



DIPLOMA WING

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

SCHEME OF STUDIES & EXAMINATIONS ( IMPLEMENTED FROM SESSION : JULY 2023)

SCHEME
OCBC JULY 2022/2023

NAME OF BRANCH
MINE SURVEYING

BRANCH CODE
M06

SEMESTER
THIRD (III)

S.N.	PAPER CODE	SUBJECT CODE	SUBJECT NAME	THEORY COMPONENT							PRACTICAL COMPONENT					TOTAL CREDITS	TOTAL MARKS	
				HRS PER WEEK	CREDITS	TERM WORK			THEORY PAPER		HRS PER WEEK	CREDITS	LAB WORK	PRACTICAL EXAM/VIVA				
						QUIZ/ASSIGNMENT	MID TERM TEST*		TOTAL	MARKS				DURATION	MARKS			DURATION
							I	II										
1		301	MINE SURVEYING - I	2	2	10	10	10	30	70	03 Hrs.	6	3	20	30	03 Hrs.	5	150
2		302	MINING TECHNOLOGY - I	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
3		303	GEOLOGY - I	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
4		304	MINE ENVIRONMENT - I	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
5		305	MINE SAFETY & LEGISLATION - I	3	3	10	10	10	30	70	03 Hrs.	0	0	0	0	0	3	100
6		306	GENERAL MECHANICAL ENGG	2	2	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	3	150
7			**SUMMER INTERNSHIP- I	0	0	0	0	0	0	0	0	0	2	20	30	03 Hrs.	2	50
8			PROFESSIONAL DEVELOPMENT	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
9			***RECOVERY CLASSES/LIBRARY etc.	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
TOTAL				16	16				180	420		20	9	120	180		25	900

- NOTE -**
- (1)\* Two Best, out of Three Mid Term Tests (Progressive Tests) Marks should be entered here.
  - (2)\*\* 3-4 Weeks Summer Internship after II Semester.
  - (3)\*\*\*To recover courses if session delays due to summer internship.

GRAND TOTAL OF CREDITS
25

GRAND TOTAL OF MARKS
900



**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	MINE SURVEYING - I
PAPER CODE	:	
SUBJECT CODE	:	301
TREORY CREDITS	:	02
PRACTICAL CREDITS	:	03

**Course Objectives:**

Following are the objectives of this course:

- To understand types of surveying works required.
- To know the types of method and equipments to be used for different surveys.
- To know the use and operational details of various surveying equipments.

**Course Contents:**

**Unit-I Overview and Classification of Survey**

- Survey-Purpose and Use.
- Types of surveying-Primary and Secondary, Classifications: Plane, Geodetic, Cadastral, Hydro-graphic, Photogrammetric and Aerial.
- Principles of Surveying.
- Scales: Engineer's scale, Representative Fraction(RF)and diagonal scale & shrunk scale.
- Surveying characteristic of work

**Unit-II Chain Surveying**

- Instruments used in chain survey: Chains & its various types, Tapes & its various types, Arrow, Ranging rod, Line ranger, Off-set rod, Open cross staff, Optical square.
- Chain survey Station, Baseline, Check line, Tie line, Offset, Tie station.
- Ranging: Direct and Indirect Ranging.
- Methods of Chaining, obstacles in chaining.
- Errors in length: Instrumental error, personal error, error due to natural cause random error. Numerical problems of error due to incorrect chain.
- Principles of chain triangulation.
- Types of offsets: Perpendicular and Oblique.

### **Unit-III Compass Traverse Survey**

- Compass Traversing-open, closed.
- Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination.
- Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass-Temporary adjustments and observing bearings.
- Components of Surveyor's Compass and their Functions, Methods of using Surveyor's Compass-Temporary adjustments and observing bearings.
- Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles.
- Methods of plotting a traverse and closing error, Graphical adjustment of closing error.

### **Unit-IV Levelling**

- Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks-GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Backsight, Foresight, Intermediate sight, Change point, Height of instruments.
- Types of levels :Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level.
- Types of Leveling Staff :Self-reading staff and Target staff.
- Reduction of level by Line of collimation and Rise and Fall Method.
- Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.
- Balancing of back sights & foresights, Curvature and refraction, distance to the visible horizon, Levelling problems, Error in Levelling.
- Level tube and sensitiveness of bubble tube.
- Permanent adjustment of Dumpy level.
- Highest flood level line.
- Maintenance of direction and gradient of a drift.

