

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 3RD SEMESTER DRILLING ENGINEERING (wef 2019-20)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
Theory									
Th.1		Exploratory Drilling-I	4			20	80	3	100
Th.2		Drilling Machinery-I	4			20	80	3	100
Th.3		Engineering Geology-I	4			20	80	3	100
Th.4		Mine Survey	4			20	80	3	100
Th.5		Environmental Studies	4			20	80	3	100
		<i>Total</i>	20			100	400		500
Practical									
Pr.1		Drilling Machinery-I Lab			6	50	50	3	100
Pr.2		Engineering Geology-I Lab			6	25	50	3	75
Pr.3		Mine Survey Lab			6	25	50	3	75
		Student Centred Activities(SCA)			1				
		<i>Total</i>			19	100	150		250
		Grand Total	20		19	200	550		750

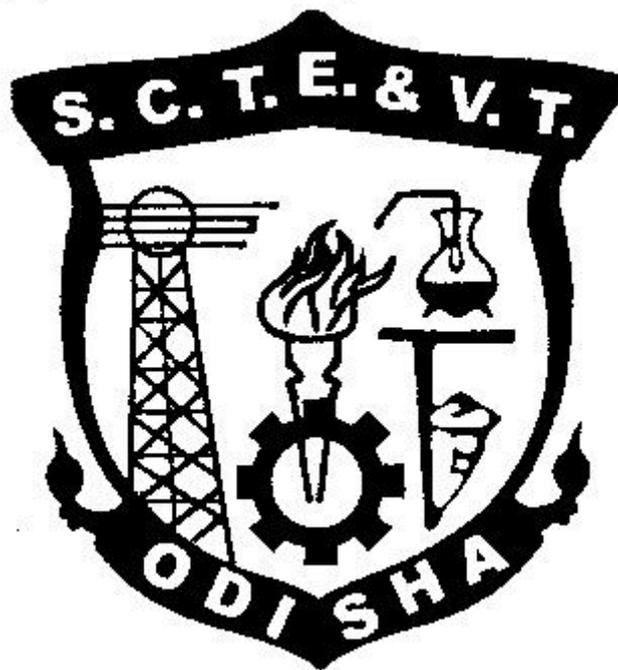
Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc., Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Industry/mining/drilling Exposure Training can be conducted during semester break after 2nd semester and/or 4th semester

**CURRICULLUM OF 3RD SEMESTER
FOR
DIPLOMA IN DRILLING ENGINEERING
(EFFECTIVE FROM 2019-20 SESSIONS)**



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

Th1. EXPLORATORY DRILLING – I

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
01.	Surface Exploratory Drilling	08
02.	Methods of Exploratory Drilling	14
03.	Drilling Practice	14
04.	Wireline Coring System	10
05.	Reverse Circulation System	08
06.	Con-Cor Process of Coring Operation	06
	Total	60

RATIONALE

It is important to highlight the types of materials involved in drilling surface of the earth to the desired depth so as to record the thickness of different types of layers of rock materials which will be useful for exploring the hidden natural resources.

OBJECTIVE

On completion of the course, students will able to:

1. Develop the concept of geology of the concealed and exposed mineral deposits and the type, size and patterns of bore holes required to meet for exploring the natural treasure.
2. Classify various methods of exploratory drilling techniques for boring shallow or deep holes manually or mechanically.
3. Solve various problems encountered during drilling and relevant techniques to overcome the problems.
4. To know various techniques of recovering core of the strata.

COURSE CONTENTS

1.0 Surface Exploratory Drilling

- 1.1 Give concept on the purposes, patterns, types and sizes of bore holes for exploring valuable placer, load, vein and stratified mineral deposits.

