

**CURRICULAR STRUCTURE FOR PART – II (2nd YEAR) OF THE FULL--TIME DIPLOMA COURSES  
IN ENGINEERING & TECHNOLOGY**

<b>WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION</b>												
<b>TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES</b>												
<b>COURSE NAME: DIPLOMA IN MINING ENGINEERING</b>												
<b>DURATION OF COURSE: 6 SEMESTERS</b>												
<b>SEMESTER: THIRD</b>												
<b>BRANCH: MINING ENGINEERING</b>												
SR. NO	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME						Total Marks
			L	TU	PR	INTERNAL SCHEME			ESE	PR		
						TA	CT	Total		INT	ENT	
1.	INTRODUCTION TO MINING	5	4	1		10	20	30	70			100
2.	EXPLOSIVES, BLASTING PRACTICES & GAS DETECTION	5	4	1		10	20	30	70			100
3.	UNDERGROUND COAL MINING METHODS & FUEL TECHNOLOGY	4	4			10	20	30	70			100
4.	MINING GAS,BORING & BLASTING LAB	3			5					50	50	100
5.	COMPUTER AIDED DESIGN & DRAFTING LAB	2			3					25	25	50
6.	PROFESSIONAL PRACTICES – I	1			2					25	25	50
7.	INDUSTRIAL TRAINING*	5			9					150	150	300
<b>Total:</b>		<b>25</b>	<b>12</b>	<b>2</b>	<b>19</b>	<b>30</b>	<b>60</b>	<b>90</b>	<b>210</b>	<b>250</b>	<b>250</b>	<b>800</b>
<b>STUDENT CONTACT HOURS PER WEEK:33 hrs</b> Theory and Practical Period of 60 Minutes each. L- Lecture, TU- Tutorials, PR- Practical, TA- Teachers Assessment, CT- Class Test, ESE- End Semester Exam. INT - Internal, ENT - External. * Students will undergo 16 weeks of Practical training during this semester. Weightage on PR & Credit points is allotted on the basis of 16 weeks of Practical training.												

Syllabus for: INTRODUCTION TO MINING

<b>Name of the Course: Introduction to Mining ( Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 05 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: 1 hrs./week</b>	<b>Teacher's Assessment : 10 Marks</b>
<b>Practical: Nil</b>	<b>End Semester Exam.:70 Marks</b>
<b>Credit: 5</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
<b>1.</b>	<b>To give introductory idea towards Mining Industry.</b>
<b>2.</b>	<b>To make familiar with the operations to start a Mine.</b>
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
<b>1.</b>	<b>Learn about preliminaries of Mining Industry.</b>
<b>2.</b>	<b>Learn the boring operation connected to Mining Industry.</b>
<b>3.</b>	<b>Learn the Shaft Sinking Technology.</b>
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
	<b>Basic knowledge in Mathematics, Physics &amp; Chemistry.</b>

**MODULAR DIVISION OF THE SYLLABUS**

MODULE	TOPIC	LECTURE PERIODS	TUTORIAL PERIODS
1	INTRODUCTORY CONCEPTS	4	1
2	BORING	6	2
3	SHAFT SINKING	10	2

LECTURE PERIODS: 20

TUTORIAL PERIODS: 5

INTERNAL ASSESSMENT: 2

TOTAL PERIODS: 27

**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	7	ANY TWENTY	1	1 x 20 = 20	TWO	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10 x 5 = 50
B	2	8				FOUR			
C	3	8				FOUR			

## **DETAIL COURSE CONTENT**

### **GROUP - A**

#### **Module 1 INTRODUCTORY CONCEPTS**

- 1.1 **Formation, mode of occurrence of coal & mineral, reserve calculation**
- 1.2 **Introduction to Indian Mining & Mineral industry.**
- 1.3 **Modes of entry by Inclines, admits & shafts.**

### **GROUP - B**

#### **Module 2 BORING**

- 2.1 **Chief uses of boreholes, percussive method by rigid rods, rope drilling, boring tools used in percussive method.**
- 2.2 **Rotary boring- various systems, different types of bits, water flushing, core recovery, single tube and double tube core barrel, wire line core barrel, diamond boring.**
- 2.3 **Troubles during boring operation (caving of walls of borehole), loss of water, deviation of borehole, cutter bits or rod damaged or disengaged inside the hole, excessive wear of bit, breakage and loss of diamond.**