### **Unit-V Calculation of Area & Volume**

- General method of determining area, Area from offsets, area by Double meridian distances, area by co-ordinates.
- Volume Measurement from Cross-Sections, Prismoidal Formula, Trapezoidal Formula, Volume from Spot levels.
- Volume of railway cutting and embankments.

- Volume and weight of coal.
- Measurement of coal stock.
- Surveying mineral stock piles.

**Suggested learning resources:**

1. Punmia, B.C.; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House.
10. Mine Surveying and Levelling Vol. I & II-S..Ghatak

**Course out comes:**

After completing this course, student will be able to:

- Select the type of survey required for given situation.
  - Compute area of open field using chain, tape and cross staff.
  - Conduct traversing in the field using chain and compass.
  - Use levelling instruments to determine reduced level for preparation of contour maps
- .....

## **MINE SURVEYING - I LAB**

### **Course Objectives:**

Following are the objectives of this course:

- To understand types of surveying works required
- To know the type of method and equipments to be used for different surveys
- To know the use and operational details of various surveying equipments.

### **List of Practical's to be performed**

1. Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.
2. Undertake reciprocal ranging and measure the distance between two stations.
3. Determine area of open field using chain and cross staff survey.
4. Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.
5. Measure Fore Bearing and back bearing of a closed traverse of 5 or 6 sides and correct the bearings and included angles for the local attraction.
6. Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building.
7. Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.6**.
8. Undertake simple leveling using dumpy level/ Auto level and leveling staff.
9. Undertake differential leveling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff.
10. Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff.
11. Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.
12. Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical **No.11**.
13. To measure the area & volume of heap.

**Suggested learning resources:**

1. Punmia, B.C.; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House.
10. Mine Surveying and Levelling Vol. I & II-S..Ghatak

**Course outcomes:**

After completing this course, student will be able to:

- Select the type of survey required for given situation.
- Compute area of open field using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass.
- Use levelling instruments to determine reduced level to prepare contour maps

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	MINING TECHNOLOGY - I
PAPER CODE	:	
SUBJECT CODE	:	302
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

**Course Objectives:**

Following are the objectives of this course:

- To know the various Elements of Mining and stages/phases in Mining.
- To list the applicability and limitations of mode of entries.
- To give the classification of drilling methods
- To know the type of explosive.
- To understand the method of working of mines.

**Course Contents:**

**Unit-I INTRODUCTION TO MINING INDUSTRY**

- Types of major minerals, their characteristic features and usages.
- Geographic locations of major mineral deposits in India, development of mining industry over the years.
- Major government, semi-government, autonomous and private industries in Mining.
- Roles and responsibilities of different agencies in mining industry such as Ministry of Mines, State government department of mines, ministry of environment and forest, DGMS, CMRI, Indian Bureau of Mines, Geological Survey of India, etc.
- Terms used in mining operations and mines.

**Unit-II ACCESS IN MINES, MODES & SELECTION**

- Different types of modes of entry in mines.
- Modes of entry in the open cast and underground mines.
- Types: Mine shafts, adit and inclines.
- Characteristic features of modes of entry in mines.
- Sinking Operation;-Marking Centre of Shaft.

- Temporary & Permanent Lining, Special Method of Sinking.

### Unit-III DRILLING & BORING IN MINES

- Drilling in mines, purpose, methods of drilling.
- Drilling for exploration./Boring type , surface arrangement
- Types of drill bits.

### Unit-IV EXPLOSIVES & BLASTING PROCESS

- Common explosive bases, Properties of Explosives, High Explosive & Low explosive, their comparison.
- Permitted explosives their types, composition, properties, uses, advantages & disadvantages. Commonly used explosive in mines. Calculation of Powder Factor.
- A detonator, common types of detonators, plain detonators, instantaneous and delay action detonators their construction, uses, comparison etc. low tension & high-tension detonators. Detonator Factor
- Safety fuses, detonating cords, detonating relays.
- Shot firing tools, exploders.
- Face preparation for shot firing, Preparation of priming charge, charging of hole in coal and drifts, Direct and inverse initiation, shot firing circuits, procedure of shot firing of holes in gassy mine, precautions. Simultaneous & delay firing.
- Solid blasting, conditions to be satisfied before doing solid blasting, advantages of solid blasting, Drilling patterns used with Solid Blasting & Open Cast Blasting
- Misfires, causes, remedy and method of relieving, dealing with misfires. Blown out shots & blown through shots. Causes and precautions.

