

CURRICULUM FOR THREE YEAR
(SIX SEMESTER)
DIPLOMA COURSE IN

=====
: MINING ENGINEERING :
: Effective from Session :
=====

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=====

=====
:Semester System :
=====

Prepared By

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: Curriculum Development Cell :
=====

INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

=====
: BOARD OF TECHNICAL EDUCATION :
: U.P. LUCKNOW, :
:CORRECTED AS SYLLABUS COMMITTEE OF:
: B.T.E. MEETING HELD ON 20.03.2018
=====

STUDY AND EVALUATION SCHEME FOR THREE YEARS (SIX SEMESTER)
DIPLOMA COURSE IN MINING ENGINEERING

(Effective From)

I Semester

Curriculum						Scheme of Examination												
Periods Per Week						Theory			Practical			Grand						
Le	Tut	Dr	Lab	Work	Tot	Examination	Sess.	Total	Examination	Sess.	Total	Tot						
c.	ori	aw	Shop	al		Dur.	Marks		Dur.	Marks		al						
4	-	-	-	-	4	2.5	50	20	70	-	-	-	70					
3	1	-	-	-	4	2.5	50	20	70	-	-	-	70					
3	1	-	-	-	4	2.5	50	20	70	-	-	-	70					
6	-	-	4	-	10	2.5	50	20	70	3	40	20	60					
4	-	10	-	-	14	3.0	50	20	70	-	-	-	70					
16	2	14	4	-	36	<-----TOTAL----->						250	100	350	40	20	60	410
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)												25						
TOTAL																435		

II Semester

3	1	-	-	-	4	2.5	50	20	70	-	-	-	-	70				
3	1	-	4	-	8	2.5	50	20	70	3	40	20	60	130				
5	1	-	2	-	8	2.5	50	20	70	3	40	20	60	130				
4	-	-	4	-	8	2.5	50	20	70	3	40	20	60	130				
4	-	-	4	-	8	2.5	50	20	70	3	40	20	60	130				
4	-	-	-	6	10	2.5	50	20	70	4	60	30	90	160				
23	3	-	14	6	46	<-----TOTAL----->						300	120	420	220	170	390	810
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)												25						
TOTAL																835		

NOTE:-

- (1) Each period will be 50 minutes duration.
- (2) Each session will be of 16 weeks.
- (3) Effective teaching will be at least 14 weeks.
- (4) Remaining periods will be utilised for revision etc.
- (5) After the II semester Student of Mine Engg will go for a two week visit of a small/medium size industry. It will be structured and supervised by the institution. Purpose of the visit is to give students an exposure of industrial setup and that of simple tools, instruments and the skill there in day to day use. Every student will submit the institution a report of his visit. The report will invariably contain the discription of his observations about (1) Products/Work (2) Tools and Equipments Used. He will be evaluated at the institution level for 20 marks--10 for viva and 10 for the reprot presented. See Annexure -I.

STUDY AND EVALUATION SCHEME FOR THREE YEARS (SIX SEMESTER)
DIPLOMA COURSE IN MINING ENGINEERING

(Effective From)

III SEMESTER

Curriculum							Scheme of Examination							
Periods Per Week							Theory			Practical			Gr-	
S U B J E C T							Examination			Examination			nd	
Le	Tut	Dr	Lab	Work	Tot		Sess.	Total	Sess.	Total	Tot			
c.	ori	aw	Shop	al			Marks	Marks	Marks	Marks	Marks	al		
al						Dur.	Marks		Dur.	Marks				
5	2	-	-	-	7	3.1 Applied Mathematics-II	2.5	50	20	70	--	--	--	70
4	-	-	4	-	8	3.2 Introduction to civil Engg.	2.5	50	20	70	3	40	20	130
4	-	-	4	-	8	3.3 Mining Technology- I	2.5	50	20	70	3	40	20	130
4	-	-	4	-	8	3.4 Mining Machinery -I	2.5	50	20	70	4	60	30	160
4	-	-	4	-	8	3.5 Mining Geology	2.5	50	20	70	3	40	20	130
2	-	-	5	-	7	3.6 Introduction To Computer	--	--	--	--	3	60	30	90
23	2	-	21	-	46	<-----TOTAL----->	--	250	100	350		240	120	360
												Games/NCC/Social and Cultural Activities + Discipline (15 + 10)	25	
												TOTAL	735	

IV SEMESTER

4	-	-	-	-	4	4.1 Functional Communication	2.5	50	20	70	-	--	--	--	70
4	-	-	3	-	7	4.2 Mining Technology -II	2.5	50	20	70	3	40	20	130	
5	-	-	2	-	7	4.3 Electrical Technology and Electronics	2.5	50	20	70	3	40	20	130	
5	-	-	4	-	9	4.4 Mine Surveying-I	2.5	50	20	70	4	60	30	160	
4	-	-	4	-	8	4.5 Underground Coal Mining	2.5	50	20	70	3	40	20	130	
-	-	8	-	-	8	4.6 Mining Machinery Drawing	3.0	50	20	70	-	--	--	70	
-	-	-	-	-	-	4.7 Mines Training, report and oral (9 weeks /yr)					--	90	90	90	
3	-	-	2	-	5	4.8 Energy Conservation	2.5	50	20	70	3	20	10	100	
25	-	8	15	-	48	<-----TOTAL----->	--	350	140	490	--	200	190	390	
												Games/NCC/Social and Cultural Activities + Discipline (15 + 10)	25		
												TOTAL	905		

- NOTE:-
- (1) Each period will be 50 minutes duration.
 - (2) Each session will be of 16 weeks.
 - (3) Effective teaching will be at least 14 weeks.
 - (4) Remaining periods will be utilised for revision etc.

STUDY AND EVALUATION SCHEME FOR THREE YEARS (SIX SEMESTER)
DIPLOMA COURSE IN MINING & MINE SURVEYING

(Effective From)

V SEMESTER

Curriculum						Scheme of Examination										
Periods Per Week						Theory					Practical					Grading
Le	Tut	Pr	Lab	Work	Tot	Examination	Sess.	Total	Examination	Sess.	Total	Total	Total	Total		
c.	ori	je	Shop	al		Dur.	Marks	Marks	Dur.	Marks	Marks	Marks	Marks	al		
al	ct															
-	-	-	4	-	4	5.1 Integrative Communication	--	--	--	--	3	40	20	60	60	
4	-	-	4	-	8	5.2 Underground metalliferous Mining	2.5	50	20	70	3	40	20	60	130	
4	-	-	4	-	8	5.3 Surface mining technology	2.5	50	20	70	3	40	20	60	130	
4	-	-	4	-	8	5.4 Mine surveying -II	2.5	50	20	70	4	60	30	90	160	
4	-	-	4	-	8	5.5 Mining Machinery-II	2.5	50	20	70	4	60	30	90	160	
4	-	-	4	-	8	5.6 Mine legislation and General Safety-I	2.5	50	20	70	3	40	20	60	130	
20	-	-	24	-	44	<-----TOTAL----->	--	250	100	350	--	280	140	420	770	
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)													25			
TOTAL														795		

VI SEMESTER

6	-	-	6	-	12	6.1 Rock Mechanics	2.5	50	20	70	3	40	20	60	130
6	-	-	6	-	12	6.2 Mine Environmental Engg.	2.5	50	20	70	3	40	20	60	130
6	2	-	-	-	8	6.3 Mine Management	2.5	50	20	70	-	--	--	--	70
6	2	-	-	-	8	6.4 Mine legislation and General Safety-II	2.5	50	20	70	-	--	--	--	70
-	-	-	8	-	8	6.5 Project	-	--	--	--	3	100	50	150	150
-	-	-	-	-	-	6.6 Mine training, report and oral (9 weeks/yr)	--	--	--	--	-	--	90	90	90
24	4	-	20	-	48	<-----TOTAL----->	--	200	80	280	--	180	180	360	640
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)													25		
TOTAL														665	
30% Carry Over of I & II.													381		
70% Carry Over of III & IV													1148		
100% Carry Over of V & VI													1460		
Aggregate														2989	

NOTE:- (1) Each period will of be 50 minutes duration.
 (2) Each session will be of 16 weeks.
 (3) Effective teaching will be at least 14 weeks.
 (4) Remaining periods will be utilised for revision etc.
 (5) Field visits and Extension lectures at institute level as per need be arranged.

Sl.No.	Particulars	Page No.
I.	Study and Evaluation Scheme	1-3
II.	Main Features of the Curriculum	6
III.	List of Experts	7
IV.	Need Analysis	8
DETAILED COURSE CONTENTS		
1.	I Semester	
1.1	Foundational Communication	9-10
1.2	Applied Mathematics-I(A)	11-12
1.3	Applied Physics-I	13-14
1.4	Applied Chemistry	15-18
1.5	Engineering Drawing	19-21
2.	II Semester	
2.1	Applied Mathematics-I(B)	22-23
2.2	Applied Physics-II	24-26
2.3	Applied Mechanics	27-29
2.4	Introduction To Mechanical Engineering	30-31
2.5	Introduction of Mining Technology and Mining Geology	32-34
2.6	Workshop Technology	35-37
2.7	Mines Training, Report and Orally	
3.	III Semester	
3.1	Applied Mathematics-II	38-40
3.2	Introduction to Civil Engineering	41-43
3.3	Mining Technology-I	44-46
3.4	Mining Machinery-I	47-49
3.5	Mining Geology	50-51
3.6	Introduction To Computer	52-54
4.	IV Semester	
4.1	Functional Communication	55-56
4.2	Mining Technology-II	57-58
4.3	Electrical Technology & Electronics	59-62
4.4	Mine Surveying-I	63-66
4.5	Underground Coal Mining	67-68
4.6	Mining Machinery Drawing	69
4.7	Mines Training, Report and Orally	
4.8	Energy Conservation	
5.	V Semester	
5.1	Integrative Communication	70-73
5.2	Underground Matlliferous Mines	74-75
5.3	Surface Mining Technology	76-77
5.4	Mining Surveying-II	78-80
5.5	Mining Machinery-II	81-82
5.6	Mining Legislation & General Safety-I	83-84
6.	VI Semester	
6.1	Rock Machines	85-87

6.2	Mine Environmental Engineering	88-89
6.3	Mine Management	90-91
6.4	Mining Legislation & General Safety-II	92-93
6.5	Project	94
6.6	Mines Training, Report and Orally	
4.	Staff Structure	95
5.	List of Equipments	96-116
6.	Learning Resources Equipment	117
7.	Annexure - 1 : Questionnaire	118-120

MAIN FEATURES OF THE CURRICULUM

1. Title of the Course : Diploma In Mining Engineering
2. Duration of the Course : Three Years(6 Semester)
3. Type of the Course : Full Time Institutional
4. Pattern of the Course : Semester System
5. Intake : 30
6. Entry Qualification : Passed High School With 35% Marks
7. Admission Criteria : State Joint Entrance Examination

LIST OF EXPERTS

On dated 08.12.2017 and 05.02.2018 the following experts whose contribution and support in the new development of this curriculum is a matter of obligation to I.R.D.T.

1. Prof A. K. Jain Department of Mining,
I.I.T., B.H.U., Varanasi
2. Shri Anil Kumar Sharma Senior Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
3. Shri S. K. Singh Senior Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
4. Shri Anjani Kr. Singh Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
5. Shri Dinesh Kumar Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
6. Km. Shivi Singh Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
7. Km. Namrata Pandey Mines Officer,
Directorate of Geology & Mining, U.P. Lucknow
8. Shri Bashishtha Yadav Mines Inspector,
Directorate of Geology & Mining, U.P. Lucknow
9. Shri Anand Kumar Misra Manager Mines,
Ultra Tech Cement Limited,
Dalla, Sonbhadra, U. P.
10. Shri I. K. Kochar Managing Partner (Mines)
J. K. Minerals, c-1, c-2
Industrial Estate, Gwalior Road
Jhansi, U. P.
11. Smt. Meenu Dwivedi Lecturer (Mechanical Engg.)
Govt. Poly., Lucknow
12. Shri S. P. Singh Lecturer (Civil Engg.)
Govt. Poly., Lucknow
13. Shri Lal Ji Patel Text Book Officer/C.D.C. Officer
I.R.D.T., Kanpur

LIST OF EXPERTS

A Curriculum Workshop for Development of Curriculum on the Subject “Energy Conservation” was held on 22nd January, 2018 at NITTTR, Chandigarh. The following participated in the workshop:-

S. No.	Name, Designation and Official address
From Field/Industries/Institutions of Higher Learning	
1.	Shri Jotinder Singh, Engineer-in-Chief(Retd.) Punjab State Power Corpn. Ltd.(PSPCL), Punjab
2.	Shri Punit Sharma, Asstt.General Manager, Electrical & Energy Management, Godrej Appliances Ltd. Mohali, Punjab
3.	Ms. Anu Singla, Associate Professor, Chitkara University, Rajpura, Punjab
4.	Shri Girish Kumar, UP New and Renewable Energy Development Authority (UPNEDA), Lucknow, U.P.
5.	Sh. Lal Ji Patel, TBO/ CDC Officer, IRDT Kanpur, U.P.
6.	Shri Ravinder Kumar, Research Assistant, IRDT, Kanpur, U.P.
From NITTTR, Chandigarh	
7.	Dr. AB Gupta, Professor & Head, Curriculum Development Centre, Coordinator

Need Analysis

Material is back bone of science and technology. The only resource of materials is our planet we live on. There are some manmade materials also , one may argue but their formation too has some geo-origin. The consumption of material is on increase with the population explosion and we are afraid of their diplition. Yet ,we are bound to exploit the resources more and more to meet the increasing demands . Mining is one way of obtaining the materials from the earth . It is different from the way we receive the crops from earth surface. Mining is now highly developed scientific and engineering process and needs multitude of power , machinary and human involvement . There is a good employment potential for trained personnel in mining . In our country till today there had hardly been adequate facility for this kind of training and education . In U.P. alone there is only one University viz BHU , Varanasi that runs a degree course in mining engineering . So it has been Longfull need to develop and run diploma course in the state . The Proposed syllabus is an effort to meet this need . This is a three year course , divided into six semester, which enables the incumbants to serve in mining industry in the capacity of work supervisor , foreman and surveyor.

**1.1 FOUNDATIONAL COMMUNICATION
SECTION "A" (ENGLISH)**

L	T	P
4	-	-

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
Section A English				
1.	PARTS OF SPEECH	12	-	-
2.	VOCABULARY BUILDING	05	-	-
3.	Grammar	15	-	-
4.	DEVELOPMENT OF EXPRESSION (Composition)	12	-	-
Section B Hindi				
5.	Topic 5	2	-	-
6.	Topic 6	5	-	-
7.	Topic 7	5	-	-
56		-	-	-

DETAILED CONTENTS

1. **PARTS OF SPEECH** :
 - a. Noun
 - b. The pronoun : Kinds and Usage
 - c. The adjective : Kinds and Degree
 - d. Determiner : Articles
 - e. The verb : Kinds
 - f. The Adverb : Kinds, Degree and Usage
 - g. Prepositions
 - h. Conjunctions
 - i. The Interjections
 - j. Subject: Verb Agreement (Concord)

2. **VOCABULARY BUILDING** :
 - a. Antonyms and Synonyms
 - b. Homophones
 - c. One word substitutions
 - d. Idioms and Phrases
 - e. Abbreviations

3. **Grammar**

- a. Sentence & its types
- a. Tenses
- b. Punctuations
- c. Active and Passive voice
- d. Transformation of Sentences
- e. Synthesis of Sentences
- f. Direct and Indirect Narrations

4. **DEVELOPMENT OF EXPRESSION (Composition) :**

- a. Paragraph Writing
- b. Essay Writing
- c. Proposal Writing
- d. Letter Writing (Formal, Informal, Business, official etc.)
- f. Report Writing
- g. Note Making
- h. News Making
- i. Application Writing
- j. Minute Writing
- k. Invitation Letter Writing

SECTION "B" (Hindi)

- 5- संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, वर्ण समास, संधि, अलंकार, रस, उपसर्ग प्रत्यय।
- 6- पत्र लेखन, निविदा संविदा, दर आमंत्रण (कोटेशन) अपील, स्वतन्त्र अभिव्यक्ति, प्रतिवेदन लेखन, प्रेस विज्ञप्ति।
- 7- वाक्य/वाक्यांश के लिए शब्द, पर्यायवाची या समानार्थी शब्द, विलोम शब्द, अनेकार्थी शब्द, शब्दयुग्म या समुच्चारित शब्द समूह, वाक्य शुद्धि (शुद्ध अशुद्ध वाक्य), मुहावरे एवं लोकोक्तियाँ।

1.2 APPLIED MATHEMATICS I (A)
[Common to All Engineering Courses]

L T P
3 2/2 -

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Coverage Time		
		L	T	P
1.	Algebra- I	8	3	-
2.	Algebra- II	8	3	-
3.	Trigonometry	6	2	-
4.	Differential Calculus-I	10	3	-
5.	Differential Calculus-II	10	3	-
-		42	14	-

DETAILED CONTENTS:

1. ALGEBRA-I : (10 Marks)
 - 1.1 Series : AP and GP; Sum, nth term, Mean
 - 1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.
 - 1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule
2. ALGEBRA-II:(10 Marks)
 - 2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.
 - 2.2 Complex number.