### **GROUP - C**

#### **Module 3 SHAFT SINKING**

**Vertical & inclined shaft, shape and size of a shaft, selection of site for shaft, sinking through normal coal measure strata, shaft plumbing — Sinking through difficult ground, special method of sinking- cementation, freezing, mechanised shaft sinking — Sinking upwards, widening, and deepening of shaft.**

**Syllabus for: EXPLOSIVES, BLASTING PRACTICES & GAS DETECTION**

<b>Name of the Course: Explosives, Blasting Practices 7 Gas Detection (Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 5 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: 1 hrs./week</b>	<b>Teacher's Assessment : 10 Marks</b>
<b>Practical: Nil</b>	<b>End Semester Exam.:70 Marks</b>
<b>Credit: 5</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
	<b>To Impart knowledge regarding Blasting Practices in Mines.</b>
	<b>To make familiar with different Mine gases and safety precautions.</b>
	<b>To make aware regarding the atmosphere of mine working.</b>
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
	<b>Learn about explosives used in Mines.</b>
	<b>Learn blasting technology in Mines.</b>
	<b>Learn the different procedure to detect different gases present in mine atmosphere.</b>
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
	<b>Basic knowledge in Mathematics, Physics &amp; Chemistry.</b>

**MODULAR DIVISION OF THE SYLLABUS**

MODULE	TOPIC	LECTURE PERIODS	TUTORIAL PERIODS
1	EXPLOSIVES	4	1
2	BLASTING PRACTICE	6	2
3	GAS DETECTION, HEAT & HUMIDITY	10	2

LECTURE PERIODS: 20

TUTORIAL PERIODS: 5

INTERNAL ASSESSMENT: 2

TOTAL PERIODS: 27

**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	7	ANY TWENTY	1	1 x 20 = 20	TWO	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10X 5 = 50
B	2	6				FOUR			
C	3	10				FOUR			

## DETAIL COURSE CONTENT

### GROUP - A

#### Module 1 EXPLOSIVES

- 1.1 Definition of explosives, constituents of explosive, properties of explosive.
- 1.2 Low and high explosives, permitted & non-permitted explosives, fuses, detonators, recent advances in explosives.

### GROUP - B

#### Module 2 BLASTING PRACTICE

- 2.1 Shot firing tools, preparation of charge & procedure of firing shots, simultaneous and delay firing.
- 2.2 SOLID BLASTING: Blasting of solid, advantages and disadvantages, pattern of shot holes.
- 2.3 Alternatives to explosives, cardox, hydrox, hydraulic coal-blaster, Armstrong air breaker.
- 2.4 MAGAZINE: layout, construction & safety features.
- 2.5 Blasting of rocks under different conditions & recent advancement in blasting practice.
- 2.6 Common causes of accidents from explosives, misfire, blown-through and blown-out shot, causes, dangers, remedial measures.

### GROUP - C

#### Module 3 GAS DETECTION, HEAT & HUMIDITY

- 3.1 Atmospheric air and mine air — Heat and humidity: Dry bulb & wet bulb temperatures — Different gases in mines: Properties, physiological effects — Sources of formation of carbon monoxide, firedamp, blackdamp and afterdamp in mines.
- 3.2 FLAME SAFETY LAMP: Working principle — Gas testing by F.S.L. — Accumulation test & percentage test — Precaution during gas testing — Description of various parts of a F.S.L., special features — Limitation of F.S.L.
- 3.3 Carbon monoxide detectors — Working principles of methanometer — Automatic gas detectors.

**Syllabus for: UNDERGROUND COAL MINING METHODS & FUEL TECHNOLOGY**

<b>Name of the Course: Underground coal Mining methods &amp; Fuel Technology (Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 5 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>	
	To make familiar with different methods of coal mining working.
	To make familiar with Stowing Practices in Mines.
	To impart preliminary knowledge about fuel like coal.
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
	To learn 'Bord & Pillar' & 'Long wall' method of mining.
	To learn about Stowing operation practised in mines
	To learn about fuel properties of coal.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
	Basic knowledge in Mathematics, Physics , Chemistry & Engg. Drawing.