### Unit-V INTRODUCTION OF MINING METHODS

- Main classifications of method of working coal
  - Board & Pillar
  - Long wall.
  - Surface Mining –
    - Open cast method
    - Open Pit Method
    - Quarry
- Applicability condition for selection of each methods of working. Advantages, disadvantages & simple layout of each method.
- Unit operations in mining

#### Suggested learning resources:

- 1 Blasthole Drilling Technology - B.V. Gokhale, Multi Fields, Bombay
- 2 Explosives & Blasting Techniques - Dr . G.K.Pradhan, Mintech Publications,Bhubaneswar.



- 3 Explosive & Blasting Practices in Mines, Dr S. K. Das, Lovely Prakashan, Dhanbad.
- 4 Elements of Mining Technology Vol.I : D.J.Deshmukh

**Course out comes:**

After completing this course, student will be able to:

- Knowledge of various Elements of Mining and stages/phases in Mining.
- Explain applicability and limitations of mode of entries.
- Details of classification of drilling methods
- Know the type of explosive.
- Understand the method of working of mines.

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## MINING TECHNOLOGY - I LAB

### Course Objectives:

Following are the objectives of this course:

- To list the applicability and limitations of mode of entries.
- To give the classification of drilling methods
- To know the type of explosive.
- To understand the method of working of mines.

### List of Practical's to be performed

1. Sketch and describe mine inclines top lay out with direct haulage.
2. Sketch and describe about pit top layout.
3. Sketch & describe blasting pattern in shaft sinking
4. Sketch and describe the usual method of drivage of gallery in coal mine showing usual arrangements of pumps, transport (direct rope haulage) and ventilation in dip faces.
5. Sketch and describe different type of exploder.
6. Describe with Sketch different type accessories of blasting such as safety fuse, detonating fuse, Nonel.
7. Sketch and describe burn cut , wedge cut & fan cut
8. Sketch and describe different type of electric detonator.
9. Blast vibration definitions

### Suggested learning resources:

1. Blasthole Drilling Technology - B.V. Gokhale, Multi Fields, Bombay
2. Explosives & Blasting Techniques - Dr . G.K.Pradhan, Mintech Publications,Bhubaneswar.
3. Explosive & Blasting Practices in Mines, Dr S. K. Das, Lovely Prakashan, Dhanbad.
4. Elements of Mining Technology Vol.I : D.J.Deshmukh

### Course out comes:

After completing this course, student will be able to:

- Explain applicability and limitations of mode of entries.
- Details of classification of drilling methods
- Know the different type of explosive.
- Understand the method of working of mines.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	GEOLOGY - I
PAPER CODE	:	
SUBJECT CODE	:	303
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

**Course Objectives:**

Following are the objectives of this course:

- To know the origin of earth.
- To understand the physical properties of geology.
- To understand the mineralogy.
- To know the various type of rock.
- To understand the structural geology.

**Course Contents:**

**Unit-I GENERAL GEOLOGY**

Branches, Sub branches, Essential Allied, Scope of geology, Origin of Earth- various hypotheses. Age of earth - Various methods of age determinations, radioactive methods and their advantages. Interior of Earth crust, mantle and core. Continental drift Isotacy.

**Unit- II PHYSICAL GEOLOGY**

Erosion & weathering - Erosion, Transport and Deposition Vent facts, Pedestal rocks, sand dunes, and loess. Weathering: Physical Weathering and chemical Weathering. Exfoliation and spheroidal weathering.

River & wind erosion - Erosion, transport and deposition, water falls, meanders, oxbow lakes, alluvial fans, flood plains, delta. Work of Wind: Erosion, Transport and Deposition Vent facts, Pedestal rocks, sand dunes, and loess.

Earth quake - seismographs, Earthquake waves, Classification of earthquakes, Elastic rebound theory, Richter scale of earthquake intensity, Distribution of Earthquakes.

Volcano - Types of volcanoes, volcanic products volcanic cones, Distribution of volcanoes.

**Unit- III MINERALOGY**

Definition, Physical Properties of minerals colour, Streak, Lusture, Hardness, Habit, Cleavage, Fracture.

Identification of common minerals Orthoclase, Plagioclase, Augite, Hornblende, Biotite, Muscovite, Olivine, Quartz Asbestos, Calcite, dolomite, corundum, Gypsum Talc.

