional features , working and use of Rotodynamic pump like Centrifugal and Turbine pump-, End thrust in Turbine pump & its balancing, characteristic curve for turbine/Centrifugal pump, Arrangement of different valves and other components in Centrifugal / Turbine pump.

Mono/ Roto pump - constructional features , working and use.

Troubles in pumps & remedial measures.

Pump calculations - numerical problems.

Main sump at pit bottom.

## **MINING MACHINERY- II LAB**

### **DETAIL COURSE CONTENT**

1. Study of samples of mining cables & sketching of their constructions.
2. Study of armoured cable joint box.
3. Study of Gate -end-box and its various protective devices and flame proofness.
4. Study of electric rotary coal drill- its constructional features, gear driving mechanism, drill rod and drill bit.
5. Study of constructional features of (i) Turbine pump(ii) Ram pump (iii) Mono pump
6. Study of continuous miners.

Syllabus for: MINE VENTILATION - II

|   |   |
|---|---|
| <b>Name of the Course: MINE VENTILATION - II ( Part III – 2nd semester, Mining Engineering)</b> |   |
| <b>Course Code:</b>   | <b>Semester: SIXTH</b>  |
| <b>Duration: : 17 weeks</b>   | <b>Maximum Marks: 50 + 50 (Practical)</b>   |
| <b>Teaching Scheme</b>  | <b>Examination Scheme</b>   |
| <b>Theory: 3 hrs./week</b>  | <b>Class Test.:10 Marks</b>   |
| <b>Tutorial: nil</b>  | <b>Teacher’s Assessment : 05 Marks</b><br><b>End Semester Exam.:35 Marks</b>                        |
| <b>Practical: 2 hrs./week</b>   | <b>Continuous Internal Assessment: 25 marks.</b>  |
|   | <b>External Assessment: 25 marks.</b>   |
| <b>Credit: 4</b>  |   |
| <b>Sl. No.</b>  | <b>Aim:</b>   |
| 1.  | To make familiar with the fan used for ventilation in underground Mines.                            |
| 2.  | To Impart elementary knowledge regarding auxiliary ventilation.                                     |
| 3.  | To make familiar with the ventilation measurement in underground Mines.                             |
| <b>Objective:</b>   |   |
| <b>Sl. No.</b>  | <b>The Students will be able to:</b>  |
| 1.  | Learn in details the operation different types of fans to suit different conditions in underground. |
| 2.  | Learn to solve numerical problems regarding fan laws applicable to underground roadways.            |
|   |   |
| <b>Pre-Requisite:</b>   |   |
| <b>Sl. No.</b>  |   |
|   | <b>Basic knowledge in general Mining practices, mathematics, Physics and Chemistry.</b>             |

**MODULAR DIVISION OF THE SYLLABUS**

| MODULE | TOPIC   | LECTURE PERIODS | TUTORIAL PERIODS |
|--------|---|-----------------|------------------|
| 1 & 2  | ARTIFICIAL VENTILATION AND NUMERICAL PROBLEMS | 25              | 0                |
| 3 & 4  | AUXILIARY VENTILATION & VENTILATION SURVEY    | 24              | 0                |

LECTURE PERIODS: 49      TUTORIAL PERIODS: 0      INTERNAL ASSESSMENT: 2      51

**EXAMINATION SCHEME**

| GROUP | MODULE | OBJECTIVE QUESTIONS |                |                    |             | SUBJECTIVE QUESTIONS |  |                    |             |
|-------|--------|---------------------|----------------|--------------------|-------------|----------------------|--|--------------------|-------------|
|       |        | TO BE SET           | TO BE ANSWERED | MARKS PER QUESTION | TOTAL MARKS | TO BE SET            | TO BE ANSWERED                             | MARKS PER QUESTION | TOTAL MARKS |
| A     | 1 & 2  | 7                   | ANY ELEVEN     | 1                  | 1 x 11 = 11 | THREE                | THREE, TAKING AT LEAST ONE FROM EACH GROUP | 8                  | 8X 3 = 24   |
| B     | 3 & 4  | 6                   |                |                    |             | THREE                |  |                    |             |