**MODULAR DIVISION OF THE SYLLABUS**

MODULE	TOPIC	LECTURE PERIODS	TUTORIAL PERIODS
1 & 2	General considerations for different methods of working and 'Bord & Pillar' method of working	7	
3 & 4	Longwall methods of working & Stowing practices.	7	
5	Fuel Technology.	6	

LECTURE PERIODS: 20

TUTORIAL PERIODS: nil

INTERNAL ASSESSMENT: 2

TOTAL PERIODS: 22

**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	8				THREE			

## **DETAIL COURSE CONTENT**

### **Group A**

#### **Module 1**

- 1. General considerations for different methods of working.**

#### **Module 2**

- 2. Bord & Pillar method**

**2.1 Development/preparatory work**

**2.2 Depillaring (Pillar extraction).**

**2.3 Use of machinery.**

**2.4 Layouts**

#### **Module 3**

- 3. Longwall methods**

**3.1 L/W advancing & L/W retreating( with caving and stowing).**

**3.2 Development/preparatory work.**

**3.3 Use of machinery.**

**3.4 Layouts.**

#### **Module 4**

- 4. Stowing practices.**

**4.1 Different types and their advantages and disadvantages.**

**4.2 Procedures with equipment for stowing.**

**4.3 Troubles during stowing operations.**

## **Module 5**

### **5. Fuel Technology.**

**5.1 Different types of fuel, rank of coal, banded constituents of coal.**

**5.2 Proximate and ultimate analysis of coal.**

**5.3 Calorific value and its determination.**

**5.4 Carbonisation of coal, Low & High temperature carbonisation.**

**5.5 Coking coal and its properties like caking index, shatter index, micum index etc.  
Consumption of coking coal in India, different types of coke.**

**5.6 Coke-oven gas, producer gas, water gas.**

**5.7 Norms of consumption of coal in different industries.**

**Syllabus for: MINING GAS, BORING & BLASTING LAB**

<b>Name of the Course: Mining Gas, Boring &amp; Blasting Lab ( Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 05 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: 5 hrs./week</b>	<b>End Semester Exam. [theory]: Marks: Nil</b>
<b>Credit: 3</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	Different gas detection & measurement in U/G Mines.
2.	To make familiar with different boring tools.
3.	To make familiar with different blasting pattern & blasting accessories used in Mines.
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
1.	Use Flame Safety Lamp, Methanometer & Co detector to detect and measure the percentage of Mine gases.
2.	Learn the use of different boring tools.
3.	Learn about the different Blasting patterns and the use of different Blasting accessories.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
1.	Basic knowledge in Mathematics, Physics, Chemistry & Engineering Drawing.

## **DETAIL COURSE CONTENT**

- 1. Study of different types of Flame Safety Lamp and their parts & use of flame safety lamp to determine % of CH<sub>4</sub>.**
- 2. Study of methanometers and CO detector.**
- 3. Study of different boring tools for percussive and rotary boring.**
- 4. Study of Exploder.**
- 5. Study of stemming rod, scraper cum break detector, blasting cable, circuit tester.**
- 6. Pattern of shot holes as practised in Coal & Rock headings.**

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Syllabus for: **COMPUTER AIDED DESIGN & DRAFTING LAB**

<b>Name of the Course: Computer Aided Design &amp; Drafting Lab. ( Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 05 weeks</b>	<b>Maximum Marks: 50 (Practical)</b>
<b>Teaching Scheme</b>	<b>Examination Scheme(Practical)</b>
<b>Theory: Nil</b>	<b>Continuous Internal Assessment: 25 marks.</b>
<b>Tutorial: Nil</b>	<b>External Assessment: 25 marks.</b>
<b>Practical: 3 hrs./week</b>	<b>End Semester Exam. [theory]: Marks: Nil</b>
<b>Credit: 2</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	To enable candidate to acquire basic knowledge about the application of Computer aided Design.
2.	To be familiar with different terms, commands and methodology of the software.
3.	To develop the application oriented attitude in field of engineering by this software.
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
1.	To develop skills in drawing diagrams, plans etc.
2.	To develop interest in the field of planning & designing.
3.	To apply the skill of designing & drafting in the field of Mining.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
1.	.Elementary knowledge of computer science and computer programming.

