

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 4TH 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		Blast Hole Drilling	4			20	80	3	100
Th.2		Underground Drilling	4			20	80	3	100
Th.3		Engineering Geology-II	4			20	80	3	100
Th.4		Basic Mechanical Engineering	4			20	80	3	100
		<i>Total</i>	16			80	320		400
Practical									
Pr.1		Drilling Sketching Lab			6	50	50	3	100
Pr.2		Engineering Geology –II Lab			6	50	50	3	100
Pr.3		Basic Mechanical Engineering Lab			6	50	50	3	100
Pr.4		Technical Seminar			4	50			50
		Student Centred Activities(SCA)			1				
		<i>Total</i>			23	200	150		350
		Grand Total	16		23	280	470		750

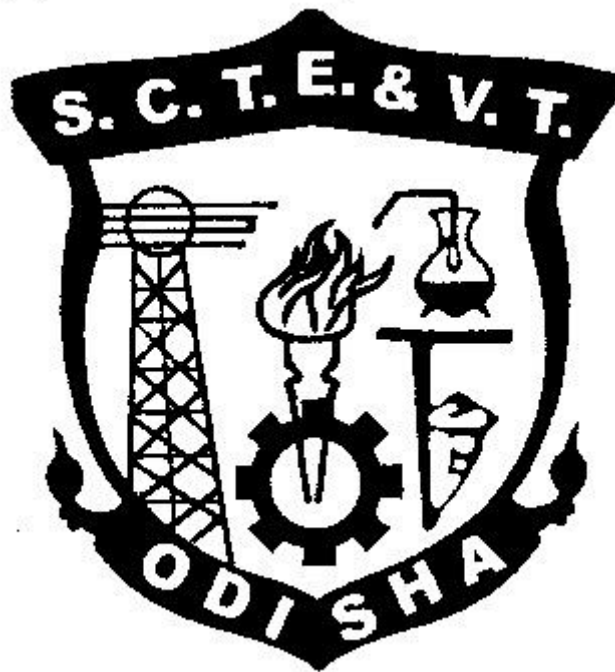
Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

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

**CURRICULLUM OF 4TH SEMESTER
FOR
DIPLOMA IN DRILLING ENGINEERING
(EFFECTIVE FROM 2019-20 SESSIONS)**



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

Th1. BLAST HOLE DRILLING

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
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.	Introduction, scope & purpose of drilling	12
02.	Blast hole drilling by rock drills	18
03.	Rotary Blast hole Drilling	12
04.	Fire Jet Drilling	08
05.	Rock Mechanics	10
	Total	60

RATIONALE

Since the outcome of mining depends upon the efficiency of blast hole drilling technology, it is imperative that a drilling engineer should have through knowledge in blast hole drilling techniques.

OBJECTIVE

The economic condition of the richest countries has been developed by utilizing their natural resources and hence the mining industries of the nations have been growing day by day throughout the world. The outcome of mining depends upon the efficiency of blast hole drilling techniques. This is way the curriculum has been designed having considered the day to day improvement of drilling technology for various mining fields. On completion of the subject, students have better knowledge in blast hole drilling technology suitable for mines and they will be able to:

1. Generalize the scope, purpose, importance and historical development.
2. Classify the different drilling methods, their principle and field of application.
3. Explain the mechanism and working principles of various rock drills used in O/C and U/G mines.
4. Describe the various drill steels and bits used for different mining ground or Heavy engineering project used like foundation for reservoir, multistoried building, tunnels, drifts etc. for the purposes of blasting.
5. Describe the various rock drills troubles and their remedies.
6. Describe the physical and mechanical properties of rocks/minerals.
7. Explain the concept of rock drill ability.

COURSE CONTENTS

1.0. Introduction, Scope and Purpose of Drilling

- 1.1 Introduce blast hole drilling.
- 1.2 State the opportunity of blast hole drilling in view of economic policy of the nation.
- 1.3 State the economic opportunity to drill a hole to ascertain the core of the strata.

