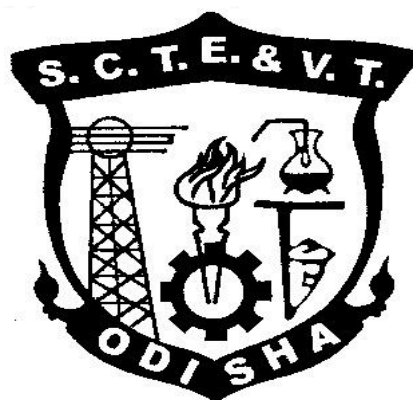


CURRICULLUM OF 3RD SEMESTER
For
DIPLOMA IN MINING ENGINEERING
(Effective FROM 2019-20 Sessions)



**STATE COUNCIL FOR TECHNICAL
EDUCATION & VOCATIONAL TRAINING,
ODISHA, BHUBANESWAR**

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING,ORISSA

TEACHING AND EVALUTION SCHEME FOR 3rd Semester(Branch Name- Mining)(w e f 2019-20)	
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SUBJECT NUMBER	SUBJECT CODE	SUBJECT	Periods/Week			Evaluation Scheme			
			L	T	P	Internal assessment / Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th .1		Surface Mining Technology	4			20	80	3	100
Th .2		Mine Survey -I	4			20	80	3	100
Th .3		Mine Geology -I	4			20	80	3	100
Th. 4		Mechanical Operation in Mines	4			20	80	3	100
Th. 5		Environmental Studies	4			20	80	3	100
		Total	20			100	400		500
		Practical							
Pr .1		Mine Survey -I LAB			6	50	50		100
Pr .2		Mine Geology -I LAB			6	50	50		100
Pr .3		Mechanical Operation in Mines LAB			6	25	25		50
		Student Centred Activities(SCA)			1				
		Total			19	125	125		250
		Grand Total	20		19	225	525		750

Abbreviations : L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration.

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%
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SCA shall comprise of Extension Lectures/Personality Development/Environmental issues /Quiz/Hobbies/Field visits/Cultural Activities/Library Studies/Classes on MOOCS/SWAYAM etc. . SCA shall be conducted in a section.
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There shall be 1 Internal Assessment done for each of Theory subject. Sessional Marks shall be total of the performance of individual different jobs/experiments in a subject throughout the semester. Industry/Mines Exposure Training can be conducted during semester break after 2nd semester and/or 4th semester.

Th.1. SURFACE MINING TECHNOLOGY

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE

As a Mining Engineer, one has to develop the basic concepts and principles of winning and working in mines. Further, he should have basic knowledge of explosives for development of mines.

B. OBJECTIVES

On completion of the subject, students will be able to :

- Develop the concept of choice of Opencast Mining.
- Determine bench parameters.
- Define slope stability and types, prevention of Slope failure.
- Explain various compositions, properties of Explosives and Blasting accessories.
- State and explain different drilling methods.
- Explain blasting practice in Mines.
- Describe blasting techniques as per statutory provisions.
- Identify basic constructional features and safety provisions of magazine.

Topic- wise distribution of periods

CHAPTER	TOPICS	PERIODS
1	Choice of opencast Mining	10
2	Benching	5
3	Slope stability	6
4	Explosive and Blasting Accessories	11
5	Drilling	8
6	Blasting practices in Mines	10
7	Control Blasting as per statutory provision	6
8	Magazine	4
	Total	60

COURSE CONTENTS (Based on specific objectives).

1. Choice of Opencast Mining

- State factors affecting choice of Open casting Mining method.
- Define stripping ratio.
- Determine overburden/ore ratio.
- Find out cut off stripping ratio.
- Determine quarriable limit.
- State favorable conditions for mechanized Opencast Mines.
- State limitations of large open pits.
- Define Box cut and determine the location of Box cut.

2. Benching

- Determine bench parameters- height, width & slope.
- Determine length of bench for overburden and ore.

3. Slope Stability

- Define slope stability.
- Factors affecting slope stability.
 - Types of slope stability.
- Causes and prevention of slope stability.

4. Explosive and blasting accessories

- Define explosive, state constituents of explosives , properties & characteristics of explosives.
- Classify explosives, state composition and uses of explosives.
- Explain PMS and SMS.
 - Define permitted explosive and classify permitted explosive.
 - Explain sheathed, equivalent sheathed and ultra safe explosive.
 - State properties of permitted explosives.
- State composition & constructional features of safety fuse, detonating fuse, detonating relay, igniter cord, nonel and raydet..
 - Describe different types of detonators and uses, state advantages of delay detonators.
- State different types of exploder, its construction and safety features, circuit tester.
- Describe stemming rod, crack detector knife, crimper.