2.0 Method of Exploratory Drilling

- 2.1 Explain the operational procedures of various manual exploratory drilling methods and state their field of applications.
- 2.2 State the various processes of percussive exploratory drilling methods indicating their field of application and explain compressively with required sketch their working procedures, tools, equipment and accessories used in each method.
- 2.3 State the different rotary core drills used for obtaining the core of the Sub-Surface strata, Explain with suitable sketches their operational procedures indicating field of applications.
- 2.4 State the factors to be considered in the selection and application of core drilling for various types ground conditions.

3.0 Drilling Practice

- 3.1 State the problems encountered during progress of drilling through fissured or broken ground, cave in formations, soft and washable formation, soluble formation etc., and explain the means of overcoming them.

- 3.2 State the effect of excessive temperature on diamonds and matrix and explain the coring operation of dry blocking drilling.
 - 3.3 Explain the conventional coring operation and recovery system of diamond core drilling.
 - 3.4 State the precautions to be taken while using a new core bit.
 - 3.5 State the relationship of bit pressure, rotational speed and rate of penetration.
 - 3.6 State the effect rotational speed verses lineal travel on diamond wear.
 - 3.7 Explain bit wear due to rock hardness.
 - 3.8 Explain the causes of bit wear and explain the process of controlling diamond wear.
- 4.0 Wireline Coring System**
- 4.1 State the objective wireline coring system.
 - 4.2 Explain the working principle of wireline system.
 - 4.3 State the application of wire line system for dry drilling.
 - 4.4 Explain the structure of overshot and inner tube assembly.
 - 4.5 Explain the mechanism of pivoting sphere head (knuckle head) and overshot latch.
- 5.0 Reverse Circulation System**
- 5.1 Give the concept of reverse circulation of drilling.
 - 5.2 Explain the mechanism of Jet Ejector.
 - 5.3 Explain with suitable sketches the working principle of a standard circulation drilling machine.
 - 5.4 Establish the conditions that favour the use of reverse circulation drilling.
- 6.0 Con-Core Process of Coring Operation**
- 6.1 Explain the principle and mechanism involved with pumping the core to the surface in con-core process of coring operation.
 - 6.2 Compare and contrast between con-core and wireline system of coring operation.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1, 2 & 3

BOOKS RECOMMENDED

1. Surface Mining by G.B. Mishra
2. Diamond Drilling Hand Book by J.D.Cummins
3. Diamond Drilling by C.P. Chugh.
4. Exploratory Drilling by B.O.A.
5. Rotary Drilling Handbook by J.E. Brantly
6. U.M.S. Vol. III

Th2. DRILLING MACHINERY – I

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Theory Periods	:	Internal Assessment	: 20
Total Periods	:	End Semester Examination	: 80
Examination	:	Maximum Marks	: 100

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
01.	Diamond Drilling Rig	12
02.	Vibration in Diamond Drilling	06
03.	Derrick	06
04.	Core Barrels	09
05.	Core Bit	09
06.	Casing	09
07.	Fishing	09
	Total	60

RATIONALE

It is imperative that a drilling engineer should be thoroughly conversant with various type of drilling machine for supervising any drilling operation.

OBJECTIVE

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

1. Explain the mechanism of different units of drilling rig.
2. Analyze the causes of vibration.
3. Know the effects of vibration.
4. Explain the mechanism of different core barrels.
5. Use and application diamond and T.C. bits according to the rock formations.
6. Find out the fish causes of obstruction of further progress of drilling.

COURSE CONTENTS

1.0 Diamond Drilling Rig.

- 1.1 Explain the general mechanical features of diamond drills.
- 1.2 State the common technical specifications of diamond drills.
- 1.3 State the different sources of powers for diamond drills and compare their merits and demerits.
- 1.4 Explain the mechanism of transmitting power to hoisting drum and spindle for the rotary motion of drill string.
- 1.5 State the different feed mechanisms used in core drills and discuss their effectiveness.
- 1.6 Explain the feed mechanism of screw feed and hydraulic feed drill head.
- 1.7 Solve problems relating capacity of rig to deploy for various depths to be drilled at different attitudes.