- 1.4 Explain the limits of action of drilling.
- 1.5 Give a concept on the prospects of employment of drilling personnel in the field of drilling.
- 1.6 Explain how the prosperity of nation depends upon drilling.
- 1.7 Explain the scope of drilling in the national and international level.
- 1.8 State the basic mechanism of rock breaking.
 - 1.8.1 Rotary percussive method.
 - 1.8.2 Rotary drilling and cutting tools used.
 - 1.8.3 Percussive drilling and cutting tools used.
 - 1.8.4 Rotary percussive drilling and cutting tools used.

2.0. Blast Hole Drilling by Rock Drills

- 2.1 Define rock drills.
- 2.2 Classify rock drills & State the field of application of rock drills.
- 2.3 Explain with sketches the working principles of jack hammer and drifter.
- 2.4 State the different parts of jack hammer and drifter drill.
- 2.5 State the function of Ratchet and pawl mechanism, rifle bar, rifle bar nut, shank of piston, drill chunk, throttle valve.
- 2.6 Explain the lubricating system of jack hammer & drifter.
- 2.7 State the field of application of air leg drill.
- 2.8 Explain the working principles of air leg drill.
- 2.9 Explain field of application of wagon drill.
- 2.10 Give a general description wagon drill.
- 2.11 State the field of application of churn drill.
 - 2.11.1 State the type of churn drill.
 - 2.11.2 Draw a sketch of a walking beam type of churn drill and label the different units of churn drill and components of drill string and explain their functions.
 - 2.11.3 Explain the drilling procedure of above.
- 2.12 Give a concept of support and feeding arrangements of different class of rock drills.
- 2.13 State the different types of mounting such as crawler, truck & trailer mounted etc.
- 2.14 State the field of application of electrically driven drills.
 - 2.14.1 Explain the working principles of electrically operated blast hole drills.
- 2.15 State the steps to be taken to minimize noise of hammer drills.
- 2.16 State the field of application of down the hole drills.
 - 2.16.1 Explain with line diagram the different units of down the hole drill and state their function.
 - 2.16.2 Clarify down the hole drill (DHD) and down the hole hammer (DTH)
 - 2.16.3. Explain the effect of gauge wear and recommended the condition of bit to regrind.
 - 2.16.4 Explain systematically the drilling procedure of a down the hole drill.
- 2.17 Define drill steels
 - 2.17.1 State the different sizes of drill steels.
 - 2.17.2 State the different designs of drill steels.
 - 2.17.3 Compare and contrast the merits and demerits of integral steels and detachable steels and bits.
 - 2.17.4 State the composition of a good drill steel.
 - 2.17.5 Explain with sketches the field of application of different drill steels and used in rock drills.
 - 2.17.6 Describe the process of forging hardening of drill steels.

3.0. Rotary Blast Hole Drilling

- 3.1 State the field of application of Auger drills.
 - 3.1.1 State the different types of augers used in drills specifying their suitability for ground condition.
 - 3.1.2 Explain with sketches the different units of an auger drill.
- 3.2 Explain the procedure of auger drilling for the purpose of blast hole
 - 3.2.1 Explain the common problems encountered during drilling and suggest the remedies.
- 3.3 State the field of application of air, water or mud flushed rotary drills with drag bits
 - 3.3.1 Illustrate the above drill and label the different units and their function.
- 3.4 State the field of application of rotary drills with roller bits using air water or mud as flushing medium.
 - 3.4.1 Discuss the merits and demerits of above flushing system.
- 3.5 Define drilling patterns.
 - 3.5.1 State the factor to be considered while choosing the drilling patterns.
 - 3.5.1.1 Define Primer, Easer and Trimmer.
 - 3.5.1.2 State the drilling patterns.
 - 3.5.1.3 Explain different drilling pattern with sketch.
- 3.6 Define the term Incline, Drift, Stope, Raise.
 - 3.6.1. Explain with sketches the blast hole patterns for development of mines for Incline, Drift, Slopes, Raise.

4.0. Fire Jet Drilling

- 4.1. Enumerate spallable rocks.
- 4.2. Specify the main operating characteristics of fire jet drill.
- 4.3. Explain the configuration of fire jet drill.
- 4.4. Explain the procedure and working principles of fire jet drilling.