5. Drilling

- Explain different principles and methods of exploratory drilling in surface mining.
- State different types of drill used in Opencast mining.
- Describe simple constructional features of churn drill, drills master, wagon drill and jack hammer.
- State D.T.H..
- Describe different types of drill bits in drilling.

6. Blasting practices in Mines

- Describe preparation of charge.
- State procedure of firing shots, direct and inverse initiation, stemming materials, water ampoules, cushion firing.
- Define blasting efficiency.
- State and describe plaster shooting and pop shooting, toe blasting.

7. Controlled Blasting Techniques as per statutory provision

- State and describe pre-splitting, cushion blasting, muffle blasting, coyote hole blasting, chambered hole blasting, directional blasting, Electronics Blasting System (EBS) .

8. Magazines

- Describe layout and arrangement of different types of magazines, state their safety features.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4.

Learning Resources:		
Sl. No.	Title of the Book	Name of Authors
1	Surface Mining Technology	S.K. DAS
2	Blasting Manuals	Sandhu & Pradhan
3	Blasting Practices in Mines	S.K. DAS
4	EMT VOL I	D.J. DESHMUKH
5	Surface Mining	G.B. Mishra
6	SME Handbook	

Th .2. MINE SURVEY - I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

Before starting the actual mining operation, it is essential for mining engineer to first survey the piece of land where mining operation is contemplated. This is not possible without the knowledge of mine surveying.

B. OBJECTIVES:

On completion of the subject, students will be able to :

- Explain different chains and their use in the field.
- Explain prismatic compass and surveyor's compass and determine magnetic meridian. Explain local attraction and make necessary correction.
- Outline knowledge regarding plane table survey in the field.
- Describe general methods of determining areas.
- Describe various leveling methods.
- Describe different methods of calculating ore reserves by materials balance and decline curve way.
- Describe the application of theodolites in surveying, micro-optic and seconds theodolite.

C. Topic wise distribution of periods

CHAPTER	TOPICS	PERIODS
1	Chain Survey	10
2	Compass Survey	8
3	Plane Table Survey	8
4	Computataion of Areas	8
5	Levelling	10
6	Calculation of ore reserves	8
7	Theodolite	8
	TOTAL	60

D.COURSE CONTENTS (Based on Specific objectives)

1. Chain Survey

- Give survey conventional signs, abbreviation used.
- Give standards of lining, inking and coloring.
- Describe selection of scales used.
- Explain principle of chain surveying.
- Describe instruments used and checking their correctness.
- Explain ranging and chaining of a line.
- Calculate errors in chaining.
- Explain obstruction while chaining.
- Describe chaining along a sloping ground.
- Describe use of optical square and line range and checking optical square for correctness.
- Describe offsets and their measurements.
- Give reference sketches of stations.
- Give procedure of chain surveying.
- Explain field booking and plotting of chain survey.

2. Compass Survey

- Describe prismatic compass, its adjustments and use.
- Explain true meridians, magnetic meridian, grid line meridian and arbitrary meridian.
- Explain W.C.B. and Q.B. and conversion from one to other
 - Find out fore and back bearing and their conversion.
 - Compute angles from bearing and bearing angles
- Define local alteration
 - Determine local alteration and necessary correction to the bearing.
- Explain closed and open compass surveying and its plotting.
- Give procedure of field booking in compass and chain traverses.
- Explain adjustment of closing error in compass traversing.
- Describe surveyor compass(miner's dial),its adjustment and use
- Compare prismatic compass with surveyor compass.

3. Plane Table Survey.

- Fundamentals of Plane Table Survey.
- Explain two point problems.
- Explain three point problems and its solution by tracing paper method.
- Describe advantages and disadvantages of plane table.

4. Computation of areas

- Explain methods of determining areas.
- Find out areas from offset to a base line using
 - Mid ordinate rule
 - Average ordinate rule
 - Trapezoidal rule
 - Simpson's rule
- Compute area by Planimeter and from graph paper.

5 Leveling

- Define benchmark M.S.L. Dumpy level.
- Adjust dumpy level, modern levels (Auto Level & etc.), and precise staff.
- Describe methods of leveling- Rise & fall method, height of instrument.
- Errors in ordinary leveling.
- Explain reciprocal leveling, subsidence leveling, setting out gradient, trigonometric leveling, geometrical leveling, and physical leveling.

6 Calculation of Ore Reserves

- Classify reserves.
- Evaluate reserves by exploratory .
- Calculate primary ore reserve by material balance method & decline curve method.