#### Unit-IV **PETROLOGY**

Rock cycle and characteristics of various Rock types.

**Igneous Rocks** – Acid and Basic rocks. Texture of Igneous rocks-Glassy, esicular, Porphyritic, Coarse Grained, medium grained, fine grained, and cryptocrystalline.

Igneous bodies- Batholiths, Laccoliths, sill and dyke Lava flows, common Igneous rocks-granite, syenite, Gabbro, basalt, Trachyte and Rhyolite. Structure Classification, occurrence & uses.

**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, minestone and breccias.

**Metamorphic Rocks** – Definition: Agents of Metamorphism- Heat, Uniform pressure, directed pressure. Chemically active fluids and gases. Structures and textures of metamorphic rocks-slaty, Schistose, Gneissose, and Granulose. Common metamorphic rocks-slaty Schist, Gneiss, Quartzite, and marble. Classification- Plutonic, Hypobysal and Volcanic rocks. Tabular Classification

#### Unit-V **STRUCTURAL GEOLOGY**

Strike, Dip Apparent Dip & True Dip.

**Folds**- Elements of Folds, anticline and syncline, limbs, axial plane, Axis of fold. Types of fold-symmetrical, Asymmetrical, Overtured, recumbent, Isoclinal, Plunging folds, Anticlinorium, Synclinorium, Open fold, close fold, Dome and Basin.

**Faults**- Fault Terminology, Fault-plane, 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, step-faults, Graben, Horst, Radial faults, Peripheral faults.

**Unconformity**-Definition, Types-Angular unconformity, Disconformity, Nonconformity.

**Joints and cleavages**- Classification- Strike Joints, dip Joints oblique Joints, bedding Joints, master Joints, sheet Joints and Columnar Joints. Outlier and Inlier.

#### **Suggested learning resources:**

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|-------------------------------------|------------------|
| ❖ Principles of Engineering Geology | - K.M.Bangar     |
| ❖ A text book of Geology            | - P.K. Mukherjee |
| ❖ Engineering and General Geology   | - Parbin Singh   |
| ❖ Mineral Economics                 | - Sinha & Sharma |
| ❖ Ground Water Hydrology            | - Todd.          |

#### **Course out comes:**

After completing this course, student will be able to:

- Concept of origin of earth.
- Detail of erosion, earthquake & volcano.
- Identify physical properties of minerals.
- Detail of various type rocks.
- Concept of structural feature of geology.

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## **GEOLOGY - I LAB**

### **Course Objectives:**

Following are the objectives of this course:

- To identify the physical properties of minerals.
- To identify the Hand Specimen of various type of minerals.

### **List of Practical's to be performed**

1. Identification of Minerals in sets. Colour Form Cleavage Fracture Luster Streak  
Moh's scale of hardness.
2. Identification of Minerals on the basis of physical properties in hand specimens. Asbestos, Augite, Biotite, Calcite, Corundum, Dolomite, Gypsum, Hornblende, Muscovite, Kaolinite, Orthoclase, Plagioclase, Quartz, Talc.
3. Identification of Igneous Rocks in Hand specimen. - Granite, Rhyolite, Syenite, Gabbro, Basalt, Trachyte.
4. Identification of sedimentary rocks in Hand specimen. - Conglomerate, Sandstone, Shale, Limestone.
5. Identification of Metamorphic rocks in Hand specimen. - Slate, Schist, Gneiss, Quartzite, Marble.

### **Suggested learning resources:**

- |                                     |                  |
|-------------------------------------|------------------|
| ❖ Principles of Engineering Geology | - K.M. Bangar    |
| ❖ A text book of Geology            | - P.K. Mukherjee |
| ❖ Engineering and General Geology   | - Parbin Singh   |
| ❖ Mineral Economics                 | - Sinha & Sharma |
| ❖ Ground Water Hydrology            | - Todd.          |

### **Course out comes:**

After completing this course, student will be able to:

- Concept of identification of physical properties of minerals.
- Understand the identification of Hand Specimen of various minerals.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	MINE ENVIRONMENT - I
PAPER CODE	:	
SUBJECT CODE	:	304
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

**Course Objectives:**

Following are the objectives of this course:

- To know the different gases its permissible limit for mines.
- To understand the mine climate.
- To understand the natural ventilation.
- To know the artificial ventilation.
- To conduct the pressure & quantity of air survey in mines.