5.0. Rock Mechanics

- 5.1. Define rock mechanics.
- 5.2. State and explain the physical properties of rock/minerals.
- 5.3. State the mechanical properties of rock/minerals.
- 5.4. Define rock drill ability.
- 5.5. Give a concept of rock drill ability.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1 & 2

BOOKS RECOMMENDED

1. Surface Mining by G.B. Mishra
2. Winning of Coal and Iron Ore by R.T. Deshmukh and D.J. Deshmukh
3. Drilling Technology Hand Book by C.P. Chugh
4. Manual of Drilling Technology by C.P. Chugh

Th2. UNDERGROUND DRILLING

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
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.	Underground Blast Hole Drilling for Coal	12
02.	Underground Blast Hole Drilling for Metal	12
03.	Underground Drilling for Mine Safety	20
04.	Planning of underground Drilling	16
	Total	44

RATIONALE

In order to conduct further exploration for development of mines, a drilling engineer needs to know how to overcome various difficulties faced during underground drilling operations.

OBJECTIVE

On completion of the course, student will be able to explain the difficulties of underground drilling. They will accordingly arrange necessary provision for removal of the same and resume drilling operation of blast hole for coal and metal, holes for mine safety and drill holes for further exploration in view of development of underground mines.

COURSE CONTENTS

1.0 Underground Blast Hole Drilling for Coal

- 1.1 Define blast hole drilling for underground coal mines.
- 1.2 Define Primer, Easer and Trimmer.
- 1.3 State and explain various drilling patterns for underground coal mines with sketch.
- 1.4 Explain Incline, Drift, Stope and Raise in a coal mine.
- 1.5 Compare various sources of power supply to coal drills for underground coal mines.
- 1.6 Compare air leg drill and electric drill.

2.0 Underground Blast Hole Drilling for Metal

- 2.1 State the drills used in underground metal mines.
- 2.3 List out the drill bits used in underground metal drilling.
- 2.4 Explain the procedure for commissioning of a portable drill in underground.
- 2.5 Enumerate the various drilling patterns for underground metal mines.

3.0 Underground Drilling for Mine Safety

- 3.1 List out the equipment required for underground drilling meant for roof stitching and rock bolting.
- 3.2 Explain the procedure for rock bolting and roof stitching.
- 3.3 Explain the upward drivage of drilling and the precautions to be taken.
- 3.4 Mention the difference between upward, vertical, inclined and horizontal drilling.
- 3.5 State the waterlogged area in underground mines.
- 3.6 Explain the working principle of burn side boring apparatus and its application.
- 3.7 State the methane drainage.
- 3.8 Explain the procedure of boring for methane drainage.

4.0. Planning of underground Drilling

- 4.1. Explain how derrick can be erected in underground mine.
- 4.2. Briefly describe the types of drilling fluid to be used.
- 4.3. Explain about the methods of development of drilling in underground.
- 4.4. Explain the procedure of locating drilling hole points.
- 4.5 Plan out the various safety precautions to be observed for underground drilling operations.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1 & 2

BOOKS RECOMMENDED

1. Diamond Drilling Hand Book by J.D. Cummins
2. Diamond Drilling by C.P. Chugh
3. Winning of Coal and Iron Ore by R.T. Deshmukh and D.J. Deshmukh
4. Manual of Drilling Technology by C.P. Chugh

Th3. ENGINEERING GEOLOGY – II

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
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.	Stratigraphy	14
02.	Fossil Fuel	11
03.	Economic Geology	15
04.	Sampling	10
05.	Prospecting & Exploration	10
	Total	60

RATIONALE

In majority of the cases, materials that need to be drilled on 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 course students will be able to

1. Outline the importance of Stratigraphy and Geological Time Scale in the study of Geology.
2. Recognize the major groups and economic minerals associated with them.
3. Describe the use, origin, and mode of occurrence and distribution of fossil fuels & where to look for them.
4. Develop a comprehensive idea regarding, mode of occurrence and uses of important ores.
5. Undertake sampling work according to B.I.S. (Bureau of India Standard).
6. Explain about various types of prospecting and exploration.