7

Theodolite

- Describe temporary and permanent adjustment of Theodolite.
- Describe the principles of operation & describe different parts.
- Measure Horizontal & Vertical angles.
- Describe setting of the instrument.
- Explain Traversing with Theodolite.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4

Learning Resources:		
Sl. No.	Title of the Book	Name of Authors
1	Textbook of Surveying	B.C. Punmia Vol I & II
2	Textbook of Surveying	T.P Kanetkar

Th.3 MINE GEOLOGY - I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

In majority of the cases, materials that need to be mined in order to reach the hidden treasure are rocks and minerals. It is therefore, essential for a mining engineer to have the basic knowledge of geology.

B.OBJECTIVES:

On completion of the course, students will be able to:

- Explain the dynamic natural agencies that are constantly moulding the landscape of earth. He will be able to visualize the erosional and depositional landforms created by natural agencies.
- Distinguish between Igneous, Sedimentary and Metamorphic rocks and their texture and structures.
- Distinguish and identify the various structures that one may encounter in the field.
- Underline the importance of crystal structures in the identification and study of minerals.
- Identify minerals based on their physical properties. They will possess a sound knowledge of silicate structures.
- Identify different rocks in the laboratory.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Physical Geology	15
2	Petrology	12
3	Structural Geology	6
4	Elements of Crystallography	12
5	Elements of Mineralogy	15
	Total	60

C. COURSE CONTENTS (Based on specific objectives)

1. Physical Geology

- Define weathering and erosion.
- Explain with suitable sketches the erosional and depositional land forms produced by wind.
- Explain with neat sketches the erosional and depositional land forms produced by river.
- Differentiate between glacier and iceberg

- Describe the erosional and depositional features produced by glacier.
 - Define moraine. Describe the different type of moraine with sketches.
- 2. Petrology**
- Define a Rock. Distinguish between a rock and a mineral.
 - Define Igneous, Sedimentary and Metamorphic rocks.
 - Describe the various textures and structures found in Igneous rocks.
 - Describe some important structures of sedimentary rocks along with neat sketches.
 - Describe various structure found in metamorphic rocks.
- 3. Structural Geology**
- Define Dip. Distinguish between true dip and apparent dip.
 - Define strike.
 - Define folds. Classify folds and describe them.
 - Define faults. Describe the various types of fault.
 - Define unconformity. Describe the various type of unconformity with neat sketches.
 - Define joints. Describe various joints.
- 4. Element of Crystallography**
- Define a crystal.
 - Explain Miller's indices.
 - Describe the Symmetry elements and forms present in the normal class of isometric system.
- 5. Elements of Mineralogy**
- Define a mineral.
 - Enumerate and describe the physical properties of minerals.
 - Describe various optical properties of minerals.
 - Explain briefly the silicate structures along with diagrams.
 - Classify minerals.
 - Describe mineralogy and physical properties of Olivine, Quartz, Feldspar and Pyroxene group of minerals.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3

Learning Resources:		
Sl. No.	Title of the Book	Name of Authors
1	Textbook of Geology	P.K Mukharjee
2	Textbook of Geology	G.B. Mohapatra
3	Ruttley's Elements of Mineralogy	H.H. Reid
4	Petrology	G.W. Tyrrel
5	Structural Geology	M.P. Billings
6	Structural Geology of Rocks at Regions	H.Davids,J Reynolds

Th. 4 MECHANICAL OPERATIONS IN MINE

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

A. RATIONALE :

As Mining Engineer it is essential to have the fundamental concept of mechanical engineering specially related to working of machines, which are used in mines.

: B.OBJECTIVES:

On completion of the subject, students will be able to:

- Describe the concept of stress, strain, bending moment and shear force, torsion with power transmission.
- Explain Fluid static's and dynamics with solution of problems.
- Explain the use of compressed air and different types of air compressor.
- Explain the concept of Internal Combustion engines.

C. Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Strength of Materials & Power Transmission	20
2	Elements of Hydraulics	15
3	Compressed Air	15
4	Internal Combustion Engines	10
	Total	60

D. COURSE CONTENTS (Based on Specific Objectives)

1. Strength of Materials and Power Transmission.

- Define
 - Elasticity
 - Hook's Law
 - Limit of Proportionality.
 - Young's Modulus
 - Factor of safety. Lateral strain and Poisson's ratio.
- Explain stress-strain curve for ductile materials.
- Explain the effect of axial load on bar of
 - Uniform section
 - Variable section
- Solve numerical problems on above
- Define bending moment and shear force.
- State types of beam and types of loading.
- Explain shear force diagram and bending moment diagram for
 - Cantilever with concentrated loading.