**Course Contents:**

**Unit-I MINE AIR**

Different Gases / Damps found in mines, Definition of damps, their threshold limits, physiological effects, source of production and detection, Degree of gassiness of seam.

Flame safety lamps, its principle, construction, safety features, and comparison.

Detection of Methane by flame safety lamp, MSA Methanometer its principle of working, construction. Principle of other method of detection of methane.

Oxymeter, Toximeter & multigas detector : their priciple of working.

**Unit-II MINE CLIMATE**

Purpose and standards of ventilation, standards for minimum & maximum velocity of air for different locations. Pressure, ventilating pressure, waterguage. Temperature, sources of heat in mines. Moisture content of mine air, relative humidity, wet bulb temperature, measurement of relative humidity. Cooling power of mine air, determination of cooling power, methods of improving cooling power of mine air, effect of heat and humidity on miners.

**Unit-III NATURAL VENTILATION**

Natural ventilation Pressure, geothermic gradient, Factors causing NVP, Effect of seasonal changes on direction of Natural ventilation, limitation of Natural ventilation.

Motive column, calculation of natural ventilation pressure.

**Unit-IV ARTIFICIAL VENTILATION**

Different types of fans used in mines: centrifugal & axial flow, their principle of working, Exhaust & forcing type. Purposes of evasee & volute casing. Reversal of air current, and characteristics curves of fans. Fans in series and parallel,

Comparison between axial flow & Centrifugal fan, exhaust & forcing Fan.  
Fan laws, Manometric efficiency, overall efficiency, theoretical depression produced by fan. Numerical problems on fan laws.

#### Unit-V **DISTRIBUTION & COURSING OF AIR IN MINES**

Laws of air flow in Mines, Atkinson's formula, splitting, advantages & disadvantages, Numerical problems on splitting, equivalent orifice. Numerical problems on equivalent orifice. Ventilation appliances, Auxiliary ventilation: Different methods, advantages & disadvantages, hazards associated with auxiliary ventilation, precautions required.

Booster fan: purpose, location of booster fan. Numerical problems on booster fan.

Ascensional and Descensional ventilation, Advantages and disadvantages. Scope and importance of ventilation survey, survey interval and location of survey station, ventilation plan. Measurement of quantity & pressure difference, anemometer, pitot static tube, Manometer. Conduct of pressure & quantity survey.

#### **Suggested learning resources:**

- Elements of Mining Technology Vol II - D.J. Deshmukh
- Mine Environment & Ventilation - G.B. Mishra
- Mine Ventilation Vol- I & II -S. Ghatak

#### **Course out comes:**

After completing this course, student will be able to:

- Knowledge of different gases its permissible limit for mines.
  - Understand the mine climate.
  - Understand the natural ventilation.
  - Concept of the artificial ventilation.
  - Conduct the pressure & quantity of air survey in mines.
- .....

## **MINE ENVIRONMENT - I LAB**

### **Course Objectives:**

Following are the objectives of this course:

- To deduce the different mine gases its permissible limit for mines.
- To understand the mine climate.
- To understand the natural ventilation.
- To explain the artificial ventilation.
- To conduct the pressure & quantity of air survey in mines.

### **List of Practical's to be performed:**

- 1- Demonstration of co-detector and measurement of carbon monoxide using Co-detector.
- 2- Demonstration of MSA Methanometer and measurement of methane using Methanometer.
3. Dismantling & assembling of different types of Flame safety lamps.
4. Detection of Methane using flame safety lamp.
5. Demonstration of whirling hygrometer and determination of relative humidity using whirling hygrometer.
6. Demonstration of Kata thermometer and determination of cooling power by Kata thermometer.
7. Demonstration of water gauge and measurement of fan water gauge.
8. Demonstration of centrifugal mine fan.
9. Demonstration of Reversal arrangement of centrifugal mine fan.
10. Demonstration of Axial flow fan.
11. Demonstration of various ventilation devices.
12. Demonstration of vane Anemometer and determination of quantity by Anemometer.
13. Demonstration of velometer and measurement of air velocity by velometer.
14. Demonstration of Inclined manometer and pitot static tube and determination of velocity pressure.
15. Demonstration of Gas Testing chamber.