2.0 Vibration in Diamond Drilling

- 2.1 State the causes of vibration in diamond drill and suggest their remedies.
- 2.2 State the miscellaneous causes of vibration.
- 2.3 Explain the means of elimination of vibration due to rock formation.
- 2.4 State the effect of rod strength vibration on core recovery and diamond wear.

3.0 Derrick

- 3.1 State the different types of derrick used in core drilling.
- 3.2 Explain the construction and design of different derricks.
- 3.3 State the field of application of different derricks.

- 3.4 Explain the process of erection and dismantling of different types of derrick used in core drilling.
- 3.5 State the daily, weekly, monthly and yearly care and maintenance of derricks.
- 4.0 Core Barrels**
 - 4.1 State the different core barrels used in coring operation.
 - 4.2 State the different sizes of core barrels.
 - 4.3 Explain the design construction of core barrel of different series.
 - 4.4 State the field of application of S.T., different types of D.T. and T.T. wireline core barrels.
- 5.0 Core Bits**
 - 5.1 State the different types and designs of bits used in coring operation.
 - 5.2 State the various sizes of diamond and T.C. bits.
 - 5.3 Discuss the field of application of different bits.
 - 5.4 State the function of Reamer Shells.
 - 5.5 Explain the use of Reamer Shell of different series.
 - 5.6 State the use of PCD bits.
- 6.0 Casing**
 - 6.1 State the function of Casing.
 - 6.2 Explain the casing requirement for the progress of hole depth.
 - 6.3 Enumerate the casing appliances.
 - 6.4 State the general difficulties occurring in the lowering and recovering casings.
 - 6.5 State the general repairing works to be carried out for reused of old casings.
 - 6.6 State the different type of casing used in core drilling.
 - 6.7 Differentiate F.C. Casing with F.J. Casing.
- 7.0 Fishing**
 - 7.1 What do you mean by fishing?
 - 7.2 State the means of determining the position and condition of detached tools.
 - 7.3 How to calculate the depth of fish?
 - 7.4 Enumerate the various fishing tools used in Diamond drilling for recovering the fish including hydraulic jar.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1, 2 & 3

BOOKS RECOMMENDED

1. Diamond Drilling by C.P. Chugh
2. Diamond Drilling Hand Book by J.D. Cummins
3. Drilling Technology Hand Book by C.P. Chugh
4. Oil Well Drilling Technology by W. Mccray and Frank W. Cole

Th3. ENGINEERING GEOLOGY – I

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
01.	The origin, nature and Geological classification of rock materials	14
02.	Surface processes causing rock disintegration	18
03.	Elements of Mineralogy	14
04.	Elements of Structural Geology	14
	Total	60

RATIONALE

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

OBJECTIVE

On completion of the subject, student will have an outline about the interior of the earth, different rocks that make up the earth surface processes that operate causing disintegration and decomposition of rocks, students will be able to identify various mineral in the field based on the study of their physical properties. Students will be able to select various geological structures that govern location of ore deposits. They will further be able to (i) categories the various sequences of strata for the purpose of drilling and (ii) Identify the areas where there is possibility of occurrence of minerals.

COURSE CONTENTS

1.0 The origin, nature and Geological classification of rock materials

- 1.1 Explain the internal structure of the earth with required diagram.
- 1.2 Define a rock. Classify three major rock groups.

2.0 Surface processes causing rock disintegration

- 2.1 Define weathering and erosion.
- 2.2 Explain with suitable sketches the erosional depositional features produced wind.
- 2.3 Explain the erosional features produced by rivers with neat diagrams.
- 2.4 Explain the depositional produced by river with neat diagrams.
- 2.5 Differentiate between glacier and iceberg.
- 2.6 Explain the erosional features produced by glacier.
- 2.7 Explain the depositional features produced by glacier with neat sketches.
- 2.8 Define a moraine. Describe the different types of moraine.