COURSE CONTENTS

1.0 Stratigraphy

- 1.1 Explain the principles of Stratigraphy.
- 1.2 Describe a brief idea about the Geological Time Scale.
- 1.3 Give the stratigraphic sequence, lithology, distribution and economic minerals deposit of
 - 1.3.1 Iron Ore Series.
 - 1.3.2 Cuddapah Super group
 - 1.3.3 Vindhyan Super group
 - 1.3.4 Gondwana Super group

2.0 Fossil Fuels

2.1 Coal

- 2.1.1 Describe the different types of coal with respect to carbon content.
- 2.1.2 Define Fixed carbon content and Fuel ratio.
- 2.1.3 Describe the various theories accounting for the origin of coal.
- 2.1.4 Describe various important lower Gondwana Coalfields of India.

2.2 Petroleum

- 2.1.1 Describe the organic and inorganic theories accounting for the origin of petroleum.
- 2.1.2 Define oil pool and oil trap.
- 2.1.3 Describe process of accumulation of oil.
- 2.1.4 Describe the favorable conditions for accumulation of oil.
- 2.1.5 Describe different important oil fields in India.

3.0 Economic Geology

- 3.1 Define ore and gangue.
- 3.2 Define tenor & grade.
- 3.3 Give the mineralogy, mode of occurrence, distribution and uses of
 - 3.3.1 Iron deposits in India
 - 3.3.2 Chromite deposits
 - 3.3.3 Copper
 - 3.3.4 Lead & Zinc

4.0 Sampling

- 4.1 Define sampling.
- 4.2 Give an outline of the method of preparation of samples for assay.
- 4.3 Explain salting.
- 4.4 Give the different methods of sampling as outlined by Bureau of India Standard (BIS).

5.0 Prospecting & Exploration.

- 5.1 Define prospecting.
- 5.2 Differentiate between prospecting & exploration.
- 5.3 Use of multishot camera for borehole direction test.
- 5.4 Enumerate and describe various criteria for geological exploration.
- 5.5 Describe various methods of Geophysical prospecting.
- 5.6 Explain Geochemical prospecting.
- 5.7 Differentiate between biogeochemical and geobotanical prospecting.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1 & 2

BOOKS RECOMMENDED

1. Geology of India & Burma by M.S. Krishna
2. An Introduction to Geology of coal and Indian Coal Fields by N.L. Sharma & K.S.V. Ram.
3. Geology of Petroleum by A. I. Levosen.
4. A handbook of Economic Geology by A.K. Sen & P.K. Guha.
5. Mineral Economic by P.K. Sinha & N.L. Sharma

Th4. BASIC MECHANICAL ENGINEERING

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
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.	Strength of Materials	12
02.	Air Compressors	10
03.	Diesel Engine	10
04.	Theory of Machines	08
05.	Friction	08
06.	Power Transmission	08
07.	Governors And Fly Wheel	04
	Total	60

RATIONALE

As a drilling engineer it is essential to have the fundamental concepts of Mechanical Engineering, specially related to the working of machines used on drilling operations.

OBJECTIVE

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

1. Develop the concept of S.F. and B.M. over various beam configurations.
2. Operate, repair, and maintain compressors and diesel engines, which are used as source of power for Blast hole drilling and Tube well drilling and any other drilling operation.
3. Explain the working of four bar link, single and double slider crank mechanism, velocity diagram of crank and connecting rod mechanism and the working of different bearings.
4. Develop the concept of power transmission system.
5. Explain the function of governor, its sensitivity and the function of fly wheel etc.