### **Suggested learning resources:**

- Elements of Mining Technology Vol II - D.J. Deshmukh
- Mine Environment & Ventilation - G.B. Mishra
- Mine Ventilation Vol- I & II -S. Ghatak

### **Course out comes:**

After completing this course, student will be able to:

- Deductions of different mine gases its permissible limit for mines.
- Understand the mine climate.
- Understand the natural ventilation.
- Concept of the artificial ventilation.
- Conduct the pressure & quantity of air survey in mines.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	MINE SAFETY AND LEGISLATION - I
PAPER CODE	:	
SUBJECT CODE	:	305
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

**Course Objectives:**

Following are the objectives of this course:

1. Provide and maintain the health and sanitary, first aid and medical appliances/facilities as per the provisions of Mines Act & Rules.
2. Supervise and enforce compliance of provisions of Regulations, from subordinate staff as per duties allotted to them under these regulations.
3. Prepare and maintain plans and section as per the provisions of mines regulations.
4. Enforce compliance of provisions related to access and egress under regulations.

**Course Contents:**

Unit-I CMR2017

- Preliminary & Definition
- Returns, notices and records
- Examination and certificates of competency and of fitness
- Inspectors and mine officials
- Duties and responsibilities of mine management, contractors, manufacturers, officials, competent persons and workmen
- Plans and sections

Unit-II CMR2017

- Means of access and egress
- Winding in shafts
- Haulage
- Mine working
- Precautions against dangers from fire, dust, gas and water
- Ventilation

### Unit-III

- Lighting and safety lamps
- Explosives and shotfiring
- Machinery, plant and equipment
- Extraction of methane from working coal mine or abandoned coal mine
- Miscellaneous (Regulation No. 237 to 260)

### Unit-IV THE MINES RULES, 1955

- Chapter I. – Preliminary
- CHAPTER – II <sup>6</sup>[COMMITTEE]
- CHAPTER – III COURT OF INQUIRY
- CHAPTER - IV CERTIFYING SURGEONS
- CHAPTER –V HEALTH AND SANITATION PROVISIONS
- CHAPTER – VI FIRST-AID AND MEDICAL APPLIANCES
- CHAPTER - VII EMPLOYMENT OF PERSONS
- CHAPTER – VIII LEAVE WITH WAGES AND OVERTIME
- CHAPTER - IX WELFARE AMENITIES
- CHAPTER – X <sup>3</sup>[REGISTERS, NOTICES AND RETURNS]
- CHAPTER – XI MISCELLANEOUS (Rule 80-83)
- CHAPTER – XII RESCISSION AND SAVINGS
- Form A to U
- ANNEXURE – 1 to III

### Unit-V

#### THE MINES ACT, 1952

- Chapter I. – Preliminary
- CHAPTER – II INSPECTORS AND CERTIFYING SURGEONS
- CHAPTER – III ‘COMMITTEES’
- CHAPTER – IV MINING OPERATIONS AND MANAGEMENT OF MINES
- CHAPTER – V PROVISION AS TO HEALTH AND SAFETY
- CHAPTER – VI HOURS AND LIMITATION OF EMPLOYMENT
- CHAPTER – VII LEAVE WITH WAGES
- CHAPTER – VIII REGULATIONS, RULES AND BYE-LAWS
- CHAPTER – IX PENALTIES AND KPROCEDURE
- CHAPTER - X MISCELLANEOUS(Act 82-87)

#### **Suggested learning resources:**

- |                                |          |
|--------------------------------|----------|
| 1. Coal Mines Regulation 1957– | L.C.Kaku |
| 2. Mine Rule 1955 -            | L.C.Kaku |
| 3. Mines Act 1952 -            | L.C.Kaku |

**Course out comes:**

1. Prepare and maintain plans and section as per the provisions of mines regulations.
2. Enforce compliance of provisions related to access and egress under regulations.
3. Supervise and carryout blasting operations and enforce compliance by provisions of regulationrelated to explosives and blasting.
4. Take precaution and prevent accidents due to fall of roofs, explosive and blasting.
5. Carry out day to day supervision in the mine to achieve the production target with Maximumeconomy and safety.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER III*

COURSE TITLE	:	GENERAL MECHANICAL ENGINEERING
PAPER CODE	:	
SUBJECT CODE	:	306
TREORY CREDITS	:	02
PRACTICAL CREDITS	:	01

**Course Objectives:**

Following are the objectives of this course:

- To develop operational skill of technician to handle machine & Mechanical instruments in the plant.
- To develop habit of energy saving and routing maintenance.
- To aware about properties of engineering materials, work developing and absorbing devices, boilers, power transmission systems etc.