Complex numbers, Representation, Modulus and amplitud
Demoivre theorem, its application in solving algebraic
equations, Mod. function and its properties..

3. TRIGONOMETRY : (8 Marks)
 - 3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relation ship between sides and angle of a triangle.
 - 3.2 Inverse circular functions : Simple case only
4. DIFFERENTIAL CALCULUS - I : (12 Marks)
 - 4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability.
 - 4.2 Methods of finding derivative, - Function of a function, Logarithmic differentiation, Differentiation of implicit functions.
5. DIFFERENTIAL CALCULUS -II :(10 Marks)
 - 5.1 Higher order derivatives, Leibnitz theorem.
 - 5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.
 - 5.3 Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

1.3 APPLIED PHYSICS-I

[Common to All Engineering Courses]

L T P
3 2/2 -

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject, teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Units & Dimensions	3	1	-
2.	Errors in Measurement	3	1	-
3.	Circular Motion	4	1	-
4.	Motion of Planets	4	1	-
5.	Dynamics of rigid body (Rotational Motion)	5	1	-
6.	Fluid Mechanics and Friction	4	1	-
7.	Friction	4	1	-
8.	Harmonic Motion	5	2	-
9.	Heat & Thermodynamics	6	4	-
10.	Acoustics	4	1	-
Total		42	14	-

DETAILED CONTENTS:

1. Units and Dimensions (4 Marks)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogeneity of dimensions and applications of homogeneity principle to:

- i) Checking the correctness of physical equations,
- ii) Deriving relations among various physical quantities,
- iii) Conversion of numerical values of physical quantities from one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measurements, accuracy and precision, random and

systematic errors, estimation of probable errors in the results of measurement (Combination of errors in addition, subtraction, multiplication and powers). Significant figures, and order of accuracy in respect to instruments,

3. Circular Motion (5 Marks)

Central forces. Uniform Circular motion (Horizontal and Vertical cases), angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES : (5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kepler's Law, Escape and orbital velocity, Time period of satellite, Geo-stationary, Polar satellites (Concept Only)

5. Dynamics of Rigid Body (Rotational Motion) (6 Marks)

Rigid body, Rotational motion, Moment of inertia, Theorems (Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylinder), Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane. Concept of Fly wheel.

6. Fluid Mechanics : (5 Marks)

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity ($A_1V_1=A_2V_2$), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. Friction : (4 Marks)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by Stoke's method.

8. Harmonic Motion (6 Marks)

Periodic Motion, characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system.

Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. Heat & Thermodynamics: (6 Marks)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. Acoustics (5 Marks)

Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Acoustics of building defects and remedy.

1.4 APPLIED CHEMISTRY

[Common to All Engineering Courses]

L T P
6 - 4

Rationale:

Engineering Chemistry has profound and deep relationship with the industrial and environmental technology. This curriculum intends to impart technical knowledge alongwith productive practice to the students of the diploma engineering. The teachers are expected to guide the students in the classroom and the laboratories according to the curriculum by demonstrations and by showing relevant materials and equipments to inculcate interests in learning among students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Atomic Structure	4	-	-
2	Chemical Bonding	6	-	-
3.	Classification of Elements	4	-	-
4.	Electro Chemistry-I	7	-	-
5.	Electro Chemistry-II	8	-	-
6.	Chemical Kinetics	4	-	-
7.	Catalysis	4	-	-
8.	Solid State	4	-	-
9.	Fuels	4	-	-
10.	Water Treatment	6	-	-
11.	Colloidal State	4	-	-
12.	Lubricants	4	-	-
13.	Hydrocarbons	7	-	-
14.	Organic Reactions & Mechanism	8	-	-
15	Polymers	4	-	-
16	Synthetic Materials	6	-	-
		84	-	56

DETAILED CONTENTS:

1. ATOMIC STRUCTURE : (3 MARKS)

Basic concept of atomic structure, Matter wave concept, Quantum number, Haiseberg's Uncertainty Principle, Shaples of orbitals.

2. CHEMICAL BONDING : (4 MARKS)

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. CLASSIFICATION OF ELEMENTS : (3 MARKS)

Modern classification of elements (s,p,d and f block elements), Periodic properties : Ionisation potential, electro negativity, Electron affinity.

4. ELECTRO CHEMISTRY-I: (3 MARKS)

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II: (3 MARKS)

Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. CHEMICAL KINETICS : (3 MARKS)

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

7. CATALYSIS : (2 MARKS)

Definition Characteristics of catalytic reactions, Catalytic promoters and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE : (2 MARKS)

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS : (3 MARKS)

Definition, its classification, high & low Calorific

value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter.

Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number.

Cracking and its type, Gasolining from hydrogenation of coal (Bergius process and Fischer tropesch's process)

Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG.

Numerical Problems based on topics

10. WATER TREATMENT : (3 MARKS)

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embrittlement, primming and foarming in biolers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER : (3 MARKS)

Concept of collidal and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, tyndal effect, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS : (3 MARKS)

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS: (4 MARKS)
- A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Group)
 - B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.
14. ORGANIC REACTIONS & MECHANISM: (4 MARKS)
1. Fundamental aspects -
 - A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
 - B. Inductive effect, Mesomeric effect, Electromeric effect.
 - 2.A. Mechanism of addition reaction (Markovnikov's Rule, Cyanohydrin and Peroxide effect),
 - B. Mechanism of Substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenation, Sulphonation, Nitration and Friedel-Craft reaction.
 - C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.
15. POLYMERS : (3 MARKS)
1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)
 2. Thermosetting and Thermoplastic resins -
 - A. Addition polymers and their industrial application - Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.
 - B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.
 3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers (Silicon)
16. SYNTHETIC MATERIALS : (4 MARKS)
- A. Introduction - Fats and Oils
 - B. Saponification of fats and oils, Manufacturing of soap.
 - C. Synthetic detergents, types of detergents and its

- manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
 4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals
 - A. Basic Radicals :
NH₄⁺, Pb⁺⁺, Cu⁺⁺, Bi⁺⁺⁺, Cd⁺⁺, As⁺⁺⁺, Sb⁺⁺⁺,
Sn⁺⁺, Al⁺⁺⁺, Fe⁺⁺⁺, Cr⁺⁺⁺, Mn⁺⁺, Zn⁺⁺, Co⁺⁺
Ni⁺⁺, Ba⁺⁺, Sr⁺⁺, Ca⁺⁺, Mg⁺⁺
 - B. Acid Radicals :
CO₃⁻⁻, S⁻⁻, SO₃⁻⁻, CH₃COO⁻, NO₂⁻,
NO₃⁻, Cl⁻, Br⁻, I⁻, SO₄⁻⁻
2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.
3. To determine the total hardness of water sample in terms of CaCO₃ by EDTA titration method using Eriochroma black-T indicator.
4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalein as indicator.
5. To determine the Chloride content in supplied water sample by using Mohr's methods.
6. Determination of temporary hardness of water sample by O-Henry's method.

1.5 ENGINEERING DRAWING

[Common to Three years Diploma Course in Civil Engg., Electrical Engg., Chemical Engg., Dairy, Ceramic, Textile Technology, Textile Chemistry]

[Also Common to Four year Part-time Diploma Course in Electrical Engineering, Mechanical Engineering (Specilization in Production Engineering)]

[Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology]

L T P
4 - 10

Rationale

Drawing, which is known as the language of engineers, is a widely used means of communication among the designers, engineers, technicians, draftmen and craftsmen in the industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus, for the effective and efficient communication among all those involved in an industrial system, it becomes necessary that the perosnnel working in different capacities acquire appropriate skills in the use of this graphic language in varying degrees of proficiency in accordance with their job requirements.

Generally speaking, an engineering technician working at the middle level of the threetier technical manpower spectrum, is required to read and interpret the designs and drawings, provided to him by technologists and subsequently to translate them to the craftsmen for actual execution of the job.

This course in Engineering Drawing has been designed, keeping in view, the above refered job functions of a technician in the industry. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects. The contents of the course have been selected as to form a core for the various deversified fields of engineering. It is expected that at the end of this session, the students acquires sufficient skill drafting and some ability in spetial visualization of simple objects.

Sl.N.	Units	Coverage Time		
		L	T	P
1.	Drawing Instruents and their use	5	-	4
2.	A. Lettering techniques	3	-	16
	B. Introduction to scales	2	-	8
3.	Conventional Presentation	5	-	8
4.	A. Principles of projections	3	-	12
	B. Point Line, Plane	2	-	28
5.	Orthographic projection of simple geometrical solids	5	-	12

6.	Section of Solids	5	-	20
7.	Isometric Projection	5	-	20
8.	Free Hand Sketching	5	-	8
9.	Development of surfaces	5	-	24
10.	Orthographics Projection of Machine Parts	5	-	12
11.	Practice on Auto Cad	6	-	24
				56 - 140

C O N T E N T S

NOTE : Latest Indian Standards Code of Practice to be followed.

1.	Drawing, instruments and their uses.	1 Sheet
1.1	Introduction to various drawing, instruments.	
1.2	Correct use and care of Instruments.	
1.3	Sizes of drawing sheets and their layouts.	
2. (a)	Lettering Techniques	2 Sheet
	Printing of vertical and inclined, normal single stroke capital letters.	
	Printing of vertical and inclined normal single stroke numbers.	
	Stencils and their use.	
2. (b)	Introduction to Scales	2 Sheet
	Necesssity and use, R F	
	Types of scales used in general engineering drawing. Plane, diagonal and chord scales.	
3.	Conventional Presentaion :	1 Sheet
	Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.	
4. (a)	Principles of Projection	1 Sheet
	Orthographic, Pictorial and perspective.	

- Concept of horizontal and vertical planes.
 Difference between I and III angle projections.
 Dimensconing techniques.
- (b) Projections of points, lines and planes. 1 Sheet
- 5 (a) Orthographic Projections of Simple Geometrical Solids 2 Sheet
- Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with referance planes.
- (b) Orthographic views of simple composite solids from their isometric views.
- (c) Exercises on missing surfaces and views
6. Section of Solids 2 Sheet
- Concept of sectioning
- Cases involving cutting plane parallel to one of the reference planes and prependicular to the others.
- Cases involving cutting plane perpendicular to one of the reference planes and inclind to the others plane, true shape of the section
7. Isometric Projection. 2 Sheet
- Isometric scale
- Isometric projection of solids.
8. Free hand sketching 1 Sheet
- Use of squared paper
- Orthographic views of simple solids
- Isometric views of simple job like carpentary joints
9. Development of Surfaces 2 Sheet
- Parallel line and radial line methods of

developments.

Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 2 Sheet

Nut and Bolt, Locking device, Wall bracket

11. PRACTICE ON AUTO CAD : 2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code. 25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.

II Semester

2.1 APPLIED MATHEMATICS I (B)
[Common to All Engineering Courses]

L T P
3 2/2 -

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Coverage Time		
		L	T	P
1.	Integral Calculus-I	12	4	-
2.	Integral Calculus-II	12	4	-
3.	Coordinate Geometry (2 Dimensional)	10	3	-
4.	Coordinate Geometry (3 Dimensional)	8	3	-
-		42	14	-

DETAILED CONTENTS:

1. INTEGRAL CALCULUS - I : (14 Marks)

Methods of Indefinite Integration :-

- 1.1 Integration by substitution.
- 1.2 Integration by rational function.
- 1.3 Integration by partial fraction.
- 1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :(14 Marks)

- 2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.
- 2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.
- 2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule :

their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):(14 Marks)

3.1 CIRCLE :

Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

3.2 Standard form and simple properties

Parabola $x^2=4ay$, $y^2=4ax$,

Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):(8 Marks)

4.1 Straight lines and planes in space -

Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),

4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz=d$ (Radius, Centre and General Equation)

2.2 APPLIED PHYSICS-II

[Common to All Engineering Courses]

L T P
3 2/2 4

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject, teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Optics	4	1	-
2.	Introduction To Fiber Optics	4	1	-
3.	Laser & its Application	4	1	-
4.	Electrostatics	4	1	-
5.	D.C. Circuits	4	1	-
6.	Magnetic Materials & Their Properties	4	1	-
7.	Semi Conductor Physics	4	1	-
8.	Introduction Diode & Transistors	4	2	-
9.	Introduction To Digital Electronics	4	2	-
10.	Non-conventional energy sources	6	3	-
Total		42	14	56

1. Optics (4 Marks)

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroids.

2. Introduction To Fibre Optics :(5 Marks)

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications (4 Marks)

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their

applications. Introduction to MASER.

4. Electrostatics : (4 Marks)

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits (5 Marks)

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties: (5 Marks)

Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics (4 Marks)

Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transistor : (6 Marks)

Majority and Minority charge carriers, P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics : (6 Marks)

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources: (7 Marks)

- (a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.
- (b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy:

Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

PHYSICS LAB

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g=4\pi^2/\text{Slope of the graph line}$
3. Determine the force constant of combination of springs in case of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carey Foster bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchoff's Law.
11. To draw Characteristics of p-n Junction diode.
12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

NOTE :

Students should be asked to plot a graph in experiments (where possible) and graph should be used for calculation of results. Results should be given in significant figures only.

2.3 APPLIED MECHANICS

[Common to three years Diploma Course in Civil Engg., Agriculture, Dairy, Ceramic, Civil & Rural Engg., Chemical Engineering, Architecture Assistantship, Computer Science & Engineering]

[Also Common to Mechanical Engineering (Spacialization In Production Engineering)

[Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology]

L T P
5 1 2

RATIONALE

The subject Applied Mechanics deals with fundamental concepts of mechanics which are useful for the students for further understanding of the second & final year subjects like S.O.M. and theory and design of steel & masonry structures as well as RCC designs. The subject enhances the method ability of the students.

TOPIC WISE DISTRIBUTION OF PERIODS

SL.No.	Topic	L	T	P
1.	Introduction	4	1	
2.	System of Forces & General Condition of Equilibrium	18	4	
3.	Moment and Couple	8	1	
4.	Friction	8	1	
5.	Machines	8	1	
6.	Center of Gravity	8	2	
7.	Moment of Inertia	8	2	
8.	Beam & Trusses	8	2	

DETAILED CONTENTS

1. Introduction:

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplaner and non-coplaner forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplaner concurrent force system.

B. General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplaner forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction:statical,limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine. Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections. (simple problems only)

Applied Mechanics Lab : Practicals

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel,

copper and glass.

5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss.
(King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and efficiency of any three of the following machines:
 - (i) Simple wheel & axle
 - (ii) Differential wheel & axle
 - (iii) Differential pulley block
 - (iv) Simple Screw jack
 - (v) Simple Worm & worm wheel
 - (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

2.4-INTRODUCTION TO MECHANICAL ENGINEERING

L	T	P
4	-	4

Rationale:

The subject General Mechanical Engineering is basically introduced to give knowledge to mining engineering students about the various mechanical engineering fundamentals like properties of steam, steam generators, turning, shaping, planing, slotting and grinding operations. The students are expected to be well known and equip with the above knowledge.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Elements of Engineering Thermodynamics	6	-	--
2.	Properties of Steams.	6	-	--
3.	Steam Generator.	6	-	--
4.	Reciprocating Steam Engines.	6	-	--
5.	I.C. Engines.	8	-	--
6.	Air Compressor	6	-	--
7.	Power Transmission	6	-	--
8.	Refrigeration & Air Conditioning	6	-	--
Total		56	-	56

DETAILED CONTENTS

1. ELEMENTS OF ENGINEERING THERMODYNAMICS:

Basic definition of heat, work. Thermodynamic process. Parameters of working body & their units. Equation of state. Universal gas constant. Relation between heat capacity & temperature. Determination of quantity of heat. Elementary concept of laws of Thermodynamics. First law & second law. Graphical representation of process. The work of expansion & compression of gas. Change in the state of ideal gas - Isochoric, Isothermal & Adiabatic process. Carnot cycle.

2. PROPERTIES OF STEAMS:

Generations of steam at constant pressure, phases of transformation. Pressure-temperature, curve for steam. Latent Heat-external work of evaporation, Sensible heat of water, dry & saturated steam. Dryness fraction, Latent heat of wet steam, detail of wet steam, total heat of super-heated steam.