COURSE CONTENTS

1.0 Strength of Materials

1.1 Define beam.

1.1.1 Classify beam.

1.2 Define S.F and B.M.

1.2.1 Find out S.F. and B.M. for cantilever beam with concentrated loading.

1.2.2 Find out S.F. and B.M. for cantilever beam with UDL over whole span.

1.2.3 Find out S.F. and B.M. for simply supported beam with concentrate loading.

1.2.4 Find out S.F. and B.M. for simply supported beam with UDL over whole span.

1.2.5 Solve numerical problems on above concept.

1.3 Define bending stress.

1.3.1 State bending formula.

1.3.2 Define section modulus.

1.3.3 Find section modulus for Rectangular Section, I – Section, T – Section

1.3.4 Solve Numerical problems involving bending formula and section modulus.

1.4 Explain concept of torsion.

1.4.1 State application of torsion.

1.4.2 State torsion formula.

1.4.3 Define polar modulus.

1.4.4 Reduce polar modulus for various section links. Circular section (Solid) and Circular section (Hollow)

1.4.5 Solve problems involving application of torsion formula.

2.0 Air Compressors

- 2.1 State industrial uses of compressed air.
- 2.2 Define air compressor.
 - 2.2.1 Classify air compressor.
- 2.3 Describe the working principles of air compressor.
 - 2.3.1 Explain the working principle of screw compressor .
 - 2.3.2 Single and double stage reciprocating air compressor
 - 2.3.3 Double stage screw air compressor
 - 2.3.4 Booster air compressor
- 2.4 Explain Inter cooling used in air compressor.
- 2.5 Define volumetric efficiency.
 - 2.5.1 Derive the expression for volumetric efficiency.
 - 2.5.2 Solve numerical problems of above concept.
- 2.6 State the care and maintenance procedure of air compressor.

3.0 Diesel Engine

- 3.1 Explain the operation of diesel Engine.
- 3.2 State the care and maintenance of diesel Engine.
- 3.3 Explain various cooling system of diesel Engine.
- 3.4 Describe working of Fuel injection pump.
- 3.5 State the various safety features of Diesel engine for underground use.
- 3.6 Explain P.V. and T.S. diagram for Diesel Engine.
- 3.7 Define I.H.P.,B.H.P.,Mechanical efficiency and Thermal efficiency.

4.0 Theory of Machines

- 4.1 Introduction to theory of Machines.
 - 4.1.1 Define Kinematics link, Kinematic pair, Kinematic chain, Mechanism, Inversion.
 - 4.1.2 Explain working of four bar link mechanism.
 - 4.2.3 Explain the Velocity diagram for crank and connecting rod mechanism.
 - 4.3.4 Explain Acceleration diagram for simple link mechanism i.e. Connecting rod mechanism.

5.0 Friction Concept

- 5.1 Explain working of multiple collar bearing.
- 5.2 Explain working of conical pivot bearing.
- 5.3 Explain friction in Screw jack, Plate Clutches.
- 5.4 Explain the working journal bearing.
- 5.5 Explain Roller bearing and Ball bearing.
- 5.6 Explain working of Absorption type dynamometer.

6.0 Power Transmission

- 6.1 Give concept of power transmission.
 - 6.1.1 Velocity ratio,Length of belt, Ratio of Tensions of a Belt Drive.
 - 6.1.2 Derive the relation of power transmitted through belt drive .
 - 6.1.3 Find width of belt required.
 - 6.1.4 Solve numerical problems of above.
- 6.2 Give a concept of rope drive.
- 6.3 State the uses of belt and chain drives.

7.0 Governors And Fly Wheel

- 7.1 State the function of Governors.
- 7.2 Define
 - 7.2.1 Sensitivity
 - 7.2.2 Stability
 - 7.2.3 Isochronisms
 - 7.2.4 Hunting
- 7.3 Differentiate between Fly Wheel and Governors.

SYLLABUS COVERAGE UP TO INTERNAL ASSESSMENT

Chapters- 1, 2 & 3

BOOKS RECOMMENDED

1. Elements of Mechanical Engineering by Mathur & Dokundwar
2. Elements of Mechanical Engineering by Naranga
3. Strength of Materials by R.S. Khurmi & N. Khurmi
4. Theory of Machines by R.S. Khurmi & J.K. Gupta
5. Thermal Engineering by R.S. Khurmi & J.K. Gupta

Pr1. DRILLING SKETCHING LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

It is essential that a drilling engineer should be thoroughly conversant with various types of drilling machines, equipments, accessories and tools used for supervising any drilling operation.