## **DETAIL COURSE CONTENT**

### **I GETTING STARTED – I**

**Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in AutoCAD – Drawing lines in AutoCAD – Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving a drawing: Save & Save As – Closing a drawing – Quitting AutoCAD**

### **GETTING STARTED – II**

**Opening an existing file – Concept of Object – Object selection methods: Pick by box, Window selection, Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO / REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles**

### **DRAW COMMANDS**

**ARC command – RECTANG command – ELLIPSE command, elliptical arc – POLYGON command (regular polygon) – PLINE command – DONUT command – POINT command – Construction Line: XLINE command, RAY command – MULTILINE command**

### **EDITING COMMANDS**

**MOVE command – COPY command – OFFSET command – ROTATE command – SCALE command – STRETCH command – LENGTHEN command – TRIM command – EXTEND command – BREAK command – CHAMFER command – FILLET command – ARRAY command – MIRROR command – MEASURE command – DIVIDE command – EXPLODE command – MATCHPROP command – Editing with grips: PEDIT**

### **DRAWING AIDS**

**Layers – Layer Properties Manager dialog box – Object Properties: Object property toolbar, Properties Window – LTSCALE Factor – Auto Tracking – REDRAW command, REGEN command**

### **CREATING TEXT**

**Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style**

### **BASIC DIMENSIONING**

**Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units – Associative dimensions – Dimensioning methods – Drawing leader**

### **INQUIRY COMMANDS**

**AREA – DIST – ID – LIST – DBLIST – STATUS – DWGPROPS**

### **HATCHING**

**BHATCH, HATCH commands – Boundary Hatch Options: Quick tab, Advance tab – Hatching around Text, Traces, Attributes, Shapes and Solids – Editing Hatch Boundary – BOUNDARY command.**

Syllabus for: PROFESSIONAL PRACTICES – I

<b>Name of the Course: Professional Practices - I ( Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 05 weeks</b>	<b>Maximum Marks: 50 (Practical)</b>
<b>Teaching Scheme</b>	<b>Examination Scheme(Practical)</b>
<b>Theory: Nil</b>	<b>Term work (TW) – 25. (Intrenal)</b>
<b>Tutorial: Nil</b>	<b>Practical (PR) - 25. (External)</b>
<b>Practical: 2 hrs./week</b>	<b>End Semester Exam. [theory]: Marks: Nil</b>
<b>Credit: 1</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	Development and evaluation of individual skills.
2.	Enhancement in soft skills through innovation.
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
1.	Prepare notes for given topic.
2.	Present given topic in a seminar.
3.	Prepare a report on industrial visit, expert lecture.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
1.	Good Communication skill.



## **DETAIL COURSE CONTENT**

### **Unit -1 Industrial Visits**

**Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. Industrial visits may be arranged in the following areas / industries:**

- 1. Underground Coal Mine.**
- 2. Opencast Coal Mine.**

**Unit -2 Seminar and Group Discussion on different topics on Mining Engg.**

**Unit – 3 Individual Assignments :**

**Study, Sketch and write a report on Mining Machinery(any one) or Mine Supports (any one system) or Blasting practices with drilling patterns (any one system) experienced in visited Mine.**

Syllabus for: INDUSTRIAL TRAINING.

<b>Name of the Course: Industrial Training. ( Part II - 1st semester, Mining Engineering)</b>	
<b>Course Code:</b>	<b>Semester: Third</b>
<b>Duration: : 16 weeks</b>	<b>Maximum Marks: 300 (Practical)</b>
<b>Teaching Scheme</b>	<b>Examination Scheme(Practical)</b>
<b>Theory: Nil</b>	<b>Continuous Internal Assessment: 150 marks.</b>
<b>Tutorial: Nil</b>	<b>External Assessment: 150 marks.</b>
<b>Practical: 16 weeks continuous</b>	<b>End Semester Exam. [theory]: Marks: Nil</b>
<b>Credit: 5</b>	
<b>Aim:</b>	
<b>Sl. No.</b>	
1.	To enable candidates to acquire Knowledge and to develop an understanding of different activities performed in the Mine.
2.	To develop skill in practical aspect of handling different apparatus.
3.	To develop an interest in the field of Mining.
<b>Objective:</b>	
<b>Sl. No.</b>	<b>The Students will be able to:</b>
1.	Understand every Mining activities.
2.	Handle different gas detectors, apparatus in actual Mine environment.
3.	Acquire knowledge in Drilling, Blasting, Loading , Transporting and Winding in actual working field.
<b>Pre-Requisite:</b>	
<b>Sl. No.</b>	
1.	Elementary ideas in Mining.