3. STEAM GENERATOR:

Type of steam generators (boilers i.e Vertical Cochran and Locomotive boilers)-Fire tube & water tube and their principles. Elementary concept and principles of modern water tube boilers. Boiler mountings and accessories.

4. RECIPROCATING STEAM ENGINES:

Working principles, classification & functions. A brief concept of engine details. Various common terms, Cycle of operations.

5. I.C. ENGINES:

Definition. Classification, Principles of operation of 4 stroke engine, Names of different parts of I.C. engine & their functions. Purpose of cooling & Lubrications. Ignition system of S.I. engines.

6. AIR COMPRESSORS :

Description and working of reciprocations and rotary compressor, single and multi stage compressor, conditions of maximum efficiency, efficiency of compressor, volumetric efficiency, effect of cylinder clearance and altitude on efficiency of compressors, advantage of using compressed air in mines, portable compressor air motor.

7. POWER TRANSMISSION :

Power transmission by belts, velocity ratio, compound belt drive, centrifugal tension in belts, maximum power transmitted by belts, speed at maximum horse power

8. REFRIGERATION AND AIRCONDITIONING :

Bell Coleman refrigerator. Vapour compression and absorption refrigerators. Psychrometry chart. Introduction to comfort air conditioning.

LIST OF PRACTICALS

1. Study of constructional features and working of Cochran boiler.
2. Study of constructional features and working of Locomotive boilers.
3. Description, study and working of steam engine (model)
4. Study the principle of working of 4-stroke and 2 stroke diesel engines.

5. Study of reciprocation air compressor in respect of the following construction features, operation, starting and stopping, safety deveices.
6. Study of rotary air compressor in respect of the following constructiona features, operation, starting and stopping, safety deveices.
7. To find the power and efficiency of a compressor and quality and quantity of air required for compressed air machines.
8. To find the loss of air pressure in pipes and hoses of various diameters.
9. Brake test on diesel engine and calculation of horse power

2.5 INTRODUCTION OF MINING TECHNOLOGY AND MINING GEOLOGY

L	T	P
4	-	4

RATIONALE :

The diploma holders in mining engineering will be responsible to prepare mining plan of the area in varying geological conditions and carrying out mining to achieve optimal output. The diploma holders in mining engineering will be responsible for carrying out mining, in structurally complex area, paleontological horizon, varied hydrogeological conditions etc. Ultimately from geological formation which are economically rich with varied characters.

These subjects provides him basic knowledge & skill of geological conditions, different types of minerals & rocks as well as broad picture of earth as a planet and its structure. Various geological agents working on the earth surface as well as different activities are being in action on the earth surface. Course content of this subjects will also provide him elementary and essential structrual geological aspects, paleotological, hydrgeological conditoins.

As for as possible teachers while teaching are supposed to give practical examples of various geological conditions & " expose the students from time to time to the actual mine site where above mentioned aspects are visible and mining techniques are adopted with modifications based on geological parameters.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	4	-	-
2.	Physical Geology	6	-	-
3.	Weathering of Rocks	3	-	-
4.	Geological Agents & Their Action	10	-	-
5.	Mineralogy	15	-	-
6.	Petrology	7	-	-
7.	Structural Geology	5	-	-
8.	Ground Water	3	-	-
9.	Introduction of Mining	3	-	-
		56	-	56

1. INTRODUCTION :

Geology, the science of the earth and its branches, their scopes & aims. Definition of mining and minerals

2. PHYSICAL GEOLOGY :

Introduction to origin and age of the earth - Tidal hypotheses, condensation of the earth, changes from the liquid to solid state, origin of continents and oceans. Age of the earth.

3. Weathering of rocks :-

Definition, physical factors, biological factors chemical factor, type of weathering, chemical weathering of feldspar, mica and limestones.

4. Geological Agents and Their Action :-

Erosion transportation and deposition by rivers, with the glaciers. Nature of river, Types of mineral deposition by the rivers,

5. Mineralogy :-

Definition, crystalline and amorphous aggregates i.e. minerals. Physical properties of minerals, Moh's scale description of the rock forming minerals, description of important mineral families feldspar, feldspathoids, amphiboles pyroxenes and mica. Coal and solid hydrocarbon minerals, river bed minerals, building stone minerals.

6. Petrology :-

Rocks as an aggregates of the minerals, cycles of rock formation.

Igneous Rocks :- Forms texture, structure, classification Bowen's reaction series.

Sedimentary Rocks :- Cycles of sedimentation, structure and texture of sedimentary rocks, classification of sedimentary rocks.

Metamorphic Rocks :- Metamorphism - agents and kinds. facies concept. Textures and structure of metamorphic rocks.

7. Structural Geology :-

Dip, strike, outcrops and incrops, structural planes and topography, Igneous structure.

Folds and Faults: Definition, classification, mechanism and its effects on mineral deposits and mining. Impact of folding and faulting on outcrops.

Joints and lineation: Definition, classification and mechanism unconformities, overlaps, inlier and outlier. Influence of these on mining.

Representation of structural data and joints by orthographic and stereographic projection.

8. Ground Water :-

Zones of distribution of ground water, water tables, perched water table, porosity and permeability of rocks.

9. Introduction of Mining :

Introduction of underground coal mining, open cast coal mining
Open cast mining, Small quarry, Underground metaliferous mining
Placer mining.

PRACTICAL

1. Study and identification of important rock forming mineral in the hand specimen.
2. Study and identification of important rocks in hand specimen.
3. Study and identification of geomorphological models.

4. Study and identification of important economic minerals in hand-specimen.
5. Study and sketch of model showing different types of faults, folds & their relation to topography.
6. Drawing of cross sections determination of dip strike from geological maps.
7. Identification of important fossils in hand specimen.

REFERENCE BOOKS :-

- | | | |
|----|----------------------------------|-------------------|
| 1. | Text book of Geology | By P.K. Mukhargi |
| 2. | Text book of Engineering Geology | By Parbin Singh |
| 3. | Text book of Physical Geology | By A.K. Dutta |
| 4. | Rutley's Elements of Mineralogy | By H.H. Read |
| 5. | Text book of Petrology | By Tywell |
| 6. | Text book of Structural Geology | By M.P. Billings |
| 7. | Text book Hydrogeology | By S.P. Garg |
| 9. | Elements of Mining-I | By D. J. Deshmukh |

2.6 WORKSHOP TECHNOLOGY

L T P
4 - 10

RATIONALE:

Every students of diploma course needs the knowledge of various operation in basic shops like fitting, plumbing, smithy, carpentry, welding and sheet metal. With this view the subject is to be taught in all the branches of diploma.

CONTENTS

1. House Keeping And Safety Precautions :

House keeping - Definition i.e. self responsibilities of student related with the activities of work shop, cleanliness of work area. Setting of tools at the start and end of operation, discipline during work. Safety guards for different operation in workshop, proper position for different operations. Proper utilization of tools and equipments.

2. Materials :

Classification of materials - Metals and nonmetals, ferrous, nonferrous metals and their alloys, composition, properties and uses of cast iron, carbon, steels, brass, bronze, gunmetal duralumin.

3. Fitting :

Various fitting tools - Hammers, files, scrapers, chisels, drills, reamers, taps, dies, scriber, surface gauge, surface plate, center punch, dot punch, scales, try square, callipers, vee block, angle plate, vices etc. various fitting operation.

4. Plumbing :

Classification of pipes, application of cement and PVC pipes for water supply, plumbing tools and accessories - pipe dies, wrenches and pipe vice. Plumbing fittings - Socket, elbow, tee, reducer, nipple, union, coupling, plug, bend, float valve, valves and taps, pipe laying.

5. Smithy :-

Blowers, anvils, swages, chisel, hammers, tongs, swage blocks,

drifts, punches, fullers, set hammers, flatters, rivet heads, rakes and pokers, brass scale and callipers. Power hammer and hearths.

6. Carpentry :-

Quantities of good timber, common indian timber- Teak, shisham, sal, Deodar, Mango, Babul, Kail, Bansum, Seasoning of timber, defects in timber, plywood, laminated board, hard board, batten board, carpentry tools, carpentry joints, preparation of surface and polishing of timber.

7. Welding :-

Tools and equipment used. Introduction to welding, types of welding, principle high pressure and low pressure, different types of flames. fluxes, filler welding, electrodes, welding techniques, edge preparation, welded joints, safety precaution. Principal of arc welding, soldering and brazing composition of solders and brazing materials.

8. Sheet Metal :-

Common sheet metals tools- Stakes, hammers, hand punch, grooves, rivet set, chisels. Marketing and measuring tools, Simple sheet metal operations and machines- Bar folder, burring, trimming, seaming, crimping, beading, grooving, wiring, riveting, circular shear machine.

NOTE :-

Study of tools and equipment should be made in reference of their specifications and functions.

PRACTICALS

Fitting :-

Simple exercises involving following operations - Filing, chipping, drilling, tapping, threading with dies and hacksawing. Manufacturing any one utility article involving the use of above operations.

Plumbing :-

Cutting and threading of water pipes, bending of pipes with simple pipe fittings viz; sockets, elbow, tee, reducer, nipple, plug, bend, float valve, valve and taps, union, coupling. PVC pipe fitting work. Fitting of tap stop valve and water meter, repair of bib cock and stop valve.

Smithy :-

Simple exercises involving following operations- Drawing, jumping, upsetting, bending, riveting, and forge welding. Manufacturing any two utility article involving the use of above operations.

Carpentry :-

Simple exercises involving following operation- Marketing, sawing, planing, chiseling, drilling, boring, grooving rebeting, moduling.

Preparations of simple joint-cross half lap joint, devetail joint, mortise joint, tennon joint, mitre joint, exercise involving polishing operation. Manufacturing any one utility article involving the use of above operation and fixig laminates.

Welding :-

Preparations of edges for arc and gas welding and preparing following joints- lap joints, butt joint, tee joint. Manufacturing any one utility article involving above operations. Exercises on soldering and brazing.

Sheet Metal :-

Simple exercises involving basic operations - cutting, reviting, soldering and brazing.

Note :-

Students have to prepare a practical note book showing the names, specifications and uses of tools and equipment for each shop with figures.

REFERENCE BOOKS :-

- | | |
|-------------------------------|----------------------|
| 1. Workshop Technology | By Gupta & Malani |
| 2. Workshop Technology(hindi) | By Tahil Maghnani |
| 3. Workshop Technology | By Kumar & Mittal |
| 4. Workshop Technology | By Hajra, Chaudhary |
| 5. Workshop Technology | By B.S. Raghhuwanshi |
| 6. Workshop Technology(hindi) | By Vinay Kumar |

III SEMESTER

3.1 APPLIED MATHEMATICS II

[Common to All Engineering Courses]

L T P
5 2 -

Rationale :

The study of mathematics is an important requirement for the understanding and development of concepts of Engg. The purpose of teaching mathematics to the Diploma Engg. students is to give them basic foundation and understanding of mathematics so that they can use the same for the understanding of engineering subjects and their advancements.

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Matrices	16	6	-
2.	Differential Calculus	15	6	-
2.	Differential Equations	15	6	-
4.	Integral Calculus	12	5	-
5.	Probability & Statistics	12	5	-
-	-	70	28	-

DETAILED CONTENTS

1. MATRICES :(12 Marks)

1.1 Algebra of Matrices, Inverse :

Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian, Skew hermitian, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix.

Definition and Computation of inverse of a matrix.

1.2 Elementary Row/Column Transformation :

Meaning and use in computing inverse and rank of a matrix.

1.3 Linear Dependence, Rank of a Matrix :

Linear dependence/independence of vectors, Definition and computation of a rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.

1.4 Eigen Pairs, Cayley-Hamilton Theorem :

Definition and evaluation of eigen values and eigen vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof) and its verification, Use in finding inverse and powers of a matrix.

2. DIFFERENTIAL CALCULUS :(10 Marks)

2.1 Function of two variables, identification of surfaces in space, conicoids

2.2 Partial Differentiation :

Directional derivative, Gradient, Use of gradient f , Partial derivatives, Chain rule, Higher order derivatives, Eulers theorem for homogeneous functions, Jacobians.

2.3 Vector Calculus :

Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

3. DIFFERENTIAL EQUATION :(10 Marks)

3.1 Formation, Order, Degree, Types, Solution :

Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, Nonlinear equation.

3.2 First Order Equations :

Variable separable, equations reducible to separable forms, Homogeneous equations, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.

3.3 Higher Order Linear Equation :

Property of solution, Linear differential equation with

constant coefficients (PI for $X=e^{ax}$, $\sin ax$, $\cos ax$, X^n , $e^{ax}V$, XV).

3.4 Simple Applications :

LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system

4. INTEGRAL CALCULUS - II: (12 Marks)

4.1 Beta and Gamma Functions :

Definition, Use, Relation between the two, their use in evaluating integrals.

4.2 Fourier Series :

Fourier series of $f(x)$, $-n < x < n$, Odd and even function, Half range series.

4.3 Laplace Transform :

Definition, Basic theorem and properties, Unit step and Periodic functions, inverse laplace transform, Solution of ordinary differential equations.

5. PROBABILITY AND STATISTICS :(6 Marks)

5.1 Probability :

Introduction, Addition and Multiplication theorem and simple problem.

5.2 Distribution :

Discrete and continuous distribution, Binomial Distribution, Poisson Distribution, Normal Distribution..

3.2 INTRODUCTION TO CIVIL ENGINEERING

L T P
4 - 4

RATIONAL

The diploma holders in mining engineering will be responsible for the use of materials in the mines. Diploma holders should have sufficient knowledge of hydraulics so that efficient planing, development of mines and optimal production will be achieved.

The course content of the subject provides elementary as well as essential knowledge related to above mentioned subject including shear, compression, bending, fluid properties and flow of fluids.

The teachers while teaching are supposed to give practical examples related to the strength of material and various sites within the mines.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Strength of Materials	28	-	-
2.	Hydraulics	10	-	-
3.	Building Materials	6	-	-
4.	Foundation and Masonary			
5.	Estimating	6	-	-
6.	Soil Mechanics			
		56		56

1. STRENGTH OF MATERIALS :

Bending moment and shear force. B.M and S.F. diagrams for static loads concentrated uniformly distributed and uniformly varying loads on cantilevers simply supported and overhanging beams. Bending and shear stress distribution in simple beams under dead loads. Concept of isotropy and anisotropy to mining. Definition of torque and angle of twist. Derivation of Torsion equation. Strength of hollow and solid circular shaft .

2. HYDRAULICS :

Fluid properties, measurement of pressure, types of fluid flow, Bernoulli's theorem, venturimeter(horizontal and

inclined) and orifice plate meter. Flow through pipes , Flow through open channels.

3. BUILDING MATERIALS :

A. Stone :

Characteristics, identification and use of common building stones, granite, basalt, trap, sand stone, lime stone, dolomite, marble, slate, quartzite, and qualities of good building stone.

B. Bricks :

Brief description of brick manufacturing, Size of bricks, Classification of bricks. Qualities of good bricks. Comparison of bricks and stone.

C. Lime :

Types of lime and their uses. Lime mortar : Preparation of lime mortar and its uses, proportions of constituents of lime mortar used for different works. Lime concrete : Preparation of lime concrete and its uses.

D. Cement :

Types of cement, properties and uses. Cement mortar : Preparation of cement mortar and its uses. Proportions of constituents of cement mortar used for different works. Cement concrete : Preparation of cement concrete and its uses. Different grades of concrete mixes as per I.S. code.

5. Foundation and masonry :

A Foundation:

Functions and various common types of foundation.

B. Masonry :

Types of masonry. Classification of stone and brick masonry. Checking of levels at different stages with the help of a spirit level and transparent flexible tube. Curing object and method.

6. ESTIMATING :

Introduction to estimating, types of estimates, units of measurement and units of payment for different types of works at the mines.

Analysis of rates of work requirement of materials labour, sundries and contractor's profit in regard to the following.

- i. Earth work in excavation and filling with a concept of lead and lift.
- ii. Brick and stone masonry in cement and lime mortar.
- iii. Cement grouting.

PREPARATION OF DETAILED ESTIMATES FOR THE FOLLOWING :

1. Miner's quarter's.
2. Foundation for head gear, winder, haulage, trippler, pump.
3. Mine dam, ventilation stopping, air crossing, doors and regulators.
7. Soil Mechanics

Introduction , Fundamental definition and their relationship, classification of soils, permeability of soils, Earth pressure.