# **MINE VENTILATION -II**

## **DETAIL COURSE CONTENT**

### **Group - A**

#### 1. Artificial ventilation

Types of Fans, Centrifugal fan and Axial flow fan - comparison between them, exhausting and forcing fans - comparison between them, Fan drives, Air velocity, control of quantity of air delivered, Laws relating to quantity of air, water guage & fan speed - Theoretical depression, Effective depression, Manometric efficiency, H.P of ventilation, Mechanical efficiency, equivalent orifice of a mine. Fan characteristics curves - Fan in series and parallel, Reversal of the air current after Fire.

#### 2. Numerical problems in fan laws, fan H.P. efficiency, Evasee chimney.

### **Group - B**

#### 3. Auxiliary ventilation - Forcing & Exhaust, Advantages and Disadvantages, Air tubes.

Booster fan and natural line, effect of booster fan on the rest of the mine, ventilation of long headings.

#### 4. Ventilation survey - objective, quantity surveying, pressure surveying, Instruments used. Ventilation of deep mines and air-conditioning.

# **MINE VENTILATION -II LAB**

## **DETAIL COURSE CONTENT**

1. Study & sketch of different types of Mine fans with reversal arrangements.
2. Study of simple mine plans showing ventilation system for the mine.
3. Preparation of ventilation plan.
4. Ventilation measurement-quantity surveying.



Syllabus for: MINE SURVEYING - II

|   |  |
|---|--|
| <b>Name of the Course: MINE SURVEYING - II ( Part III – 2nd semester, Mining Engineering)</b> |  |
| <b>Course Code:</b>   | <b>Semester: SIXTH</b>   |
| <b>Duration: : 17 weeks</b>   | <b>Maximum Marks: 100 + 100 (Practical)</b>  |
| <b>Teaching Scheme</b>  | <b>Examination Scheme</b>  |
| <b>Theory: 3 hrs./week</b>  | <b>Class Test.:20 Marks</b>  |
| <b>Tutorial: nil</b>  | <b>Teacher's Assessment : 10 Marks</b>   |
|   | <b>End Semester Exam.:70 Marks</b>   |
| <b>Practical: 3 hrs./week</b>   | <b>Continuous Internal Assessment: 50 marks.</b>                                     |
|   | <b>External Assessment: 50 marks.</b>  |
| <b>Credit: 4</b>  |  |
| <b>Sl. No.</b>  | <b>Aim:</b>  |
| 1.  | To make familiar with the use of Theodolite.   |
| 2.  | To Impart knowledge regarding Triangulation, correlation & Tacheometry.              |
| 3.  | To make familiar with the method of Stope surveying.                                 |
| <b>Objective:</b>   |  |
| <b>Sl. No.</b>  | <b>The Students will be able to:</b>   |
| 1.  | Learn to do traversing & curve setting by theodolite surveying.                      |
| 2.  | Learn the method of Correlation survey and Triangulation survey applicable in Mines. |
| 3.  | Learn different methods to perform Stope surveying in Mines.                         |
| <b>Pre-Requisite:</b>   |  |
| <b>Sl. No.</b>  |  |
|   | <b>Basic knowledge in Surveying, Mathematics, Physics and Engg. Drawing.</b>         |

**MODULAR DIVISION OF THE SYLLABUS**

| MODULE  | TOPIC   | LECTURE PERIODS | TUTORIAL PERIODS |
|---------|---|-----------------|------------------|
| 1 & 2   | THEODOLITE & CURVE SETTING                        | 16              | 0                |
| 3 & 4   | CORRELATION & TRIANGULATION                       | 16              | 0                |
| 5,6 & 7 | TACHEOMETRY, STOPE SURVEYING & DIP FAULT PROBLEM. | 17              | 0                |