- Cantilever with U.D.I. over whole span.
 - Simply supported beam with concentration loading.
 - Simply supported beam with U.D.I. over whole span.
 - State bending formula.
 - Define section modules.
 - Find out section modules for beam section of simple cases.
 - Define torsion and state its effects.
 - State application of torsion formula.
 - Explain working of
 - Shaft couplings such as hydraulic and magnetic couplings.
 - Belt, chain and rope Drive.
 - Simple and compound gear train.
 - Torque converters.
 - State function of flywheel and governors.
 - Explain working of watt, purler and proel governors.
- 2. Elements of Hydraulics.**
- State various fluid properties.
 - Define pressure of fluid and pressure head.
 - State and explain working principle of various pressure measuring devices such as:
 - Pieccometer tube.
 - State and explain continuity equation.
 - State and explain Bernoulli's theorem.
 - Explain working of venturimeter.
 - Solve numerical problems on above.
 - Define and classify orifices.
 - State the formula and discharge for rectangular orifices and solve problems.
 - Define and differentiate between orifice and notch.
 - Classify notches.
 - State formula for discharge through notches & solve problem on above.
 - State and explain laws of fluid friction.
 - State and explain loss of head due to friction (Darcy weisbach formula)
 - Explain hydraulic gradient and energy gradient.
 - Solve numerical problems as above.

3. Compressed Air

- Explain introduction of compressed air as a power.
- Classify Compressor & state working principle.
- State the various methods of transmission and storage of compressed air.
- State and explain the advantages of use of compressed air in mines.
- Explain the working principle of pneumatic machines.

4. Internal Combustion Engines

- Explain various air cycles utilized in I/C Engines such as:
 - OTTO Cycle.
 - Diesel Cycle.
- Explain working principle of 2 stroke and 4 stroke petrol and diesel engines.
- Define I.H.P., B.H.P. & Mechanical efficiency of I/C Engine.
- State various applications of I/C Engines in Mining field.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2

Learning Resources:		
Sl. No.	Title of the Book	Name of Authors
1	Strength of Materials	Ramrutham
2	Applied Mechanics	Khurmi & Gupta
3	Fluid Mechanics	Ramrutham
4	Thermal Engineering	Rav Saro

Th5. ENVIRONMENTAL STUDIES

(Common to all Branches)

Name of the Course: Diploma in Electrical Engineering			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVE:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it' s Conservation	08
5	Environmental Pollution	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	Total:	60

D. COURSE CONTENTS

1. The Multidisciplinary nature of environmental studies:

- 1.1 Definition, scope and importance.
- 1.2 Need for public awareness.

2. Natural Resources:

Renewable and non renewable resources:

- a) Natural resources and associated problems.
 - 2.1.1. Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
 - 2.1.2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
 - 2.1.3. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
 - 2.1.4. Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity, .
 - 2.1.5. Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
 - 2.1.6. Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.
- b) Role of individual in conservation of natural resources.
- c) Equitable use of resources for sustainable life styles.

3. **Systems:**

- 3.1. Concept of an eco system.
- 3.2. Structure and function of an eco system.
- 3.3. Producers, consumers, decomposers.
- 3.4. Energy flow in the eco systems.
- 3.5. Ecological succession.
- 3.6. Food chains, food webs and ecological pyramids.
- 3.7. Introduction, types, characteristic features, structure and function of the following eco system:
- 3.8. Forest ecosystem:
- 3.9. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

4. **Biodiversity and it's Conservation:**

- 4.1. Introduction-Definition: genetics, species and ecosystem diversity.
- 4.2. Biogeographically classification of India.
- 4.3. Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and option values.
- 4.4. Biodiversity at global, national and local level.
- 4.5. Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

5. **Environmental Pollution:**

- 5.1. Definition Causes, effects and control measures of:
 - a) Air pollution.
 - b) Water pollution.
 - c) Soil pollution
 - d) Marine pollution
 - e) Noise pollution.
 - f) Thermal pollution
 - g) Nuclear hazards.
- 5.2. Solid waste Management: Causes, effects and control measures of urban

and industrial wastes.

5.3. Role of an individual in prevention of pollution.

5.4. Disaster management: Floods, earth quake, cyclone and landslides.

6. Social issues and the Environment:

6.1. Form unsustainable to sustainable development.

6.2. Urban problems related to energy.

6.3. Water conservation, rain water harvesting, water shed management.

6.4. Resettlement and rehabilitation of people; its problems and concern.

6.5. Environmental ethics: issue and possible solutions.

6.6. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.