LIST OF PRACTICALS

1. Determination of the modulus of elasticity by Searles's apparatus.
2. Tensile test on mild steel for failure.
3. Compression test on cast iron and timber.
4. Bending test on mild steel and timber.
5. Torsion test on mild steel and brass.
6. Verification of Bernoulli's theorem.
7. Determination of the co-efficient of a Venturimeter.
8. Determination of the Cc, Cv and Cd for an orifice.
9. Determination of the co-efficient of friction in pipes.
10. Study of pumps (i) Centrifugal (ii) Reciprocating.
11. Identification of different types of stones.

12. Plan, elevation and section of a small residential building from a given line plan.
13. Sketches of different types of roof - trusses.
14. Sketches of English and flemish bonds in brick masonry up to two thick walls.

REFERENCE BOOKS

- | | |
|--------------------------------|------------------------|
| 1. Strength of Materials | B. C. Punmia |
| 2. Hydraulics | K. R. Arora |
| 3. Estimating | B. N. Dutta, Raguwalla |
| 4. General Civil Engg. (Hindi) | T. D. Soni |
| 5. Building Construction | Susil Kumar |
| 6. Construction Material | T. D. Soni |

3.3 MINING TECHNOLOGY-I

L	T	P
4	-	4

RATIONAL :

The diploma holders in mining engineering will be responsible for carrying out mining operation after locating a mineral rich area by exploration.

The course content of the subject includes basic terminology, method of exploring a mineral, drilling and blasting methods. As far as possible teachers while teaching are expected to give practical examples of mining operations i.e. boring, drilling & blasting from time to time.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction To Mining Industry	4	-	-
2.	Introduction To Mining System	9	-	-
3.	Prospecting	8	-	-
4.	Drilling	9	-	-
5.	Explosive and Blasting	13	-	-
6.	Deep Hole Blasting	9	-	-
7.	River Bed Mining (Sustainable method of sand mining)	4	-	-
		56		56

1. INTRODUCTION TO MINING INDUSTRY :

Mineral resources of uttar pradesh and India. Mining of important minerals of uttar pradesh and India
Various terms used in Mining. Mode of entry by inclines, adits and shafts.

2. INTRODUCTION TO MINING SYSTEM :

Mining system adopted in underground coal mining, metalliferous mining, open cast mining (manual, semi-mechanised, mechanised).

Nomenclature and technical terminology used in all types of mining operation.

3. PROSPECTING :

Principle and method of prospecting - pit, shaft, trench and boreholes.

Principle of boring, selection of sites for boreholes, surface layout for boring, methods of boring - percussive and rotary system. Details of equipment, properties of drilling mud. Borehole logging, maintenance of records. Deviation of borehole, survey of boreholes, difficulties in boring, fishing tools and their uses.

4. DRILLING :

Terminology for drilling equipments and tools for underground mining. Drilling patterns and their selection. Wedge, Burn, Fan, Pyramid cut, etc. for drivage and stone drift. Drilling pattern for coal working.

5. EXPLOSIVE AND BLASTING :

Classification and properties of explosives. Storage and handling of explosives, Various initiating devices - fuse, cord, detonators, exploders, basic tool and equipment, safe practices in use of explosive, priming charging, stemming. Calculation of explosive quantity, powder factor, detonator factor.

Dangers due to static electricity in blasting circuits and their testing. Precautions before connection, firing, series and parallel connection. Misfire, socket, their causes and handling. Precautions after blasting

Introduction to SMS, SME, PMS and Heavy ANFO system.

6. DEEP HOLE BLASTING :

Calculation of charges, multi row blasting, twin bench blasting, muffle blasting, V-cut square cut and staggered patterns, over casting/side casting by blasting, deep hole blasting in u/g mines.

7. River Bed Mining (Sustainable method of sand mining):

Mining of sand, bajri, boulders and morrum (coarse sand) exclusively

Found in river bed as per sustainable sand mining guidelines-2016

Of MOEF & CC Government of India.

LIST OF PRACTICALS

1. Preparation of sketch showing various mining terms.
2. Study and preparation of mineral map of India and Uttar Pradesh showing important mineral occurrences.
3. Study, sketch and operate the feed mechanism of the given drilling machine and accessories.
4. Study and sketch of Hydraulic feed mechanism of the drilling machine.
5. Study, sketch and use of the boring and fishing hole.
6. Study and sketch of various types of detonators relays and exploders.
7. Study and sketch of firing circuits, their laying and checking.
8. Different types of pattern, drilling, charging and blasting of explosives.
9. Study and sketch of approved types of explosive magazines.
10. Study and sketch of different types of drilling patterns used in u/g mines.
11. Study and sketch of wagon drill

REFERENCE BOOKS :-

- | | |
|--|-------------------------|
| 1. Elements of mining I & II | -D.J. Deshmukh |
| 2. Drilling Technology | -Chugh |
| 3. Elements of mining | -AROGYAMSWAMY |
| 4. Sustainable Sand Mining Guidelines-2016
Govt. | - MOEF & CC
Of India |
| 5. Mining and Working Vol 1 & 2
Prakashan, Dhanbad) | - S. Ghatak
(Lovely |

3.4 MINING MACHINERY-I

L	T	P
4	-	4

RATIONALE :

The diploma holders in mining engineering will be responsible to supervise the working of the machinery at a mine site. purchase of machinery at the initial stage in any mining project with justification, suitability and efficiency of the machines according to the nature of mineralisation, depth of occurrence type of mining and local geological condition.

This subject will provide him basic knowledge and skills of different type of machineries like face machineries pumps haulage, conveyors, locomotives etc.

The teachers are supposed to give demonstration of functioning of working models in the laboratory as well as machineries in operation at the actual mining site.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Face Machinery	14	-	-
2.	Transport	14	-	-
3.	Open Cast Machinery	14	-	-
4.	Mine communication	10	-	-
5.	MMS (Mining Surveillance System)	4	-	-

-
1. Face Machinery:
Principles of drilling , Cutting and ploughing, Drills , Coal cutting machnies , loaders , continuous miners and cutter - loaders , Features of modern shearers.
 2. Transport:
 - (i) Rail haulage
Types of rope haulage,Track, mine tubes and mine cars , safety appliances on haulage roads , locomotive haulage.
 - (ii) Conveyors:

Construction and operation of belt , chain and cable belt conveyors. Aerial ropeways-types , construction , application and operation.
 - (iii) LOCOMOTIVES:

Types, diesel, battery, electric and compressed air driven.Comparision.their construction , operation , application and maintenance.
 3. Open Cast Machinery:

Blasthole drills , rippers and scrapers , shovels , drag lines, dumpers, road graders and dozers - their construction and operation , bucket wheel excavators, spreaders- construction and operation .
 4. Mine Communication

Signalling , telephone and wireless communication.
 5. MMS (Mining Surveillance System) :

Developed by MEIT (Ministry of Electronics and Information Technology), Government of India

LIST OF PRACTICALS

1. Electric drill construction, working and maintenance.
2. Study and sketch of gear arrangement of coal cutting machines.
3. Study and sketch of cutting machines, picks and pick boxes.
4. Measurement of rate of penetration by jack hammer.
5. Study and sketch of compressed air mono pumps and various

Mine's pumps.

6. Assembly and valve system of pumps.
7. Study and sketch of haulage clips, drag, jimcrow.
8. Study and sketch of electric drill panel.
9. Compressed air operated scraper used in underground mines.
10. Pneumatic loader.
11. Shuttle car used in coal mines.
12. Arrangement at the loading station of an aerial rope-way.
13. Tension arrangements unloading of buckets of an aerial rope-way.
14. Tension arrangement of an endless rope haulage.
15. Changing of rope of an endless rope haulage.
16. Different types of locomotives used in mines.
17. Tubes & Minecars.
18. Tube couplings.

REFERENCE BOOKS:

1. Open cast mining by C.P.Singh.
2. Surface mining by G.B.Mishra.
3. Elements of Mining-II by D. J Deshmukh
4. Mining and Working By S. Ghatak

3.5 MINING GEOLOGY

L T P
4 - 4

RATIONALE:

The diploma holders in mining Engineering will be responsible for the development mines and supervision of sampling, assay plan, geological mapping, estimation of ore reserves to get optimal output.

The course contents of the subject provides him basic knowledge about economic fuel geology, detailed aspects of metallic and nonmetallic economic materials their characteristics and geological mapping etc.

The teacher while teaching supposed to conduct technical visits of mines, where, different techniques of ore reserves estimation and geological mapping are in practice justified in varied situation.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Formation of Mineral Deposits	12	-	-
2.	Economic Geology	12	-	-
3.	stratigraphy	12	-	-
4.	Fossil Fuels	12	-	-
5.	Environmental Geology	8	-	-
		56	-	56

1. Formation of Mineral Deposits :

Definition of ore and gangue minerals, tenore and grade of ores. Classification of mineral deposits.

Introduction of various processes of formation of economic mineral deposits.

Crystallography:Definition, Application and scope , crystal system description , geologic occurrences, geographical distribution in India and uses of the important rock forming minerals / groups .

2. Economic Fuel Geology :

Ore genesis and geothermo -barometry ,study of formation and classification of mineral deposits in india: Iron , Copper, lead , Zinc , manganese, bauxite, chromite, gold and silver

minerals.

3. Stratigraphy

Definition and scope , Geological time scale .

Fossils : Definition and importance of Fossils to geologist and mining engineers . Conditions, Modes of preservation and uses Stratigraphic scale .

Major geologic formation of India : Dharwar , Cuddapah, Vindhyan , Gondwana and Tertiary systems.Their economic importance.

4. Fossil Fuels

Origin and constituents of coal and petroleum. Structural Features of coal seams and reservoir traps . Their occurrence in India.

5. Environmental Geology

Introduction and its role in mitigation and control of environmental pollution and rivers ecology .

PRACTICALS

1. Study and identification of important minerals in hand specimen.
2. Study and identification of important rocks in hand specimen.
3. The study of different economic minerals in hand specimen.
4. Geological sections of simple maps representing simple structures and completion of outcrops on Topographical maps.
5. Microscopic study of 10 important rock forming minerals.
6. Study and sketch of Brunton compass and clinometer, including surveying.
7. Microscopic study of syenite, dolerite, basalt, granite, gabbro, micaschist, gneiss, dolomitic lime stone
8. Plotting of bore log, calculation of ore reserve and sampling.
9. Preparation of assay plans.

REFERENCE BOOKS :-

- | | |
|--|--------------------|
| 1. Text book of Geology of India and Burma | BY M.S. Krishnan |
| 2. Ore deposits of India. | By Gokhale & Ray. |
| 3. India's Mineral Resources | By Krishnaswamy |
| 4. Text book of mine economics | By Sinha & Sharma |
| 5. Winning Coal & Iron in India | By R.T. Deshmukh & |

3.6 INTRODUCTION TO COMPUTER

[Common with Civil Engg., Civil (Spl. With Rural), Mechanical Engg., (Specialisation in Production, Automobile, Refrigeration and Air conditioning), Electronics Engg., Instrumentation and Control Engg., Dairy Engg., Leather Technology, Footwear and Leather Goods Tech., Cermics, Chemical Engg. (Four year Sandwich), Chemical Tech. (Rubber & Plastic), Chemical Tech. (Fertilizer)]

L T P
2 - 5

Rationale:

Computers are being used for design and information processing in all branches of engineering. An exposure to fundamentals of computer programming is very essential for all diploma holders. This subject has been included to introduce students in the use and application of computers in engineering.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Introduction to Computer	4	-	-
2.	Introduction To Operating System (MS DOS/Windows)	3	-	-
3.	Word Processing	4	-	-
4.	Worksheet	4	-	-
5.	Presentation	4	-	-
6.	Data Base Operation	3	-	-
7.	Introduction to Internet	2	-	-
8.	Introduction to advance tools	4	-	-
		28	-	70

DETAILED CONTENTS

1. Introduction to Computer:
 - A. Block Diagram of Computer.
 - B. Types Of Computer
 - C. Types of Input and Output devices
 - D. Memories Devices (Its Types and Basic).
2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

What is operating system, its significance, Commands of DOS, Features/Application of window.

3. WORD PROCESSING:

File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup
Edit : Cut, Copy, Paste, Office Clipboard, Select All, Find, replace, Goto, etc.
View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.
Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.
Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc.
Tools : Spelling & Grammer, Language, Word Count, Letters & Mailing, Options, Customize, etc.
Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.
Mail Merge

4. WORKSHEET:

Introduction, Use of Tools/Icons for preparing simple Mini Project.

5. PRESENTATION :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. DATABASE OPERATION :

Create database using MS Access, Create Table and Creating Reports.

7. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. INTRODUCTION TO ADVANCE TOOLS :

I. Steps requires to solving problems.

A. Flow Chart

B. Algoithm

C. Programming

II. Use of advance Tools such as Skype, Teamviewer, Installation of Modem, use of WiFi, Etc.

INTRODUCTION TO COMPUTER LAB

List Of Practicals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, modifying tables in Database tool.
4. Creating labels, report, generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool..
6. Creating simple presentation.
7. Creating mail ID, Checking mail box, sending/replying e-mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units		Coverage Time		
			L	T	P
Section A English					
1.	On Communication		04	-	-
2.	Exploring Space	04	-	-	
3.	Sir C.V. Raman		04	-	-
4.	Professional Development		04	-	-
5.	Buying a Second Hand Bicycle		04	-	-
6.	Leadership and Supervision		04	-	-
7.	First Aid	03	-	-	
8.	The Romanance of Reading		03	-	-
9.	No Escape from Computers		03	-	-
10.	Bureau of Indian Standards		03	-	-
Section B Hindi					
1.	Topic 1		02	-	-
2.	Topic 2		02	-	-
3.	Topic 3		02	-	-
4.	Topic 4		02	-	-
5.	Topic 5		02	-	-
6.	Topic 6		02	-	-
7.	Topic 7		02	-	-
8.	Topic 8		01	-	-
9.	Topic 9		02	-	-
10.	Topic 10		02	-	-
11.	Topic 11		01	-	-
			56	-	-

Section "A" (English)

Text Lessons

Unit I.	On Communication
Unit.II	Exploring Space
Unit.III	Sir C.V. Raman
Unit.IV	Professional Development of Technicians
Unit.V	Buying a Second Hand Bicycle
Unit.VI	Leadership and Supervision
Unit.VII	First Aid
Unit.VIII	The Romanance of Reading
Unit.IX	No Escape from Computers

Section "B" Hindi

- 1- स्वरोजगार
- 2- भारतीय वैज्ञानिकों एवं तकनीकियों का भारत के विकास में योगदान
- 3- ग्राम्य विकास
- 4- परिवार नियोजन
- 5- सामाजिक संस्थायें
- 6- नियोजन और जन कल्याण
- 7- भारत में प्रौद्योगिकी के विकास का इतिहास
- 8- हरित क्रान्ति
- 9- पर्यावरण एवं मानव प्रदूषण
- 10- श्रमिक कल्याण
- 11- भारत में श्रमिक आन्दोलन

4.2 MINING TECHNOLOGY-II

L	T	P
4	-	3

RATIONALE

The diploma holders in mining engineering will be responsible for the development of mines in scientific manner in hard as well as soft rock's area to achieve optimal output along with safety of workers's engaged in various activities related to mining.

Subjects provide him basis as well as up to date knowledge & skills shaft sinking and tunnelling course contents also includes elementary aspects as mineral processing.

It is expected from teachers to give typical examples and conduct technical visits to expose the students with mining technological aspects in the mining area.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Shaft Sinking	20	-	-
2.	Tunnelling	14	-	-
3.	Elementary Mineral processing	14	-	-
4.	Machanised Loader Machines & Heavy dumpers	8	-	-
		56	-	42

1. SHAFT SINKING :

Site selection size and shape of shafts, sinking shaft-preparatory arrangements,drilling and blasting, mucking, hoisting, ventilation, pumping, lighting and dewatering , temporary and permanent lining, complete cycle opration.

Special methods of sinking in difficult and water bearing ground . piling, drop shaft caisson, cementation, freezing etc. Shaft sinking by shaft borers, widening and deepening of shafts.

2. Tunnelling:

Main haulage drifts and tunnels: Purpose, shape , size and location ;excavation- ground breaking , muck disposal,

ventilation and supporting .
High speed drifting / tunnelling : application of mechanical methods, roadheaders and tunnel boring machines.

3. ELEMENTARY MINERAL PROCESSING :

Scope, object and limitation of mineral processing. Theory and practice of crushing and grinding. Brief idea of jaw crusher, cone crusher, ball mill. Heavy media separation and jigging methods of coal washing. Introductory froth floatation principle, floatation of sulphides , oxides and coal . Simplified sheets for coal , copper , lead , zinc , gold, iron, manganese ores and lime stone.