LECTURE PERIODS: 49

TUTORIAL PERIODS: 0

INTERNAL ASSESSMENT: 2

25

**EXAMINATION SCHEME**

| GROUP | MODULE  | OBJECTIVE QUESTIONS |                |                    |             | SUBJECTIVE QUESTIONS |   |                    |             |
|-------|---------|---------------------|----------------|--------------------|-------------|----------------------|---|--------------------|-------------|
|       |         | TO BE SET           | TO BE ANSWERED | MARKS PER QUESTION | TOTAL MARKS | TO BE SET            | TO BE ANSWERED                            | MARKS PER QUESTION | TOTAL MARKS |
| A     | 1 & 2   | 8                   | ANY TWENTY     | 1                  | 1 x 20 = 20 | FOUR                 | FIVE, TAKING AT LEAST ONE FROM EACH GROUP | 10                 | 10X 5 = 50  |
| B     | 3 & 4   | 8                   |                |                    |             | THREE                |   |                    |             |
| C     | 5,6 & 7 | 7                   |                |                    |             | THREE                |   |                    |             |

# **MINE SURVEYING – II**

## **DETAIL COURSE CONTENT**

### **GROUP - A**

#### 1. Theodolite.

Transit vernier theodolite and its application, different part and their function.

Geometric relationship of different axes and tests and adjustment- temporary, permanent.

Theodolite traversing by different methods on surface and underground. Continuous azimuth method, double foresight method, and back and foresight method.

Method of measuring horizontal angles- Repetition and reiteration methods including booking and measurement of vertical angles, index error.

Computation of traverse results- plane rectangular co-ordinates, calculation of closing error, balancing of traverse. Permissible errors- traverse problems.

Salient features of modern glass arc theodolite.

Basic principle of Gyro theodolite and its application in mining.

#### 2. Curve setting.

Objective of setting out curves .

Definition of circular curves such as simple curves, compound curves, reverse curves, and transition curves, designation of curves.

Elements of simple circular curve.

Different methods of setting out simple circular curve-

By chord & off set method,

By chord and angle method,

By Rankine's method of tangential angle- using one theodolite, two theodolites

When intersection points are inaccessible.

Elements of compound curves- super elevation-necessity of super elevation computation.

Setting out problems.

### **GROUP - B**

#### 3. Correlation of surface survey and underground survey.

Definition and purpose of mine correlation.

Methods of correlation through inclines and shafts.

Two shaft method- single shaft method, coplaning rule, Weisback triangle method and Weis quadrilaterals.

Modern method- gyroscopic method of correlation- introduction.

By Autoplumb and Laser (to impart idea).

An introduction to EDM and their usage.

Joint survey between two large collieries. Source of error in correlation- permissible error, correlation survey problems.

Shaft depth measurements - only enumeration of different types.

Subsidence survey- subsidence plan and section.

#### 4. Mine Triangulation.( plane triangle only)

Principle of triangulation survey, classifications, triangulation figures, consideration for selection of triangulation stations, condition of adjustment of braced quadrilateral and polygon with a central station.

Base line measurement by traditional methods, correction to be applied for measuring base.

Procedure for triangulation survey.

Extension of base line, double extension of baseline, broken base, satellite station and National grid.

Field Astronomy- common astronomical terms, different methods of determination of true north, determination of true north by observation to a circumpolar star.

### **GROUP - C**

#### 5. Tacheometry.

Tacheometry and its various types and their accessories- its application.

Derivation of formula for horizontal distances and reduced levels.

Stadia tacheometry, tangential tacheometry, substance bar tacheometry, Beman's stadia arc.

Numerical examples in tacheometry.

#### 6. Stope Surveying.

Introduction to and types of stope survey instruments required in stope surveying such as Hanging compass, Clinometer, Stereometer, Auxiliary telescope, Strecher bars.

Methods of stope surveying such as- Tape triangulation, Tying in method, Shrinkage stope surveys.

#### 7. Different type of numerical problems on .

Drift ,full dip, apparent dip, borehole and fault, percentage extraction of pillars.