6.7. Air (prevention and control of pollution) Act.

6.8. Water (prevention and control of pollution) Act.

6.9. Public awareness.

7. Human population and the environment:

7.1. Population growth and variation among nations.

7.2. Population explosion- family welfare program.

7.3. Environment and human health.

7.4. Human rights.

7.5. Value education

7.6. Role of information technology in environment and human health.

Syllabus coverage up to Internal assessment

Chapters: 1, 2 and 3.

<u>Learning Resources:</u>			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand & Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt. Ltd.
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

Pr.1. MINE SURVEY – I LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	50
Maximum Marks:	100	End Semester Examination	50

A. RATIONALE:

In the field of mining, it will help in all measurements, calculations & mapping at all stages from prospecting to exploitation and utilizing mineral deposits by both surface & underground working.

B. OBJECTIVE:

On completion of lab students will able to :

- Develop a clear idea about Chain survey & Compass survey.
- Know various components of Level and Theodolite & their uses.
- Distinguish methods employed for measurement of horizontal and vertical angle.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Chain Survey	15
2	Compass Survey	15
3	Levels	15
4	Theodolite	15
5	Measurement of Horizontal angle	15
6	Measurement of Vertical angle	15
	Total	90

C. Course Content

1. Chain Survey

- Ranging a line more than 100 m in length and measuring its correct length applying corrections.
- Taking offsets of objects on both sides of a line.
- Plotting the above details.
- Overcoming obstructions in chaining.
 - Vision free, chaining obstructed (Pond, river)
 - Chaining free, vision obstructed (Raising ground)
 - Both vision and chaining obstructed (Building)
- Measuring on sloping ground.
- Chain surveying and plotting of small plot by triangulation.

2. Compass Survey

- Finding bearing of line and applying check.
- Closed traversing of a small plot with station (without intermediate filling)
- Open traversing of a small length with few station (without offsets)
- Plotting both the above traverses applying correction.

3 Levels:

- Temporary and permanent adjustment, sensitivity of bubble tube practice with different types of level(Auto Level & etc.)

4. Temporary & permanent adjustment of theodolite.
5. Measurement of horizontal angle by reiteration and repetition methods.
6. Measurement of vertical angle

Pr.2. MINE GEOLOGY – I LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	50
Maximum Marks:	100	End Semester Examination	50

A. RATIONALE:

In majority of the cases, materials that need to be explored comprise of rocks & minerals. It is therefore, essential for an engineer to have basic knowledge regarding the composition, structure & texture of both rock and minerals.

B. OBJECTIVE:

On completion of Lab students will able to:

- Identify ore forming & rock forming minerals.
- Determine specific gravity of minerals by workers steel yard balance.
- Analyze thin section of minerals and rocks under microscope.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Identification of Minerals	30
2	Specific Gravity by Steel yard Balance	30
3	Analysis of Thin section of Minerals and Rocks	30
	Total	90

C.Course Content:

- Identification of rock forming and ore minerals in hand specimens.
- Determinations of specific gravity by workers steel yard balance.
- Analysis of thin sections of minerals and rocks under the microscopes.

Pr.3 . MECHANICAL OPERATION IN MINES

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	3rd
Total Periods:	90	Examination	3 hrs
Theory Periods:	6P/week	Internal Assessment	25
Maximum Marks:	50	End Semester Examination	25

A. RATIONALE

As mechanisation is a common trend now-a-days in mining sector. So as a mining engineer, one should have some fundamental knowledge regarding the machines used in mines.

B. OBJECTIVE:

On the completion of Lab students will be able to:

- Know application of Bernoulli's Theorem
- Determine velocity of air
- Determine volumetric efficiency of air compressor.
- Distinguish construction and working procedure of 2- stroke and 4 - stroke diesel engine.
- Describe I.C. Engine Test.

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Verify Bernoulli's Theorem	15
2	Determine rate of flow of air	15
3	Conduct Tensile test of a mild steel specimen	15
4	Determine volumetric efficiency of Air compressor	15
5	Study of 2-Stroke and 4-Stroke diesel engines	15
6	Conduct of I.C Engine Test	15
	Total	90

C. Course Content:

- Bernoulli's Theorem by Bernoulli's Verification Apparatus.
- Determine rate of flow through the venturimeter set-up.

- Conduct tensile test of a mild steel specimen and plot stress-strain curve, show salient points on it.
- Determine volumetric efficiency of air- compressor.
- Study of 2-stroke & 4-stroke diesel engines.
- Conduct I/C engine testing on single cylinder diesel engine & find out I.H.P., B.H.P. & mechanical efficiency.