4. Mechanised Loader Machines & Heavy dumpers

PRACTICALS

1. Sketches of temporary lining during shaft sinking.
2. Sketches of permanent lining shaft.
3. Study and Sketch of surface arrangements for shaft sinking.
4. Study and Sketch drilling and blasting pattern for shaft sinking.
5. Study and Sketches of arrangement for freezing methods of shaft sinking.
6. Study, Sketch and layout of signalling bell, and visual indicators circuits.
7. Study of flow chart of beneficiation of important ores of India.
 - a. Flow chart of Pyrophyllite and diaspore
 - b. Flow chart of silica sand
 - c. Flow chart of rock phosphate.
 - d. Flow chart of Coal.
 - e. Flow chart of Iron.

REFERENCE BOOKS :-

1. Elements of mining I & II BY D.J. Deshmukh
2. Mineral Dressing By Gaudin

4.3 ELECTRICAL TECHNOLOGY & ELECTRONICS

(Common With Dairy Engineering, Mechanical Engineering)

L	T	P
5	-	2

Rationale :

The superiority of electricity as power over other means in use in home or industry can not be denied. So it is imperative to introduce the mechanical engineering students with electrical machines and their various uses.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Electric Induction	4	-	-
2.	A. C. Theory	6	-	-
3.	Three Phase Circuits	6	-	-
4.	Measurement & Measuring Instruments	10	-	-
5.	Electronics	10	-	-
6.	D. C. Machines	8	-	-

7.	Transformers	6	-	-
8.	Synchronous Machines	6	-	-
9.	Induction Motors	6	-	-
10.	Electro Heating	4	-	-
11.	Electro Plating	4	-	-
<hr/>				
-		70	-	28
<hr/>				

DETAILED CONTENTS

1. ELECTRIC INDUCTION:

Faraday's Laws of electromagnetic induction. Self and mutual induction. Statically and Dynamically induced e.m.f., Lenz's law. Fleming's left hand and right hand rule.

2. A. C. THEORY:

Production of alternating e.m.f. Definition of cycle, Frequency, Amplitude, Time period, Instantaneous, Average, R.M.S. maximum values of sinusoidal wave. Form factor, peak factor.

Representation of a sinusoidal quantity by a mathematical expression and phasor, phase and phase difference, Relationship of voltage and current for pure resistance, pure inductance and pure capacitive reactance, impedance. Solution and phasor diagrams of simple R.L.C. series and parallel circuits. Active and reactive power. Significance of P.F.

3. THREE PHASE CIRCUITS:

Production of Three phase voltage, advantages of three phase supply. Concept of star and delta connections. Relationship between phase and line values of currents and voltages, Power in three phase circuits, simple numerical problems.

4. MEASUREMENT & MEASURING INSTRUMENTS:

(i) Primary and secondary instruments-Indicating, Recording and Integrated instruments.

(ii) Working principle and construction of the following instruments.

(a) Ammeter & Voltmeter (Moving coil & Moving Iron).

Extension of their ranges.

(b) Dynamometer type wattmeter.

(c) Single Phase A. C. Energy Meter.

(iii) Measurement of power in a single phase and three phase circuits by wattmeter, Use of digital multimeter for measurement of voltage, Current and testing of devices.

5. ELECTRONICS:

Basic idea of semi conductors P & N type. Semi conductor diodes, Zener diodes and their applications in rectifiers. Transistors-PNP and NPN-their characteristics and uses as an amplifier (Brief description only). Principle characteristics and application of SCR. Devices like UJT, FET, DIAC, TRIAC (Brief introduction, Introduction to operational amplifier, Introduction to basic logic gates and microprocessors.

6. D. C. MACHINES:

D. C. Generator:

Working principle, Constructional details, e.m.f. equation, Types of generators and their applications.

D. C. Motor:

Working principle, Back e.m.f., Types of D. C. motor and elementary idea of their characteristics. Torque equation,

Methods of speed control (Description Only).

7. TRANSFORMERS:

Working principle and constructional details of a single phase and 3 phase transformers, e.m.f. equation, Losses and efficiency, Cooling of transformers, Elementary idea of auto transformers and welding transformers.

8. SYNCHRONOUS MACHINES:

(a) Alternators:

Working principle, Types of alternators, Constructional details, E.M.F. equation, Condition for parallel operation.

(b) Synchronous Motors:

Working principle, Constructional details, Vector diagram, Effect of excitation on armature current and power factor, Synchronous condenser.

9. INDUCTION MOTORS:

(a) Three Phase Induction Motors:

Working principle and constructional details-Types of induction motors-Slipring and Squirrel cage. Slip in induction motors. Speed torque characteristic, Starting and speed control. Application of induction motors in industry. General faults and their remedies.

(b) Single Phase Induction Motors:

Working principle and constructional details and application of single phase motors (Split phase, Capacitor start and Run Motor). A. C. series motors, General faults and their remedies.

10. ELECTRO HEATING:

Types of electro heating. Brief description of resistance ovens and induction furnace and core furnaces.

11. ELECTROPLATING:

Importance of electroplating, Principle of electroplating and equipment used. Processes used in electroplating, Anodising.

ELECTRICAL TECHNOLOGY & ELECTRONICS LAB

1. To change the speed and direction of rotation of d.c. shunt motor by
 - (a) Armature control method.
 - (b) Field control method.
2. To change the speed and direction of rotation of d.c. compound motor by
 - (a) Armature control method.
 - (b) Field control method.
3. To measure the terminal voltage with variation of load current of
 - (a) D.C. shunt generator.
 - (b) D.C. compound generator.
4. To perform load test on a single phase transformer and determine its efficiency.
5. To start and run a induction motor by
 - (a) Star Delta Starter.
 - (b) Auto Transformer Starter.
6. To measure slip of an induction motor by direct loading.
7. To start and change the direction of rotation of an induction motor.
8. To measure transformation ratio of a single phase transformer.
9. To measure power and P.F. in a single phase circuit by Ammeter, Voltmeter and Wattmeter.
10. To measure power and P.F. in a 3 phase/A.C. circuit by two wattmeter method.
11. To calibrate a single phase energy meter at different P.F.'s and different loads.
12. To locate the faults in an electrical machine by a megger.
13. To connect a fluorescent tube and note its starting and running current.
14. To draw characteristics of Silicon Controlled Rectifier (SCR).
15. Testing of electrical devices - Zenor, Diode, Transistor,

- FET, UJT, SCR.
16. Use of operational amplifier as adder, subtractor, comparator, differentiator and integrators.

4.4 MINE SURVEYING - I

L	T	P
5	-	4

RATIONALE:

The diploma holders in mining engineering will be responsible to carry out survey of the mine area in open cast as well as underground so that efficiency planning for the development of the mining area & proper development of the mine be obtained.

The subject provide him elementary knowledge of surveying as chain survey, compass survey, level survey and theodolite survey with reference to mining and mine surveying.

As far as possible teachers while teaching are supposed to give demonstration of different type of surveying and instruments used in each survey and preparation of survey plan.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	10	-	-
2.	Chain Surveying	5	-	-
3.	Compass Surveying	10	-	-
4.	Leveling	12	-	-
5.	Dials	10	-	-
6.	EDM	10	-	-
7.	Contours	13	-	-
		70		56

1. INTRODUCTION :

Definition of plane surveying and geodetic surveying. Use of

surveying in engineering. Principles of surveying. Methods of locating a point.

2. CHAIN SURVEYING :

Brief description and uses of :-

- i. Chains - meter chain, engineer's chain, gunter's chain, revenue chain.
- ii. Tapes - linen, metallic, fibre glass, steel, invar, steel band.
- iii. Ranging rods, offset rods.
- iv. Line ranger, cross staff, optical square.
- v. Arrows

Folding, unfolding, testing and adjusting the chain. Ranging chain lines - Direct indirect. Method of chaining on plane ground conventional signs in surveying. Reading and recording results in field book. Chaining on sloping ground - direct method and indirect method, common errors and precautions to be taken in the field to minimise them. To calculate correct dimension with a defective chain/tape - correction for change in temperature, sag, etc.

Chain surveys of small areas - triangulation, traversing. Preparation of a reference sketch, Fixing and marking - stations, base line, chain lines, check lines, tie lines, chain angles, Changing and detail filling by taking off-sets. Booking results in field book and plotting common obstacles in chain surveying. Chaining through obstacles.

3. COMPASS SURVEYING :

Names and function of different parts of a prismatic compass and surveyor's compass , their construction and uses .

Definition of meridian, magnetic meridian, true meridian, magnetic declination, dip, bearing - fore bearing, back bearing whole circle bearing, quadrantal bearing or reduced bearing - conversion of whole circle bearing to quadrantal bearing and vice versa. Reading the bearing of lines with the help of prismatic compass and computing included angles. Distribution of instrumental error.

Definition of local attraction. Causes of local attraction and its effect on observed bearing. Correction of error due to local attraction.

Traversing with chain and compass, open traverse, closed traverse. Booking readings in field book computation and plotting. Adjustment of errors in a closed traverse.

4. LEVELING :

Definition of level, levelling instruments, level line, names and function of different parts of dumpy level & tilting level.

Temporary adjustment of a dumpy level & tilting level, difference between dumpy level & tilting level.

Definition of the term-axis of telescope, line of collimation axis of bubble tube, vertical axis of the instrument. Height of the instrument and height of the line of collimation, focussing, parallax, its removal, bench marks, back sight, intermediate sight, change point.

Simple & differential leveling with dumpy & tilting levels, reduction of level by various methods, arithmetic checks, errors in leveling & precautions to be taken.

5. Dials :

Construction and use of the miners dial, vernier and micro optic dials, traversing, booking and plotting.

6. EDM

Principle of measurement, types, corrections, selection of equipment, total station.

7. Contours

Plane table surveying : Methods and instruments

Contouring: Definition, characteristics of contours, method of contouring by level, the theodolite, tachometer, use of contour map. interpolation of contours.

LIST OF PRACTICALS

1. Chains :

- i. Study of various types of chain, types and other accessories e.g. engineers chain, metric chain, steel tape, metallic tape, cross staff, optical square, line ranger.
- ii. Use of Chains :-

- a. Folding and unfolding chains.
 - b. Testing and adjusting the lengths of chains.
 - c. Ranging and chaining on level and sloping ground.
 - d. Setting right angles.
 - e. Setting parallel lines
 - f. Taking offsets.
- iii. Recording observation in field book and plotting.
2. Compass :
- i. Study of the different parts of prismatic compass.
 - ii. Measurements of bearings by prismatic compass.
 - iii. Traverse by prismatic compass and graphical adjustment of closing error.
3. Study of different parts and temporary adjustment of
- (i) Dumpy level.
 - (ii) Tilting level.
4. Study of levelling staves and Theodolite.
5. Use of dumpy level and tilting level in :
- i. Finding the difference in level between two points.
 - ii. Longitudinal sectioning and its plotting.
 - iii. Cross sectioning and its plotting.
 - iv. Reciprocal levelling
6. Testing and adjustment of dumpy and tilting levels.
7. Testing and adjustment of mining dial and survey of a small area with mining dial and plotting.
8. Contouring and preparation of a contour survey plan of an uneven area.

REFERENCE BOOKS :

- 1. Surveying By B. C. Punmia
- 2. Surveying By K. R. Arora

4.5 UNDERGROUND COAL MINING

L	T	P
4	-	4

RATIONAL

The diploma holder in mining Engineering will be Responsible to select a suitable method in mining, in different types of deposit coal mines.

The where content covers detailed aspects about the method of mining, their criteria of section on Indian perspective.

This teachers are expected to demonstrate various methods with the suitable models.

Sr.no.	Topics	L	T	P
1.	Introduction	9	-	
2.	Board and Pillar mining	9	-	
3.	Long wall mining	9	-	
4.	Underground coal mine planning	9	-	
5.	Mining of Thick and thin seams	9	-	
6.	Short wall mining & High Wall Mining Methods	8	-	
-----		56	-	56

DETAILED CONTENTS

1. Introduction:
 - mining condition in Indian coalfields , choice of mining methods .
2. Board and Pillar mining:
 - Design of board and pillar working, the panel system, panels and inter- panel barriers , size of pillar and galleries. Method of driving galleries ; preparatory arrangement for depillaring . Pillar extraction and safety , Room & pillar method of working .
3. Longwall mining:
 - Longwall system of working , advancing and retreating methods ; design of longwall working - longwall layout, face length, panel length , size of great roads , development of longwall panels , equipment of a longwall face, strata behaviour and support requirements.
4. Underground coal mine planning:
 - Elements of underground coal mining planning - size and production capacity of mines, in-seam mining versus horizon mining.

5. Mining of thick and thin seams:

Concept of thick seam ; problems of mining thick seams , modern multi- slice methods- inclined slicing , horizontal slicing and cross slicing in ascending and descending sequence.

Underwinning methods - Sub level caving, integral caving , blasting gallery method and hydraulic mining .
concept of thin seams, problems in mining thin seams , equipment and methods for thin seam extraction.

6. Shortwall mining:

layout of working , equipment and system of extraction and high wall mining Method.

LIST OF PRACTICALS

1. Study & layout of broad & pillar method of working.
2. Study & layout of long wall method of working.
3. Layout for open cast mining with shovel-dumper.
4. Layouts of open cast mining with manual working.
5. Layouts of Horizon method of mining.
6. Layouts of Hydraulic mining.

REFERENCE BOOKS :-

- | | |
|---|------------------|
| 1. Elements of mining I & II | By D.J. Deshmukh |
| 2. Advance coal mining | By B. Singh |
| 3. Principles and Practices of Modern Coal Mining | By R. D. Singh |

4.6 MINING MACHINERY DRAWING

L	T	P
-	-	8

Rationale

Drawing is the language of Engineers . BEfore preparation of a drawing of any equipment , machninery, plant etc. sketching is needed. Hence the subject of sketching of mining appliances is essential for students studying to obtain Diploma in Mining & Mining Surveying. A good Knowledge of sketching of engineering appliances is essential to understand principle of their opertaion.

1. Sketching of transport appliances:

sketch of various types of steel rope , sections , tubes , rails, crossing and conveyor - roller, belt joints. chain and flat. sketch of various system of rope haulage ; belt and chain conveyors.

2. Sketching of winding appliances:

cage, suspensioh of cage (attachment of winding rope to the cage), suspension of guide rope with attachment at pit bottom , safety- hook (King's safety hook/ safety hook), cage shoes, winding pulley, winding drum, Signalling bell- Ac/Dc

3. Sketching of Mining machinery:

Skecth of a drill (i) pneuamtic (ii) Electric and their bits
,skectch of coal cutting machine elements.
4.Face support :
Hydraulic & friction pumps , different types of roof bolts.
Open circuit and close circuit hydraulic equipment at the face.

REFERENCE BOOKS:

- | | |
|-------------------|--------------------|
| 1. M/C Drawing | By. N.D. Bhatt. |
| 2. Coal Mining | By D. J. Desh Mukh |
| 3. Coal Mining | By R. D. Singh |
| 2. Mining of Coal | By S. Ghatak |

4.7 Mines Training, report and oral(9 weeks /yr)

4.8 ENERGY CONSERVATION

L T P
3 - 2

RATIONALE

The requirement of energy has increased manifold in last two decades due to rapid urbanization and growth in industrial/service sector. It has become a challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as an additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

DETAILED CONTENTS

1. **Basics of Energy**
 - 1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
 - 1.2 Global fuel reserve
 - 1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
 - 1.4 Impact of energy usage on climate
2. **Energy Conservation and EC Act 2001**
 - 2.1 Introduction to energy management, energy conservation, energy efficiency and its need
 - 2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
 - 2.3 Standards and Labeling
 - 2.3.1 Concept of star rating and its importance
 - 2.3.2 Types of product available for star rating
3. **Electrical Supply System and Motors**
 - 3.1 Types of electrical supply system
 - 3.2 Single line diagram
 - 3.3 Losses in electrical power distribution system
 - 3.4 Understanding Electricity Bill
 - 3.4.1 Transformers Tariff structure
 - 3.4.2 Components of power (kW, kVA and kVAR) and power factor, improvement of power factor

3.4.3 Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

3.5 Transformers

- 3.5.1 Introduction
- 3.5.2 Losses in transformer
- 3.5.3 Transformer Loading
- 3.5.4 Tips for energy savings in transformers

3.6 Electric Motors

- 3.6.1 Types of motors
- 3.6.2 Losses in induction motors
- 3.6.3 Features and characteristics of energy efficient motors
- 3.6.4 Estimation of motor loading
- 3.6.5 Variation in efficiency and power factor with loading
- 3.6.6 Tips for energy savings in motors

4. Energy Efficiency in Electrical Utilities

4.1 Pumps

- 4.1.1 Introduction to pump and its applications
- 4.1.2 Efficient pumping system operation
- 4.1.3 Energy efficiency in agriculture pumps
- 4.1.4 Tips for energy saving in pumps

4.2 Compressed Air System

- 4.2.1 Types of air compressor and its applications
- 4.2.2 Leakage test
- 4.2.3 Energy saving opportunities in compressors.