3.0 Elements of Mineralogy

- 3.1 Enumerate and describe different physical properties of minerals.
- 3.2 Enumerate and describe different optical properties of minerals in brief.
- 3.3 Explain in brief the silicates structures with their proper diagram.
- 3.4 Define rock forming minerals.
- 3.5 Give the mineralogy and physical properties of quartz and feldspar.

4.0 Elements of Structural Geology

- 4.1 Define dip and strike.
- 4.2 Distinguish between true dip and apparent dip.

- 4.3 Define folds. Give the classification with brief description.
- 4.4 Define faults. Give their classification with brief description.
- 4.5 Reorganization of faults in the fields.
- 4.6 Define unconformity. Describe the different types of unconformity with neat sketches.
- 4.7 Define joints. Describe important joints.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1 & 2

BOOKS RECOMMENDED

1. A Text Book of Geology by P.K. Mukharjee
2. Text Book of Geology by G.B. Mohapatra
3. Rutley's Elements of Mineralogy by H.H. Reid
4. Elements of Structural Geology by M.P. Billings

Th4. MINE SURVEY

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
01.	Measurement of Distance	14
02.	Compass Survey	16
03.	Leveling	16
04.	Contouring	08
05.	Calculation of Ore Reserves	06
	Total	60

RATIONALE

Before starting the actual drilling operation, which is very expensive, it is essential for a drilling engineer to first select the piece of land and locate bore hole points. This is not possible without the knowledge of Mine Surveying.

OBJECTIVE

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

1. Locate the Bore Hole points establish on a grid pattern method.
2. Select the area of a piece of land to be explored.
3. Calculate the volume of ore reserves.
4. Read the contour map and locate the position / direction of dip/strike of a vein.

COURSE CONTENTS

1.0 Measurement of Distance

- 1.1 Enumerate and explain the different measuring instrument used for measuring distances and taking offsets.
- 1.2 Derive the formula for finding out the correct chain length in case the measurement with incorrect Chain/ Tape.
- 1.3 Explain chaining and ranging of a line.
- 1.4 Explain the process of chaining and ranging of a line due to various obstacles.
- 1.5 State the offsets and explain taking of offsets.

2.0 Compass survey

- 2.1 Explain the prismatic compass, it's adjustment and use.
- 2.2 State the reference directions employed for compass surveying.
- 2.3 State and explain different bearings.
- 2.4 Explain the process of conversion of W.C.B. to Q.B. and Q.B. to W.C.B.
- 2.5 Explain the computation of angles from bearings and bearing from angles.
- 2.6 Explain local attraction and its determination and correction to the bearings.
- 2.7 Explain closed and open traverse and its bearings.
- 2.8 Explain the procedure of reconnaissance and field booking for compass survey
- 2.9 Explain the process of adjustment of closing error of compass surveying.
- 2.10 State the means of computation of areas by geometry and co-ordinates.

3.0 Leveling

- 3.1 Define the following terms:
A level line, Horizontal plane, A horizontal line, Vertical line, Datum surface, elevation of a point, difference in elevation, Bench Mark, B.S., F.S., I.S.,

- C.P., station and H.I.
- 3.2 Explain the construction of a dumpy level with neat sketch.
 - 3.3 Explain the staff, their types and uses.
 - 3.4 Explain the adjustment of Dumpy level for taking staff/ reading.
 - 3.5 Explain the staff observation.
 - 3.6 Explain the methods of leveling
 - 3.7 Explain the rise and fall methods of booking.
 - 3.8 Explain how to find R.L. of a point.
 - 3.9 Explain how to plot level sections.
 - 3.10 Explain how to measure the cutting or filling from a level selection.
- 4.0 Contouring**
- 4.1 What do you mean by contouring & explain contouring.
 - 4.2 State the characteristic of contour lines.
 - 4.3 State the uses of contour plan.
Explain interpolation contour gradient by different methods.
- 5.0 Calculation of Ore Reserves**
- 5.1 Explain the process of estimation of reserves by exploratory drilling.
 - 5.2 Explain the process of estimation of primary ore reserves by material balance method and decline curve method.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1 & 2