**Course Contents:**

Unit-I

**ENGINEERING MATERIALS**

Introduction of Materials. Need and classification of engineering materials Metals and alloys.

Ferrous Metals: Cast Iron, Wrought Iron, Steel and Alloy Steel

Non Ferrous Metals: Aluminum, Copper, Lead, Tin, Copper tin-antimony alloy, Bearing metals, Copper tin alloy, Zinc and Copper Zinc alloy.

**MECHANICAL PROPERTIES AND TESTS**

Properties of Materials: Stiffness, Strength, Ductility, Malleability, Elasticity, Plasticity, Toughness, Brittleness, Hardness and Harden ability and Fatigue.

Material Test: Tensile Test, Impact Test (Izod and charpy) and Hardness Test (Brinell, Rockwell and Vickers).

Unit- II

**HEAT TREATMENT**

Definition and objectives of Heat treatment, Effect of different factors in heat, treatments

Heat treatment Process: Annealing, Normalizing, Hardening by Quenching, Tempering, Case hardening and Carburizing.

**THERMODYNAMICS**

Introduction, Work, Heat & Power, Various thermodynamics properties,

Thermodynamic system: State of the System and Process on the system

Statement of Ist and IInd law of thermodynamics

Law of Ideal gases: Boyl's Law, Charles Law and Gas equation

Properties of steam : Enthelphy of Dry and wet steam, Specific volume of dray and wet steam and Internal Energy of Dry and Wet Steam.  
 Boilers and Classification of boilers: Fire tube and Water tube.  
 Sketch and description: Simple vertical boiler, Lankashire boiler and Babcock, Wilcox boiler and Locomotive boiler.

Unit- III

### **I.C. ENGINE**

Define Heat Engine, Differentiate I.C. Engine and E.C. Engine, Classification of I.C. Engines. Explain the working of two strokes and four stroke petrol engine with line diagram

Explain the working of two stroke and four stroke diesel engine with line diagram

- Indicated Horse Power (1HP)
- Brake Horse Power (B HP)
- Mechanical Efficiency

### **AIR COMPRESSOR**

Introduction of Air Compressor and their classification, Working principle of reciprocating Air-compressor. Industrial uses of Air-compressor, Multistage reciprocating compressor & their merit & Demerit and Rotary compressor.

Unit-IV

### **FLUID MECHANICS**

Definition of various fluid properties, Fluid pressure and its measurement

Pascal's Law, Static Pressure

- (i) Intensity of pressure at a point in fluid at rest
- (ii) Pressure head
- (iii) Absolute and gauge pressure

Simple and differential U type mano meters.

Total and center of pressure on the plate surface immersed in water Horizontally and vertically.

### **HYDRODYNAMICS**

Energies in fluid: Pressure energy, Kinetic energy, Potential energy and Total energy

Bernoulli's theorem, its assumption and application, Pitot tube, Venturimeter, Orifice meter. Working principle of Hydraulic Pumps: Reciprocating pump and Centrifugal pump. Working Principles of water turbine: Impulse turbine and Reaction turbine.

Unit-V

### **POWER TRANSMISSION**

Methods of Power transmission.

Belt drive: Open and cross belt drive, Application and advantages of belt drive, Velocity ratio of pulleys, Compound belt drive and Effect of slip in the belt drive.

Gear drive : Simple gear drive, Compound gear drive, Worm and wheel, Bevel gear. Velocity ratio in gear drive, Merit and demerits of gear drive and Simple problems

of gear drive

**Suggested learning resources:**

- General Mechanical Engineering by S.B. Mathur
- Elements of Mechanical Engineering by Mathur, Mehta & Tiwari
- Elements of Mechanical Engineering by Raw & Choudhary
- Fluid Mechanics by R.S. Khurmi.

**Course out comes:**

After completing this course, student will be able to:

- Operational skill of technician to handle machine & Mechanical instruments in the plant.
- Develop habit of energy saving and routing maintenance.
- Concept of aware about properties of engineering materials, work developing and absorbing devices, boilers, power transmission systems etc.

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## GENERAL MECHANICAL ENGINEERING LAB

### Course Objectives:

Following are the objectives of this course:

- To develop operational skill of technician to handle machine & Mechanical instruments in the plant.
- To develop habit of energy saving and routing maintenance.
- To aware about properties of engineering materials, work developing and absorbing devices, boilers, power transmission systems etc.