4.3 Energy Conservation in HVAC and Refrigeration System

- 4.3.1 Introduction
- 4.3.2 Concept of Energy Efficiency Ratio (EER)
- 4.3.3 Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

5 Lighting and DG Systems

5.1 Lighting Systems

- 5.1.1 Basic definitions- Lux, lumen and efficacy
- 5.1.2 Types of different lamps and their features
- 5.1.3 Energy efficient practices in lighting

5.2 DG Systems

- 5.2.1 Introduction
- 5.2.2 Energy efficiency opportunities in DG systems
- 5.2.3 Loading estimation

6 Energy Efficiency in Thermal Utilities

6.1 Thermal Basics

- 6.1.1 Types of fuels
- 6.1.2 Thermal energy
- 6.1.3 Energy content in fuels
- 6.1.4 Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

6.2 Energy Conservation in boilers and furnaces

- 6.2.1 Introduction and types of boilers
- 6.2.2 Energy performance assessment of boilers
- 6.2.3 Concept of stoichiometric air and excess air for combustion
- 6.2.4 Energy conservation in boilers and furnaces
- 6.2.5 Do's and Don'ts for efficient use of boilers and furnaces

6.3 Cooling Towers

- 6.3.1 Basic concept of cooling towers
- 6.3.2 Tips for energy savings in cooling towers

6.4 Efficient Steam Utilization

7 Energy Conservation Building Code (ECBC)

- 7.1 ECBC and its salient features
- 7.2 Tips for energy savings in buildings
 - 7.2.1 New Buildings
 - 7.2.2 Existing Buildings

8 Waste Heat Recovery and Co-Generation

- 8.1 Concept, classification and benefits of waste heat recovery
- 8.2 Concept and types of co-generation system

9 General Energy Saving Tips

Energy saving tips in:

- 9.1 Lighting
- 9.2 Room Air Conditioner
- 9.3 Refrigerator
- 9.4 Water Heater
- 9.5 Computer
- 9.6 Fan, Heater, Blower and Washing Machine
- 9.7 Colour Television
- 9.8 Water Pump
- 9.9 Cooking
- 9.10 Transport

10 Energy Audit

- 10.1 Types and methodology
- 10.2 Energy audit instruments
- 10.3 Energy auditing reporting format

PRACTICAL EXERCISES

1. To conduct load survey and power consumption calculations of small building.
2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3. To measure energy efficiency ratio (EER) of an air conditioner.
4. To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.
5. To measure and calculate energy saving by arresting air leakages in compressor.
6. To measure the effect of blower speed on energy consumed by it.

V SEMESTER

5.1 INTEGRATIVE COMMUNICATION

L	T	P
-	-	4

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Introduction to Personality Development	-	-	02
2.	Factors Influencing / Shaping Personality	-	-	02
3.	Self Awareness - 1	-	-	03
4.	Self Awareness - 2	-	-	02
5.	Self Awareness - 3	-	-	02
6.	Change Your Mind Set	-	-	02
7.	Interpersonal Relationship and Communication	-	-	03
8.	Non-Verbal communication Communication Skills	-	-	02
9 .	Communication Skills ACTIVITIES	-	-	06
10.	Body Language skills	-	-	03
11.	Leadership Traits & Skills	-	-	03
12.	Attitude	-	-	03
13.	Analyzing & Solving a Problem skills	-	-	02
14.	Time Management skills	-	-	03
15.	Stress Management Skills	-	-	02
16.	Interview Skills	-	-	04
17.	Conflict Motives	-	-	02
18.	Negotiation / Influencing Skills	-	-	02
19.	Sociability	-	-	03
20.	Importance of Group	-	-	03
21.	Values / Code of Ethics	-	-	02

PERSONALITY DEVELOPMENT

1 Introduction to Personality Development

AIM, Skills, Types of Skills, LIFE SKILLS VS OTHER SKILLS, Concept of Life Skills. Ten core Life Skills identified by

WHO

2. Factors Influencing / Shaping Personality :

Introduction, Physical and Social Factors Influencing / Shaping

Personality (Hereditary, Self-Development, Environment, Education, Life-situations) Psychological AND Philosophical Factors Influencing / Shaping Personality (Past Experiences, Dreams and Ambitions, Self-Image, Values)

3. Self Awareness - 1

DIMENSIONS OF SELF AWARENESS (Self Realization, Self Knowledge or Self Exploration, Self Confidence, Self Talk,

Self

Motivation, Self Esteem, Self Image, Self Control, Self Purpose, Individuality and Uniqueness, Personality, Values, Attitude, Character), SELF REALIZATION AND SELF EXPLORATION THROUGH SWOT ANALYSIS AND JOHARI WINDOW,

4. Self Awareness - 2

SYMPATHY VS EMPATHY AND ALTRUISM, Importance of Empathizing with Others,

5. Self Awareness - 3

Self-Awareness through Activity, Body Image (What is Body Image, What Decides our Body Image, What is Poor Body Image, What are the Harmful Effects of Poor Body Image), Tackling Poor Body Image(Enhance Self-Esteem, Build Up Critical Thinking, Build up Positive Qualities, Understand Cultural Variation, Dispel Myths, Utilize Life Skills)

6. Change Your Mind Set

What is Mindset, HOW TO CHANGE YOUR MINDSET (Get the Best Information Only, Make the best people your Role Model, Examine Your Current Beliefs, Shape Your Mindset with Vision and Goals, Find Your Voice, Protect Your Mindset, Let Go of Comparisons, Put An End To Perfectionism, Look At The Evidence, Redefine What Failure Means, Stop Worrying About What "People" Think)

INTERPERSONAL SKILLS

7. Interpersonal Relationship and Communication

INTERPERSONAL RELATIONSHIP , Forms of Interpersonal Relationship, Must Have in an Interpersonal Relationship, Interpersonal Relationship between a Man and a Woman (Passion, Intimacy, Commitment), Relationship Between Friends, ROLE OF COMMUNICATION IN INTERPERSONAL RELATIONSHIP (Take Care Of Your Tone And Pitch, Choice of Words is Important in Relationships, Interact Regularly, Be Polite, Try To Understand The Other Person's Point Of View As Well, Individuals Can Also Communicate Through Emails,

8. NON-VERBAL COMMUNICATION Communication Skills

Non-Verbal Communication,
We Communicate with Our Eyes, Communication with Facial Expression, A Good Gesture, Appearance, Posture and Gait, Proximity and Touch), IMPORTANCE OF LISTENING,
Characteristics of Good and Effective Listener(Is Attentive,

Do

Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)

9. Communication Skills ACTIVITIES -

Activities in Making Collages, Making Advertisements, PPT Preparation & Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore Speeches, Listening to an audio clip and telling its gist, Answering a telephone call, Making enquiries, General tips-

Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a report, article, Writing- Resume Writing, Writing joining report,

Notice writing, Report making, Proposal writing, Advertisement,

Notice for tender, Minutes writing, E-Mail writing, Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),

10. Body Language skills

Introduction, What is Body Language , Body Language Parts, Personal Space Distances (Intimate Distance, Personal Distance,

Social Distance, Public Distance), IMPORTANT BODY LANGUAGE SIGNS AND THEIR MEANING

UNDERSTANDING OTHERS

11. Leadership Traits & Skills :

Introduction, Important Leadership Traits (Alertness, Bearing,

Courage, Decisiveness, Dependability, Endurance, Enthusiasm, Initiative, Integrity, Judgment, Justice, Knowledge, Loyalty, Sense

of Humour), Other Useful traits (Truthfulness, Esprit-de-corps, Unselfishness, Humility and sympathy, Tact without loss of moral courage, Patience and a sense of urgency as appropriate, Selfconfidence, Maturity, Mental including emotional stability)

12. Attitude

Types of Attitude, Components of Attitudes (Cognitive Component, Affective Component, Behavioral Component), Types of Attitudes (Positive Attitude, Negative Attitude, Neutral Attitude, Rebellious Attitude, Rational and Irrational Attitudes, Individual and Social Attitudes), Kinds of Attitude, ASSERTIVENESS, How to Develop Assertiveness (Experiment and Try New Things, Extend Your Social Circle, Learn to Make Decisions for Yourself, Indulge in Knowledge, Admire Yourself & Others), Negotiation (Be Sensitive to The Needs Others, Be Willing To Compromise, Develop Your Problem-Solving Skills, Learn to Welcome Conflict, Practice Patience, Increase Your Tolerance For Stress, Improve Your Listening Skills, Learn To Identify Bottom-Line Issues Quickly, Be Assertive, Not Aggressive)

PROBLEM SOLVING

13. Analyzing & Solving a Problem skills

Critical Thinking, Creative Thinking, Decision Making, Goal Setting & Planning, Problem Solving

14. Time Management skills

Need of Time Management, TIME WASTERS (Telephone, Visitors , Paper work, Lack of Planning & Fire Fighting , Socializing , Indecision , TV , Procrastination), PRINCIPLES OF TIME MANAGEMENT - Develop a Personal Sense of Time (Time Log , value of other people's time), Identify Long-Term Goals , Concentrate on High Return Activities , Weekly & Daily Planning (The Mechanics of Weekly Planning , Daily Planning), Make the Best Use of Your Best Time , Organize Office Work (Controlling Interruptions , Organizing Paper Work), Manage Meetings, Delegate Effectively, Make Use of Committed Time, Manage Your Health,

15. Stress Management Skills

INTRODUCTION, Understanding Stress and its Impact, Expected Responses (Physical, Emotional, Behavioral), stress

- signals(thoughts, feelings, behaviors and physical), STRESS MANAGEMENT TECHNIQUES (Take Deep Breath, Talk It Out, Take A Break, Create a Quite Place in Your Mind, Pay Attention to Physical Comfort, Move, Take Care of Your Body, Laugh, Mange Your Time, Know Your Limits, Do You Have To Be Right Always, Have A Good Cry, Look for the Good Things Around You, Talk Less, Listen More), UNDERSTANDING EMOTIONS AND FEELINGS-through Activity
- 16. Interview Skills (2 sessions from Industry Expert is Compulsory)**
- Curriculum Vitae (When Should a CV be Used, What Information Should a CV Include, personal profile, Covering Letter, What Makes a Good CV, How Long Should a CV Be, Tips on Presentation), Different Types of CV (Chronological, Skills-Based), BEFORE THE INTERVIEW , CONDUCTING YOURSELF DURING THE INTERVIEW , FOLLOWING THROUGH AFTER THE INTERVIEW , Interview Questions To Think About , MOCK INTERVIEW - Activity (MOCK INTERVIEW EVALUATION - NON-VERBAL BEHAVIORS, VERBAL BEHAVIORS, General Etiquettes to face the Board , Telephonic interview
- 17. Conflict Motives -Resolution**
- Motives of Conflict(Competition for Limited Resources, The Generation Gap and Personality Clashes, Aggressive Personalities, Culturally Diverse Teams, Competing Work and Family Demands, Gender Based Harassment), Merits and Demerits of Conflict , Levels of Conflict (Interpersonal Conflict, Role Conflict, Inter-group Conflict, Multi-Party Conflict, International Conflict) , Methods of Conflict Resolution (The Win-Lose Approach, The Lose-Lose Strategy, The Win-Win Approach), Techniques for Resolving Conflicts (Confrontation and Problem Solving Leading to Win-Win, Disarm the Opposition, Cognitive Restructuring, Appeal to Third Party, The Grievance Procedure)
- 18. Negotiation / Influencing Skills**
- Why Influencing, What Is Influencing, TYPES OF INFLUENCING SKILLS (Probing And Listening, Building Rapport, Sign Posting, Pacing, Selling, Assertiveness), LAWS AND PRINCIPLES OF INFLUENCE, The Six Laws of Influence (The Law of Scarcity, The Law of Reciprocity, The Law of Authority, The Law of Liking, The Law of Social Proof, The Law of Commitment and Consistency), Influencing Principles (Making a Start, Buy Yourself Thinking Time, Dealing With Disagreement, Difficult And Sensitive Situations)

19. Sociability : Etiquettes And Mannerism & Social Skills

Need for Etiquette , Types of Etiquettes (Social Etiquette, Bathroom Etiquette, Corporate Etiquette, Wedding Etiquette, Meeting Etiquette, Telephone Etiquette, Eating Etiquette, Business Etiquette, E-Mail Etiquettes,), MANNERISMS, HOW TO IMPROVE YOUR SOCIAL SKILLS (Be Yourself, Be Responsible, Be Open & Approachable, Be Attentive, Be Polite, Be Aware, Be Cautious)

20. Importance of Group / Cross Cultural Teams / Team Work skills

Introduction, Types and Characteristics of Groups (Definition of a Group, Classification / Types of Groups, Friendship Group, Task Group, Formal Groups, Informal Group, Effective Group), Importance of a Group, Characteristics of a Mature Group, TYPES AND CHARACTERISTICS OF A TEAM (Definition of a Team, Types of Teams, Functional Teams, Problem Solving Teams, Cross - Functional Teams, Self - Managed Teams), Importance of a Team, Characteristics of a Team

21. VALUES / CODE OF ETHICS

Meaning, A FEW IMPORTANT VALUES (Honesty, Integrity, Purity, Discipline, Selflessness, Loyalty, Fairness, Equality, Trust, Support, Respect, etc)

Note : One Orientation module for the faculty is must.
Involvement of Industry Experts is necessary for Interview Skills

5.2 UNDERGROUND METALLIFEROUS MINING

L T P
4 - 4

RATIONAL:

The diploma holders in Mining Engineering will be responsible to select a suitable method to approach the mineral, developing the area, selecting Techno-economic method of extraction & carrying out actual extraction of minerals.

The course content of this subjects covers in detail about the method of developing a mine, selecting method of work weather by open cast or underground & in detail about various methods of Mining.

Teachers are expected to arrange visits for on site observation of various methods of mining.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Opening up of ore Deposits	18	-	--
2.	Mine Development	18	-	--
3.	Stoping Method	20	-	--
		56	-	56

1. Opening up of Deposits:

Choice of mode of entry-adit , shaft, declined and combined mode. their applicability , number and disposition : Choice of level interval and block / block length ; shape , size , position , excavation and equipping of shaft station , grizzly , ore / waste bin , main orepass system , underground crushing and loading stations, under ground chambers, sump and other subsidiary excavation ; arrangement for dumping into main orepass.

2. Mine Development :

Driving of raises by conventional methods Alimakraise climber, its cycle of operation, drop raising using large dia drills,raise borers, winzes, pit botteom station methods of stops preparation.

3. Stoping Method :

Factors influencing the selection of stoping methods,various

methods of stoping under-hand, overhand, breast stoping, shrinkage stoping cut and fill method. Block caving, vertical crater mining, square set stoping, sublevel stoping.

PRACTICAL

1. Study and sketch of Alimake raise climber.
2. Study and sketch of shrinking method.
3. Study and sketch of square set stopping method.
4. Study and sketch of cut and fill method.
5. Study and sketch of sublevel stopping methods.
6. Study and sketch of block caving, sublevel caving and top slicing methods.
7. Study and sketch of modern ring hole drilling and blasting system as used at Zawar mines and Khetri copper mine.

REFERENCE BOOKS :-

- | | |
|---------------------------|------------------|
| 1. S.M.E. Handbook | BY Hartman |
| 2. Introduction to mining | BY G.B. Mishra |
| 3. Surface mining | By D.J. Deshmukh |
| 4. Open cast mining | |

5.3 SURFACE MINING TECHNOLOGY

L	T	P
4	-	4

RATIONALE

The diploma holders in mining engineering will have to prepare feasible planning & development in varied geological conditions with optimal output.

The course content of the subject will provide essential and detail knowledge about mine supports, subsidence and stowing technology.

The teachers while teaching are supposed to give demonstration of present mining technological situations and challenges in mining fields with reference to above mentioned mining technological aspects.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	14	-	--
2.	Mining and Processing of Building stones	14	-	--
3.	Mining of Dimensional stones	14	-	--
4.	Processing			

1. Introduction:
General information, basic definition, terms, advantages & disadvantages. Opening up of deposits, driving of trenches, laying of communication routes, system of disposal of overburden, removal of cover rock. General open cast mining methods, basic layout, choice of mining methods, dumper-shovel scraper, ripper.
2. MINING AND PROCESSING OF BUILDING STONES :

Mining of granite and sand stone for grits, boulders, stone, Bricks, etc. Blasting pattern in hard rocks and sand stones. Controlled blasting in sand stone areas, Stone crushing plant Types of stone crushers.
3. MINING OF DIMENSIONAL STONES :

Resources of marble, granite, slate, sandstone, limestone as dimensions, their uses, marketing and export.