BOOKS RECOMMENDED

1. A Text Book of Surveying by T.P. Kanetkar
2. A Text Book of Surveying by T.A. Agor
3. Survey and Leveling by T.P. Kanetkar
4. Mineral Economics by Sinha & Sharrma
5. Mining Geology by Mc.Kinstry

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 optin 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

Pr1. DRILLING MACHINERY - I LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Lab Periods	:	Sessional	: 50
Total Periods	:	End Semester Examination	: 50
Examination	:	Maximum Marks	: 100

RATIONALE

It is imperative that a drilling engineer should be thoroughly conversant with various types of drilling machine, accessories, instruments and fittings for supervising any drilling operation.

OBJECTIVE

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

1. Understand the mechanism of different units of drilling rig..
2. Know the effects of vibration.
3. Understand the mechanism of different core barrels.
4. Use and application diamond and T.C. bits according to the rock formations.
5. Find out the fish causes of obstruction of further progress of drilling.
6. Understand the operation of different engines, motors and pumps used in drilling operation

COURSE CONTENTS

1. Study of drilling accessories, instruments and fittings.
2. Study of different fishing tools.
3. Study of different drill machines, different units of rig by disassembling and assembling.
4. Practicing the starting of Diesel Engine, Petrol Engine and Running Electric Motors.
5. Study of different types of water pumps and different units of reciprocating pump, centrifugal pump, turbine pump, mono pumps, submersible pump etc by disassembling and assembling.
6. Practicing operational techniques and maintenance of rig, Simplex, Duplex and Triplex pump at site.
7. Practicing the operation of rig at the site.

Pr2. ENGINEERING GEOLOGY - I LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Lab Periods	:	Sessional	: 25
Total Periods	:	End Semester Examination	: 50
Examination	:	Maximum Marks	: 75

RATIONALE

In majority of the cases, materials that need to be drilled in order to reach the hidden treasure are rocks and minerals. It is, therefore, essential to have the basic knowledge of identification of common minerals for drilling engineers.

OBJECTIVE

On completion of this semester, student will have an outline about the various physical properties of minerals. The student will distinguish about the various types of minerals, their origin. The student will be able to identify minerals from its physical properties.

COURSE CONTENTS

1. Identification of ore minerals in hand Specimen.
(Minimum 20 minerals to be identified)
2. Identification of Industrial mineral in hand Specimen.
(Minimum 20 minerals to be identified)
3. Identification of rocks forming mineral in hand specimens.
(Minimum 20 minerals to be identified)

Pr3. MINE SURVEY LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 3rd
Lab Periods	: 6 Periods/week	Sessional	: 25
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 75

RATIONALE

Before starting the actual drilling operation, which is very expensive, it is essential for a drilling engineer to first select the piece of land and locate bore hole points. This is not possible without the knowledge of Mine Surveying.

OBJECTIVE

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

1. Locate the Bore Hole points establish on a grid pattern method.
2. Select the area of a piece of land to be explored.
3. Calculate the volume of ore reserves.
4. Read the contour map and locate the position / direction of dip/strike of a vein.

COURSE CONTENTS

1. Introduction

Survey conventional signs, abbreviations, and colors used.

2. Chain Survey

- a. Ranging and chaining of a line more than 200 m applying correction.
- b. Taking offsets of objects on both sides of a line and booking field notes.
- c. Plotting the above details.
- d. Overcoming obstructions in chaining.
- e. Vision free, chaining obstructed (Pond, River).
- f. Chaining free, vision obstructed (Rising ground).
- g. Both vision and chaining obstructed (Building).

3. Compass Survey

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

4. Leveling

- a. Temporary and permanent adjustments, sensitivity of bubble tube.
- b. Preparing of level or staff reading and practicing reading of staff with level.
- c. Preparation of a level section spot and leveling.
- d. Preparation of a level section spot and contouring.