OBJECTIVE

On completion of the course, students will be able to

1. Explain mineral exploration and different units of diamond drilling rig.
2. Describe working and use of accessories and equipments.
3. Explain working of different units of rock drills.
4. Explain working of different feed mechanisms.

COURSE CONTENTS

1. Study and sketching of layout of a diamond drilling rig, drill site, working units, including different parts and accessories.
2. Study and sketching of the following
 - 2.1 Core Splitter
 - 2.2 Hoisting Plug
 - 2.3 Water swivel
 - 2.4 Different types of drill rods.
 - 2.5 Different types & designs of diamond, T.C. and R.R. bits.
3. Study and sketching of different rock drills
 - 3.1 Jack hammer drill.
 - 3.2 Air leg drill.
 - 3.3 Wagon drill.
 - 3.4 D.T.H. drill.
 - 3.5 Compressor (reciprocating & Screw)
4. Study and sketching of feed mechanism.
 - 4.1 Screw feed mechanism.
 - 4.2 Hydraulic feed mechanism.
 - 4.3 Rope feed.

N.B.: Students will submit their sessional records for evaluation on completion of course. Individual viva-voce test will be conducted by the internal/external examiner at the end of the semester.

Pr2. ENGINEERING GEOLOGY - II LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 100

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 rocks for drilling engineers.

OBJECTIVE

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

COURSE CONTENTS

1. Identification of common Igneous rocks in hand specimen.
(Minimum 20 specimens to be identified)
2. Identification of common Sedimentary rocks in hand specimen.
(Minimum 20 specimens to be identified)
3. Identification of common Metamorphic rocks in hand specimen.
(Minimum 20 specimens to be identified)

N.B.: Students will submit their sessional records for evaluation on completion of course. Individual viva-voce test will be conducted by the internal/external examiner at the end of the semester.

Pr3. BASIC MECHANICAL ENGINEERING LAB

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

As a drilling engineer it is essential to have the fundamental concepts of Mechanical Engineering, specially related to the working of machines used in drilling operations.

OBJECTIVE

After completion of the course, students will be able to develop basic concepts on mechanics of solid, theory of machines and internal combustion engines used in drilling operations.

1. Study of Universal Testing Machine and determination of Young's Modulus of mild steel.
2. Compression testing on C.I., wood and concrete cubes by compression Testing machine.
3. Determination of bending stress in beam using gauge.
4. Determination of hardness of different metals.
5. Determination of impact strength of ductile materials.
6. Machines shop practice.
7. Study of Internal Combustion Engines.
8. Determination of M.A., V.R., Efficiency for Screw jack.
9. Moment of inertia of a flywheel.
10. Study of different types of Governors, (Watt, Porter and Hartnell).

N.B.: Students will submit their sessional records for evaluation on completion of course. Individual viva-voce test will be conducted by the internal/external examiner at the end of the semester.

Pr4. TECHNICAL SEMINAR

Name of the Course: Diploma in Drilling Engineering			
Course Code	:	Semester	: 4th
Lab Periods	: 4 Periods/week	Sessional	: 25
Total Periods	: 60	End Semester Examination	: 25
Examination	: 3 Hours	Maximum Marks	: 50

RATIONALE

The subject is to develop ability of improved communication skill. Ability to review, prepare and present technological developments.

OBJECTIVE

On completion of the course, students will be able to

1. Study advanced engineering developments.
2. Prepare and present technical reports.
3. Use various teaching aids such as overhead projectors, power point presentation and demonstrative models.

COURSE CONTENTS

Students will select topics individually or in a group consisting of three related to Drilling Engineering. Students should prepare seminar reports with active support and guidance from the faculty members. Students should be encouraged to extensively use library facilities, audio visual aids and also to collect relevant materials from different technical magazines and journals. Each student should be usually to present a paper on the topic in the seminar within fifteen minutes followed by a question session for five minutes. Students should be encouraged to collect newspaper clippings and magazines cutting, to be displayed on the date of the seminar. The records/reports are to be maintained by the students and evaluated by a team of faculty members and team would award final marks. In the examination, students should be evaluated by External Examiner and Internal Examiner.