Conventional, diamond wire saw cutting, jet flame, helicoidal wire saw, Lorfman chain saw cutter, hydraulic jacks, track mounted rock drills, monoblade block dresser, mechanised crane, controlled blasting.
4. PROCESSING :

Processing of marble. granite, gang saw cutter, diamond blade saw, wire saw, circular saws, their construction and uses, preparation of medium size and large size slabs and tiles. Grinding and polishing of marble and granite. Brief idea of Italian plant, flow sheet for various operation, output per day. Various abrasives used in processing.

LIST OF PRACTICAL

1. Sketch and diagram of various types of stone crushers.
2. Layout of crushing plant
3. Layout of open cast mining.
4. Sketch and diagram of mechanical loaders.
5. Sketch and diagram of tippler and dumpers.
6. Layout of mines composing loaders, machines and dumpers.
7. Sketch and diagram of blasting pattern in hard rock building Stone mines.
8. Sketch and diagram of blasting pattern of controlled blasting
9. Sketch and diagram of wire saw.

10. Sketch and diagram of gang saw cutter.
11. Sketch and diagram of polishing unit.

REFERENCE BOOKS:-

1. Surface Mixing By Samir Das
2. Elements of Mining I,II & III Vol. By D. J. Deshmukh
3. Surface Mining By G. B. Mishra

5.4 MINE SURVEYING-II

L T P
4 - 4

RATIONALE:

The diploma holders in minig Engg. will be responsible for various types of surveying methods used for preparing various types of plans and sections used in open cast as well as undergruond surveying.

The subject will provide him basic knowledge, triangulation, correlation, setting out curves, stope surveying. As far as possible teachers while teaching are supposed to give practical knowledge of surveying with ti mining fields as per course content.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Theodolite Traversing	7	-	-
2.	Techometry	6	-	-
3.	Triangulation	6	-	-
4.	Correlation	7	-	-
5.	Setting Out	7	-	-
6.	Stop & Face Surveying	7	-	-
7.	Theory of Errors	6	-	-
8.	Mine Plans and Sections	7	-	-
9.	Field Astronomical Survey	3	-	-
		56	-	56

1. THEODOLITE :

Types of theodolite and their construction, measurment of horizontal & vertical angles. Theodolite traversing, traverse calculations, adjustment of the traverse, computation of co-ordinates, temporary & permanent adjustment.

2. Tacheometry:

Principles of tacheometry , types of techeometers, use of tacheometry for determination of distances and levels , techeometric surveying, problem solving.

3. Triangulation:

Principles involved in triangulation, purpose of triangulation, base line measurement, method of measuring angles, reference direction, true magnetic meridian, booking readings, calculation of coordinates and plotting.

4. Correlation:

Needs for correlation, method of correlation of surface and underground surveying through inclines, one or two vertical shafts, steeply inclined shafts. correlation by magnetic needles.

5. Setting Out:

Setting out a point of known rectangular co-ordinates, points for foundations, shafts surveys, selection and fixing of underground stations, difficulties in underground surveying, underground curve laying. Giving and maintaining direction and gradient for inclined shafts, slopes, levels and tunnels, maintaining alignment. Auxiliary telescope-top and side telescope. Surveying for open pits.

6. Stop and Face Surveying:

Uses of Miner's dial, hanging compass with clinometer, theodolite in stop surveying, tape trisngulation, traversing, radiation and other methods, planimeter and its use .

7. Theory of Errors:

Classification & causes of errors, most probable true & residual errors, average & standard errors, most probable values of single obsevation & arithmetic means, laws of weight. Adjustment of traverse. Adjustment of errors in triangulation.

8. Mine Plans and Sections:

Legal requirement to mine plans and sections, conventional signs, preparation and preservation of mine plans and sections.

Enlargement of plans , use of ediographer and pantograph, represttation of geological and other features on mines plans sections plan to be checked on the change ownership, recopeining of mines.

9. Field Astronomical Survey:-

Astronomical terms:- meridian, latitude , declination, hour angle , right ascension, astronomical triangle, prime

vertical, ecliptic, Zenith and nadir poles, Circumpolar stars,
culmination and elongation.
Determination of the true bearing of a survey line.

LIST OF PRACTICAL

1.
 - i. Study of the different parts of a theodolite.
 - ii. Reading of horizontal and vertical angles.
 - iii. Traversing and plotting by gales method.
 - iv. Testing and adjustment of a theodolite.
2. Determination of theodolite constants.
3. Determination of height of an inaccessible point by tachometric survey.
4. Determination of distance between two inaccessible objects (base line method)
5. Exercise on tachometric contouring.
6. Base line measurement.
7. Triangulation of small area.
8. Maintaining the grade of roads by grade peg method.
9. correlation by single shaft and double shaft or incline.
10. Setting out curves.
11. Stop surveying by the method of tape triangulation.
12. stop surveying by tying in the method.
13. Study, sketch and use of a planimeter.
14. Study and preparation of a mine plan per mining regulation.
15. Determination of azimuth of line by method observing a star at equal altitude.
16. Different problems on dip, faults and outcrops of a bed.
17. Study of G.T. sheets and laying out.

18. Surveying of small quarry.

REFERENCE BOOKS:-

- | | |
|--|----------------|
| 1.Surveying vol.II&III | By- B.C.Punmia |
| 2.Metalliferrous Mines
regulation 1961. | By- Wini berg |
| 3.Metalliferrous Mine
Surveying. | ---do----- |
| 4.Answer to papers Mine
Surveyor's nundation
of nundation examination. | By- D.K.Jain |
| 5.Mine Surveying vol.III | By- S-Ghatak |

5.5 MINING MACHINERY-II

L	T	P
4	-	4

RATIONALE :

The diploma holders in mining engineering are expected to know about various types of wires ropes, winding system and mineral handling at pit top and pit bottom

The course content of the subject will provide him basic knowledge and skills about various types of wire rouples winding systems and pit top and pit bottom layouts, mine fires and nundation.

The teachers while teaching are supposed to give practical examples relating to mining fields.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Wire Ropes	14	-	--
2.	Winding	14	-	--
3.	Full Face borers For Tunnels, Raises and Shafts	14	-	--
4.	Mine Pumps & Fans	14	-	--
		56	-	56

1. WIRE ROPES :

Types, construction and use, care and maintenance , rope splicing .

2. WINDING :

Types of winding system- drum winding and friction winding .
shaft fittings- signals , guides, catchplate, keps, tilting platform, cage receivers , winding drums, drives. Fitting of Winding engines - brakes, depth indicator, automatic contrivance, friction sheave, suspension gear, cages and skips , multilevel and deep winding.

3. FULL FACE BORERS FOR TUNNELS, RAISES AND SHAFTS :

Principle of operation, construction features, their suitability, operation and maintenance of boring machines.

4 MINE PUMPS AND FANS :

Types , construction and characterstics of mine pumps and fans .
Installation of mine pumps and fans.

List of Practicals

1. Capping and recapping of wire ropes.
2. Study different types of safety hooks
3. Suspension of nipes and cables in the shaft
4. Pit top layouts.
5. Pit bottom layouts
6. Various types of water dams.

REFERENCE BOOKS :

1. Elements of Mining Vol-III By D. J. Deshmukh
2. Mine Fires, Explosion, Recovery and Innundations. By M. A. Ramlu.
3. Water Problems in Mines By Rakesh & M. C. Lele
4. Mine Disasters in india VOL I & II By National Council of Safety in Mines
5. Combating coal fires By Dr. B. Singh
6. Mining of Coal By S. Ghatak

5.6 MINE LEGISLATION AND GENERAL SAFETY-1

L	T	P
4	-	4

Rationale

The diploma holders in mining Engineering will be responsible for the development of mine maintaining proper environmental conditions in open cast and underground mining.

The course content of the subject provide him basic knowledge and skills about mine environmental engineering i.e.heat and humidity in mines,mine gases ventilation and lighting.The teachers while teaching are supposed to give practical examples of environmental conditions of various working in India and typical world examples and visits of mine sites.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Heat and Humidity in Mines and General Conditions.	12	-	-
2.	Mine Gases	12	-	-
3.	Ventilation	12	-	-
4.	lighting	12	-	-
5.	Dust	8	-	-
		56	-	56

1. Heat and Humidity in Mines and General Conditions:

Geothermal-gradient, humidity its determination and effect, kata thermometer, effects of heat and moisture in mine absolute and relative humidity, dew point, determination of humidity, hygrometer. Control of temperature and humidity in deep mines, air conditioning in mines.

2. Mine Gases

Mine atmosphere, requirements of breathing air mine gases, their physical and chemical properties, physiological effects; detection of gases by flame safety lamps, gas detection equipment their working and up keep.

3. Ventilation :

Natural and artificial ventilation, distribution and coursing of air currents, law of air flow, equivalent orifices; measurement of air flow by anemometers and volume resistance and power required; construction of stoppings, air crossing and doors; leakage and its prevention, mine fans main, auxiliary and booster type - their construction and uses reversible arrangements, splitting of air currents; simple numerical problems; time for clearing noxious gases, principles of ventilation survey.

4. Lighting :

Various types of flame and electric safety lamps their working and maintenance; lamp rooms - design and organisation standard of illumination, illumination survey, photometry.

5. Dust:

Formation, dangers, dust sampling apparatus, preventive and suppression measures for dust. plantation techniques in different forest areas, national parks and water sources.

LIST OF PRACTICALS

1. Study and sketch of whirling hygrometer and determination of relative humidity.
2. Study and use of katabatic thermometer.
3. Testing of methane with flame safety lamps.
4. Study of anemometer and velometer and to make readings to calculate air flow.
5. To study P.S. Carbonmonoxide, detector.
6. To study Mc Luckie's methanometer and gas detector.
7. To study different types of flame safety lamps.
8. To study a standard lamp room layout.
9. Study of principal types of mine fans with layouts for regulation of air current.
10. Study of a cap lamp.

REFERENCE BOOKS :

1. Mine Environmental Engg.
2. Elements of Mining Vol. II

By G. B. Mishra

By D. J. Deshmukh

6.1 ROCK MECHANICS

L	T	P
6	-	6

RATIONALE :

The diploma holders in mining engineering will be responsible for stability of underground construction and to design a safe opening in mine.

Dimensional stone technology has been gaining popularity for the past few years and diploma holder in mining is liable to know different methods of mining barble, grainite/sandstone, etc. and subsequent processing of these stones.

Course content of the subject covers study of rock properties, strength and their behaviour under static and dynamic loading.

Alos it includes detail knowldege of various method of mining dimensioal stone, processing machine, cutter, dresser, etc. While teaching teachers should arrange visit for nearly by stone mines for practical demonstration.

In lavioratory they should arrange for study of rock properties and determining their strength.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	10	-	-
2.	Mechanical Properties of rocks	10	-	-
3.	Failure criteria	10	-	-
4.	Slope stability	10	-	-
5.	Instrumentation	12	-	-
6.	Rock fragmentation	12	-	-
		84	-	84

1. Introduction:

Role & status of rock mechanics in mining, rock properties, preparation of cut specimen.
analysis of strss, strain & constitutive relations in isotropic & anisotropic rocks.

Rock Indices:-Specific gravity,hardness porosity, moisture content,permeability, swell index.slake durability, thermal conductivity.

2. Mechanical Properties of rocks

Compressive,tensile & shear strength, modulus of elasticity,poisson's ratio and traxial strength.
determination of in-situ strength & in-situ stresses.
Rheological models and time dependent properties of rocks.

3. FAILURE CRITERIA :

Introduction,mechanics of roch failure, Mohr's general theory failure, griffth's theory.

4. SLOPE STABILITY :

Factors influencing stability of slopes, method of improving estability of slopes, waste dumps. Effect of ground water table on stability.

5. INSTRUMENTATION :

Rock mechanics measurement including strain guages.

6. Rock fragmentation

Mechanics of drilling, ripping & cutting. Mechanics of blasting.Effect of Physico-mechanical properties & discontinuities on rock fragmentation.Ground vibrations.

LIST OF PRACTICALS

1. To determination compressive strength of given specimen.
2. To determine tensile strength of given specimen.
3. To determine shear strength of given specimen.
4. Study of rock behaviour under triaxial loading.

REFERENCE BOOKS :

1. Mining Electronics & Instrumentation B. Singh
2. Mechanical Properties of rock A. Jumkis
3. Rock Slope Engineering Hock & Bray J.W.
4. Experimental Stress Analysis Hames W. Dally,
 William R.Raley
 Pub : Mccraw Hill Book company
5. Mining & Processing of Dimensional Stone Lecture Note for
ISTE Summer School 1991.

6.2 MINE ENVIRONMENTAL ENGINEERING

L T P
6 - 6

RATIONALE :

The diploma holders in mining engineering will be responsible for mining without disturbing the ecosystem and maintaining normal environmental condition within the mine so that target production will be achieved along with safety of the mines and people residing in the near by areas

This subject will provide him basic knowledge about concept and scope of engg. , impact assessment technique , preparation of environmental impact assessment plan, environmental management plan , rehabilitation techniques , pattern of energy consumption in the mining as well as environmental condition within the mine like heat and humidity , mine gases, ventilation and lighting. As far as possible teachers while teaching are supposed to give practical examples of the typical mining fields and expose the students from time to time the actual mining sites.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	19	-	--
2.	Environmental Impact Assessment	19	-	--
3.	Reclamation & Rehabilitation	19	-	--
4.	Dust, air and water pollution	19	-	--
5.	Mines closure plan	4	-	--
6.	Environmental Impact Assessment Of river bed mining	4	-	--
		84	-	84

1. Introduction:

Scope and concept of environmental engg. and mine environmental engg. .

2. Environmental Impact Assessment :

Base line data collection , compilation , interpretation and analysis , various types of approaches , buffer zones . Impact on climatic conditions and sources-heat , humidity, wind , rainfall, dust. Impact on soil , water , air , noise

level , flora , land use pattern and socio- economic survey.

I.S.I. standards of air ,soil, water and noise pollution their control, I.S.I. standards applicable to mines. Acid mine water and drinage and control . Enviromental management plan based on impact assessment.

3. Reclamation and Rehabilitation:

Reclamation of open cast mines with special reference to cast benefit approaches . Land use management plan in mining industry with special reference to cast benefit degradation, reclamation and scaping , utilisation of mine waste , tailing and disposal of waste.

4. Dust, Air and Water Pollution:

Formation, dangers , dust sampling apparatus , preventive and suppression measures for dust . Plantaion techniques in different forest areas , near national parks and water sources. Air pollution-causes and remedies, Water Pollution-causes and remedies,

5. Mines Closure Plan :

Preparation of Mines Closure Plan

6. Environmental Impact Assessment Of river bed mining :

Effect of mining in river bed- impact assessment

PRACTICAL

1. Measurement of niose level of different mining machineries .
2. Determination of vibrations produced by machineries .
3. Determination of pH values of water samples discharged from mines.
4. Measurement of dust particales produced by blast hole drills.
5. Study, sketchand describe the Konimeter.
6. Study,sketch and describe the dust trap.
7. Study, sketch and describe the qeavimeteric dust extractor.
8. Measurement of dust by portable hand held dust extractor.

REFERENCE BOOKS:-

1. Impact of mining on environment By- R.K. Trivedi.
2. Environmental Management of Mining operation By- prof.B.B.Dhar.
3. Environmental Impact of industrial mining activities By- Lalit N.Patnaik.
4. Elements of Mining-II By D. J. Deshmukh

6.3 MINE MANAGEMENT

L	T	P
4	2	-

Rationale:

The knowledge of this subject is required for Mining engineering technicians, but it becomes more important for those technicians who wish to choose mining industry as their career. This course is designed to develop understanding of various functions of mining management.

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Introduction	8	4	-
2.	Management Process	8	4	-
3.	Organisation	8	4	-
4.	Techniques of operations research	8	4	-
5.	Management information system	8	4	-
6.	Human Resource Development	8	4	-
7.	Materials Management	8	4	-
		56	28	-

DETAILED CONTENTS

1. INTRODUCTION :

Evaluation of management thought, Classical theory : Scientific management, administrative theory, Behaviour approach. Non classical theory : Behavioural model. Modern theory : System approach. Total quality management.

2. MANAGEMENT PROCESS :

Planning, organising, directing, motivating, controlling, co-ordinating and communicating. Role of manager. Staffing : Jobs analysis, manpower planning and recruitment. Performance appraisal. Manpower development and planning.