# **MINE SURVEYING-II LAB**

## **DETAIL COURSE CONTENT**

1. Handling Theodolite.
2. Practical Theodolite traverse survey in field.
3. Co-ordinate plotting of the correlation survey with given data.
4. Determination of horizontal distances & vertical differences between tachometric methods.
5. Study of Modern survey equipment.

Syllabus for: PROJECT WORK & SEMINAR.

|   |  |
|---|--|
| <b>Name of the Course: PROJECT WORK &amp; SEMINAR. ( Part III - 2nd semester, Mining Engineering)</b> |  |
| <b>Course Code:</b>   | <b>Semester: SIXTH</b>   |
| <b>Duration : 17 weeks</b>  | <b>Maximum Marks: 100 (Practical)</b>  |
| <b>Teaching Scheme</b>  | <b>Examination Scheme(Practical)</b>   |
| <b>Theory: Nil</b>  | <b>Continuous Internal Assessment: 50 marks.</b>   |
| <b>Tutorial: Nil</b>  | <b>External Assessment: 50 marks.</b>  |
| <b>Practical: 4 hours per week</b>  | <b>End Semester Exam. [theory]: Marks: Nil</b>   |
| <b>Credit: 2</b>  |  |
| <b>Aim:</b>   |  |
| <b>Sl. No.</b>  |  |
| 1.  | To provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills.  |
|   |  |
| <b>Objective:</b>   |  |
| <b>Sl. No.</b>  |  |
| 1.  | The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging and it should provide a taste of real life problem that a diploma-holder may encounter as a professional in their future life in Industry. |
|   |  |
| <b>Pre-Requisite:</b>   |  |
| <b>Sl. No.</b>  |  |
| 1.  | Knowledge in details in Mining Engineering, Electrical Engineering, Mechanical Engineering , Surveying etc.  |

## **Preparation of Project and presentation in seminar**

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a Faculty of their core discipline who will work as a Project Guide. Number of students per group may vary with the strength of the student and topics provided.

The course shall include preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute.

**The project work will be based mainly on Mining Engineering subjects.**

**Seminar on Project Work** is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, audio and visual communication aids which they have learnt. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

|   |  |
|---|--|
| <b>Name of the Course: GRAND VIVA. ( Part III - 2nd semester, Mining Engineering)</b> |  |
| <b>Course Code:</b>   | <b>Semester: SIXTH</b>   |
| <b>Duration: : 17 weeks</b>   | <b>Maximum Marks: 100 (Practical)</b>  |
| <b>Teaching Scheme</b>  | <b>Examination Scheme(Practical)</b>   |
| <b>Theory: Nil</b>  | <b>Continuous Internal Assessment: 50 marks.</b>   |
| <b>Tutorial: Nil</b>  | <b>External Assessment: 50 marks.</b>  |
| <b>Practical: 2 hours per week</b>  | <b>End Semester Exam. [theory]: Marks: Nil</b>   |
| <b>Credit: 1</b>  |  |
| <b>Aim:</b>   |  |
| <b>Sl. No.</b>  |  |
| 1.  | To facilitate the students in enrichment of their technical knowledge, communication skill and attitude towards specific subject matter. |
| 2.  | To motivate the students in learning ,delivering and positive thinking.  |
| <b>Objective:</b>   |  |
| <b>Sl. No.</b>  | <b>The Students will be able to:</b>   |
| 1.  | Overcome the weakness in communication skill.  |
| 2.  | Face interviews before different industrial representatives with confidence.   |
| 3.  | Evaluate themselves regarding their level of knowledge, understanding the subject as a whole and develop themselves further.             |
| <b>Pre-Requisite:</b>   |  |
| <b>Sl. No.</b>  |  |
| 1.  | Knowledge in details in Mining Engineering, Electrical Engineering, Mechanical Engineering , Mine Surveying etc.                         |

**COURSE CONTENT**

The syllabi of all the theoretical and sessional subjects taught in the three years of diploma in Mining Engg.