### List of Practical's to be performed

1. Perform Tensile Test of standard mild steel and C.I. specimen.
2. Perform Hardness Test Brinell and Rockwell.
3. Impact Test Izod and Charpy on mild steel specimen.
4. Study of Boilers: Fire tube, Water tube, Babcock & Wilcox Boiler, Boiler mountings and Boiler accessories.
5. Study of steam engine.
6. I.C. Engines. Study of I.C. Engine: Two stroke and four stroke Petrol & Diesel Engine.
7. Study of Air Compressor, Single stage and multistage compressor their construction and their uses.
8. Determination of coefficients of discharge of the following devices - Venturi meter, Rota meter, Orifice Meter and Pitot tube
9. Study of simple gear & compound train in power transmission system

### Suggested learning resources:

- General Mechanical Engineering by S.B. Mathur
- Elements of Mechanical Engineering by Mathur, Mehta & Tiwari
- Elements of Mechanical Engineering by Raw & Choudhary
- Fluid Mechanics by R.S. Khurmi.

### Course out comes:

After completing this course, student will be able to:

- Operational skill of technician to handle machine & Mechanical instruments in the plant.
- Develop habit of energy saving and routing maintenance.
- Aware about properties of engineering materials, work developing and absorbing devices, boilers, power transmission systems etc.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
**MINE SURVEYING (MO6)**

*SEMESTER - III*

COURSE TITLE	:	SUMMER INTERNSHIP - I
PAPER CODE	:	--
SUBJECT CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	02

SUMMER INTERNSHIP –

3-4 weeks summer internship after II<sup>nd</sup> Semester.

It should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/Govt. Skill Centers/Schemes.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

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**DIPLOMA WING**  
**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**  
 DIPLOMA IN MINE SURVEYING (M06)

*SEMESTER - III*

COURSE TITLE	:	PROFESSIONAL DEVELOPMENT
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	00

**Course Objectives:**

Following are the objectives of this course:-

- (1) To learn the principles of Professional and Social ethics.
- (2) To know the concept of Lifelong learning and Self-directed learning.
- (3) To present self for employment.
- (4) To introduce the need of industrial visits.
- (5) To understand CV, Resume, Bio-data and Interview and their significance.
- (6) To develop the skills of Group Discussion.

**Course Content:**

**Unit – I Professional and Social Ethics**

Professional ethics, its need and importance, general code of ethics for engineers, ethical issues for engineers.

Need and importance of social skills, social skills for better group performance, important social skills such as social perceptiveness, coordination, negotiation, persuasion etc.

**Unit – II Lifelong learning and Self-directed Learning**

Lifelong learning, its examples, self-directed learning, its examples, important steps in lifelong learning.

Need for planning self-directed learning, planning self-directed learning plan, examples.

**Unit – III Career Planning**

Importance of career planning, major career opportunities in concerned branch of engineering , study of the important career opportunities regarding qualification, knowledge, skills, experience required for them, role of personal factors like personal life style, interest areas, desires, personal preferences in career planning.

Identification and detailing of important career opportunities in relation to branch of diploma, identification and detailing of important self-personal factors and self-personal preferences, development of self-career plan.

**Unit – IV Industrial Visits**

Necessity of exposure to environment and practices, lectures by industry experts.

Importance of Students' industrial visits, learning through observing real life industrial systems, planning and organizing the industrial visits.

**Unit – V CV, Resume, Bio-data and Interview**

Need of presenting self for employment, salient features and formats of bio-data, CV, resume, comparison of the three for their merits, limitations and specific uses, study of cases and examples of bio-data, CV, resume and covering letter by all students for self of for the given cases.

Importance of employment related interviews, purpose of interview, dress code, body language and posture of interviewee, do's and don'ts for interviews, interview checklist, practice of facing employment related interviews for all students.

**Unit – VI Group Discussion**

Need and importance of group discussion in professional work, ideal group discussion and skills needed to effectively participate in group discussion, practice of group discussion skills.

**Course Outcomes:**

After completing this course, the student will be able to:-

- (1) Demonstrate his/her understanding of Professional and Social ethics.
- (2) Plan self-learning and self-directed learning for completing the task.
- (3) Suggest an action plan for his career planning.
- (4) Demonstrate his/her learning from visits to industry.
- (5) Prepare CV, Resume and Bio-data along with a covering letter for a job.
- (6) Effectively face an interview.
- (7) Participate in Group discussion.

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