3. ORGANISATION :

Principles of organisation. Departmentation : Levels of management, organisational chart.

4. Techniques of operations researchs:

OR models: PERT and CPM. some applications in mining industry.

5. MANAGEMENT INFORMATION SYSTEM :

Introduction, concepts, design, implementation and case study.

6. HUMAN RESOURCE DEVELOPMENT :

Management, development and training of personnel. Role of human factors, Industrial psychology and sociology. Workers participation, Trade Union

7. MATERIALS MANAGEMENT :

Introduction : purchase and stores management : inventory analysis and control, value analysis.

REFERENCE BOOKS:-

1. Mine's management legislation and General Safety - By S. Ghatak
2. Mine's Rule 1955
3. Vocational Training Rules
4. Crache Rules
5. Mines Rescue Rules 1985
6. D.G.M.S. circular

6.4 MINE LEGISLATION AND GENERAL SAFETY-II

L T P
6 - -

RATIONALE :

The diploma holders of Mining Engineering should know various mines act, rules and their provisions for proper regulation of mine. He should also know about the cause of accidents happening in mine and their preventive measures.

The subject contains detailed knowledge of various mines act, rules and regulation relating ventilation, welfare, opening, methods of work, explosives, mineral concession etc.

Teachers at the time of teaching should quote practical examples of accident occurred in mines, its causes, relating rules regulations and preventive measures taken after that.

TOPIC WISE DISTRIBUTION OF PERIODS

Sr.No	Topic	L	T	P
1.	Introduction	20	-	-
2.	Mineral conservation and development laws	20	-	-
3.	Health & Safety laws	20	-	-
4.	Safety in Mines	24	-	-
		84	-	-

1. Introduction: Mining laws of India; National Mineral Policy.

2. Mineral Conservation and Development Laws

Salient Provisions of the mines and minerals (Regulation & Development) Act 1957; Mineral Concession Rules, and Mineral Conservation and Development Rules, 1988. Salient Provision of Indian Explosive Act and Rules

3. HEALTH & SAFETY LAWS

The Mines Act 1952, The Mines Rules 1955; The Coal Mines Regulations, The Metalliferous Mines Regulations, Mines Rescue Rules, 1985; Additional Provisions of Indian Electricity Rules, 1956, applicable to mines.

4. SAFETY IN MINES

Occupational hazards of mining; Accidents and their classification; Causes and Prevention of accidents. Emergency measures and organisation. Accidents enquiry report. Cost of accidents. Measures for improving safety in mines.

REFERENCE BOOKS :

1. Legislation in Indian Mines Rakesh & Prasad
2. Coal Mines Regulation 1957 Geeta Book Store,
Dhanbad
3. Mining Manual Pub. Dimonion Law
Depot, Dhanbad
4. Metalliferrous Mines regulation-1961 Geeta Book Store,
Dhanbad
5. Explosive Act 1984 Pub. Eastern Book Comp.
Lucknow
6. Indian electricity rules-1965 Geeta Book Store
Dhanbad
7. U. P. Miner Mineral (Concession)
Rule 1963
8. Mines and Mineral Development
And Regulation Act- 1957
9. Mines Act- 1952

6.5 PROJECT

L	T	P
-	-	8

RATIONALE :

Problems related to mine planning will be given during the course work at the start of term students will be sent to various mining organisation to collect the data and specifications of machineries from the mines. Some models/charts related to method of working, operation of machineries shall also be prepared at institutional level. The student will submit the report after completion of examination.

INDUSTRIAL TRAINING :

Industrial training will divided into two terms.

Part I :

During this training student will be sent to open cast, U/G coal and U/G metal mines, for equal duration. The training will be supervised by the faculty member.

Part II :

During this training student will given choice placed training.

STAFF STRUCTURE

Intake of the Course Pattern of the Course		30 Semester Pattern
Sl. No.	Name of Post	No.
1.	Principal	1
2.	H.O.D.	1
3.	Lecturer Mining Engineering	4
4.	Lecturer in Electrical Engg.	1
5.	Lecturer in Maths	1 Part Time
6.	Lecturer in Chemistry	1 OR
7.	Lecturer in Physics	1 Common
8.	Lecturer in Comm. Tech.	1 with
9.	Computer Programmer	1 other discipline

10.	Steno Typist	1	
11.	Accountant / Cashier	1	
12.	Student / Library Clerk	1	
13.	Store Keeper	1	
14.	Class IV	6--	
15.	Sweeper	Part time or as per requirement	
16.	Chaukidar & Mali	as per justification	

Note :

1. Services of other discipline staff of the Institute may be utilized if possible
2. Qualifications of Staff : as per service rule

LIST OF EQUIPMENTS

Only those of the equipments given below which are essentially required for the conduction of practicals mentioned in the curriculum are to be procured by the institutions.

"Machine/Equipments/Instruments of old BTE list which are not included below are to be retained in the Lab/Shop for Demonstration purpose but not to be demanded fresh for purchase."

NOTE : Equipment for different shop and lab of latest version should be purchased.

I. APPLIED PHYSICS LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Brass ball with hook dia 1.8 Cm to 2 Cm diameter	2	50	100
2.	Stop watch least count Least Count 0.1 Sec. (non-magnetic) 0.01 sec to 0.001 sec (Electronic Desirable)	4	750	3000
3.	Wall bracket with clamping arrangement 8" to 10" length	2	50	100

4.	Meter scale Least count 0.1cm, wooden 1meter	5	40	200
5.	Meter scale Least count 0.1cm, wooden 50 Cm	5	40	200
6.	Searl's conductivity apparatus with copper & steel rods 25 cm length 4 cm.diameter with all accessaries	2 set	1500	3000
7.	Constant Level Water Flow Container of one liter capacity vertical stand & rubber tubing	2	250	500
8.	Thermometer 0-110oC(Least count 0.1oC desirable)	4	100	400
9.	Potentiometer - 10 wires (1 meter length of each wire) with jockey, sunmoical top	4	750	3000
10.	Moving coil galvenometer 30-0-30 with moving mounting	5	300	1500
11.	Rheostat 50 ohm., 100 Ohm., 150 Ohm.16 capacity	2	300	4800
12.	Lead Accumulator 2V, 6V (1 No.Each)	2	250	500
13.	Meterbridge 1 meter length, sunmica top copper strips fitted with scale	2	300	600
14.	Resistance Coil (Standard) 1 ohm. to 10 ohm.	10	50	500
15.	Moving coil ammeter 0-1 amp., 0-2 amp., 0-5 amp. with mounting	8	250	2000

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
16.	Moving coil voltmeter 0-1 V., 0-2V 0-5 V., 0-10 V. with mounting	8	250	2000
17.	Denial cell with complete accessories	2	250	500
18.	Leclanche Cell with complete accessories	2	250	500
19.	Standard Cadmium Cell with complete accessories	2	250	500
20.	Battery Charger with complete accessories	1set	1800	1800
21.	Battery Eliminator Multi range	2set	750	1500
22.	Multimeter(Digital)	1set	800	800
23.	Carey Foster Bridge (With all accessories)	2set	4500	9000
24.	Resistance Box (2 No. Each) 0-1 Ohm, 0-100 Ohm.	4	850	3400
25.	Fractional Resistance Box 0-1 Ohm.	2	1200	2400
26.	Post office box Key type	2	1200	2400
27.	Post office box Dial type	2	1200	2400
28.	Resistance Wire(100 Gm.) (Constanton/Maganin)	1 lacchi	100	100
29.	Connecting Wire Copper(1/2 Kg.) (Cotton Insulated)	1 lacchi	700	700

30.	Screw gauge L.c 1/100 mm	5set	150	750
31.	Vernier Callipers L.c. 1/10 mm	5set	100	500
32.	Appratus for determining characteristics of P-N junction diode complete with all accessories	2 set	1500	3000
33.	Resonance Column of steel One Meter length and 3-4 Cm diameter fitted with scale & water level arrangement	2	1600	3200
34.	App. for determining coefficient of friction on a horrizontal plane (Complete with all accessories)	2 set	700	1400
35.	Tuning Fork's Sets Set of differnt frequency (with rubber pad)	3set	350	1050
36.	Physical balance with weight box Complete with Fractional weight	2	800	1600
37.	Anemometer with counter cup type	1	1000	1000
38.	Spring Force Constant Apparatus with graduated mirror & pointer, weight set with hanger	2	1200	2400
39.	Viscosity Apparatus (Stock law) with steel balls and viscous liquid & timer	2set	1600	3200
40.	Thermometer of different range Mercury thermometer 0-50oC to 0-110oC	10set	100	1000
41.	Wall Thermometer Alcohah Filled 0-50oC	2set	20	40

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
42.	Sprit Level Technical Type	1set	60	60
43.	Drilling Machine Electric with different size bits	1set	800	800
44.	LPG Gas Burner with Cylinder	1set	800	800
45.	Tool Kit with different tools Complete	1set	800	800
46.	Lab stools	30		
47.	Lab tables	8		
48.	Plug Keys One Way	5	50	250
49.	Plug Keys Two Way	5	100	500
50.	Helical Springs - Soft, 10 cm each	6	100	600

II. APPLIED CHEMISTRY LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Test tube stand (Plastic/Tafflon)	30	20	600
2.	Funnel stand (Plastic/Tafflon)	30	20	600
3.	Burette stand Stainless Steel/Wooden/Iron	30	50	1500
4.	Pipette stand Stainless Steel/Wooden/Plastic	30	20	600
5.	Chemical balances with analytical weights 1gm -200gms	5	1500	7500
6.	Fractional weights set with rider 10 mg to 500 mg with rider	5sets	25	125
7.	Kipp's apparatus 1000 ml. Plastic/ Tafflon	2	500	1000
8.	Reagents bottles			
	250ml	120	20	2400
	500ml	25	25	625
	1000ml	5	30	150
9.	Wide mouth bottle 250 ml Glass	50	15	750
10.	Winchester bottle 2.5 litre Plastic/Tafflon	15	30	450
11.	Test tubes 1/4" x 6"			
	i. Corning or Borosil	200	9	1800
	ii. Glass	200	2	400
12.	Boiling tube 1" x 6"			
	i. Corning or Borosil	100	16	1600
	ii. Glass	100	5	500
13.	Pestle and mortar Dia 10 cms 15 cms (Ceramics)	2	30	60
14.	Watch glass 5.0 cms, 7.5 cms glass	15	5	75
15.	Beakers (Glass/Brosil/Corning Plastic)			
	250 ml.	50	20	1000
	500 ml.	50	20	1000
16.	Weighing Tube 10 ml with lid (Plastic)	30	10	300
17.	Wash bottles (Plastic/Tafflon)	30	15	450
18.	Conical flask 250 ml. Glass (Brosil/Corning/Plastic) Transparnt	100	30	3000
19.	Flat bottom flask 500 ml. Glass	15	40	600
20.	Flat bottom flask 250 ml. Glass	15	25	375
21.	Burette 50 ml. (Plastic/Tafflon)	30	60	1800
22.	Pipette 25 ml. (Plastic/Tafflon)	30	20	600
23.	Measuring flask 250 ml. with stopper	30	50	1500
24.	Measring cylinder of various sizes (100 ml, 250 ml, 500 ml, 1000 ml) 3 no. of each	12	30	360
25.	Bunsen's burner of brass	30	50	1500
26.	Gas plant petrol/LPG 10 to 20 burners automatic	1	5000	5000
27.	Spirit lamp (Brass)	30	30	900
28.	Tripod stand (Steel/Iron) Large/Medium	30	30	900

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
29.	Wire gauge 15 X 15 cm. with asbestos	30	15	450
30.	Test tube holder wodden	50	10	500
31.	Porcelain plates Ceramic	30	20	600
32.	Funnel 15 cm. Glass Borosil Corning/Plastic	60	16	960
33.	Spatula hard & nickel/steel	2 each	50	100
34.	Distilled water units (electrical)	1	10000	10000
35.	Distilled water units (solar)	1	5000	5000
36.	Open balance 1000 gms./10 mg.	1	600	600
37.	Brush for cleaning Hydro Fiber Acid & Alkali Resistant	100	10	1000
38.	Jars 20 Lit. for keeping distilled water	5	100	500
39.	Lab table 2 m. x 1.2 m. x 1 m. hight with central sink and cup boards (Teak wood) with drawers and two built in almirah on each side with reagent racks, better tile top	4	8000	32000
40.	Exhaust fans 18" (GEC make/Crompton)	4	2000	8000
41.	Side racks and selves for bench reagents made of teak wood for 24 bottels each set	4	2000	8000
42.	Digital balance electronic Electronics upto 2 decimal places	1	10000	10000
43.	Hot plates 7-1/2", 3" dia controled 2000 watts	1	1000	1000
44.	Hot air oven thermostatically controled with selves and rotary switches 350 x 350 x 25 high	1	8000	8000
45.	pH Meter (Digital)	1	1000	1000
46.	Glass Electrode	2	850	1700
47.	Reference Electro	2	850	1700
48.	Weight Box 1gm,2gmX2, 5gm,10 gm 20gmX2, 50gm, 100gm with for cep Miscellaneous	LS		15000

III. APPLIED MECHANICS LAB

Sl.No.	Name of Equipment	No.	Rate	Amount
1.	Polygon of Forces Apparatus	4	1500	60000
2.	Universal Force Table	2	2500	5000
3.	Principle of Moment Apparatus Bell Crank lever	4	1500	60000
4.	Combined Inclined plane & Friction apparatus	4	1500	60000
5.	Simple wheel and axle	2	2500	5000
6.	Differential wheel and axle	2	3500	7000
7.	Double sleeve Pulley Block	1	800	800
8.	Simple Screw Jack	4	3000	12000
9.	System of pulleys (Any I,II,III)	2Set Each	4000	8000
10.	Worm & Worm wheel	2Set Each	5000	10000
11.	Simply Support Beam with different weights (2 Sets)	2	3000	6000
12.	Jib Crane	2	2500	5000
13.	Jointed Roof Truss Apparatus	2	2500	5000
	Misc.	Lum Sum		5000

Note :

1. S. No. 1,2 Acrylic/Wood material/Aluminium Cast
2. S.No. 3,4,5,8,9 working model of Acrylic/Aluminium/Cast
3. Above items are for 2 batches of 15 students each.

ELECTRICAL TECHNOLOGY & ELECTRONICS LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	D.C. Shunt Motor 3 Kw. 1500 RPM with 3 Point Starter.	2	10000	20000
2.	D.C. Compound Motor 3 Kw. 1500 RPM	2	10000	20000
3.	Single Phase Transformer 1 KVA 50 Hz. Primary Voltage 230 with tapping at 50%, 86.6 % Facility	2	6000	12000
4.	3 Phase Induction Motor 415 V., 50 Hz, 440 RPM, 3 KVA Star/Delta/Autotransformer Starter.	2	5000	10000
5.	Loading Drum Spring Balance & Belt Arrangement.	2 Set	1000	2000
6.	Tachometer (Analog/Digital)	1	2000	2000
7.	3 Phase Inductive Loading of Variable Nature	1	8000	8000
8.	Single Phase Inductive Loading Variable 0-10 Amp., 50 Hz.	1	8000	8000
9.	Moving Coil Ammeter 0-10 Amp.	8	1000	1000
10.	Moving Coil Voltmeter 0-300 V.	8	1000	8000
11.	Moving Iron Ammeter 0-10 Amp.	8	1000	8000
12.	Moving Iron Voltmeter 0-300 V.	8	1000	8000
13.	Wattmeter Single Phase Dynamo Type 75/300/600 V. 2.5/5 Amp.	4	2500	10000
14.	Three Phase Variable Inductive Loading.	1	8000	8000
15.	Single Phase Variable Inductive Loading with Rheostat.	1	8000	8000
16.	Megger 0-20 Mega Ohm, 500 RPM .			
17.	Flouroscent Tube With Choke.	1	100	100
18.	SCR Bread Board	1	1000	1000

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
19.	Power Supply 230 V.	1	1000	1000
20.	Moving Coil Ammeter 0-500 M.A.	1	1000	1000
21.	Moving Coil Voltmeter 0-250 V.	1	1000	1000
22.	Energy Meter Single Phase 230 V., 5 Amp	1	2000	2000
	Misc.		LS	1500

Note:

1. Above items are for 2 batches of 15 students each.

V. WORKSHOP TECHNOLOGY

CARPENTRY SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	60 cm.rule	10	50	500
2.	Flexible steel rule 2 metre	2	75	150
3.	T square 23 cm. steel	10	50	500
4.	Bevel square 23 cm. steel	2	100	200
5.	Marking knife 25 cm. steel	10	100	1000
6.	Marking gauge wooden & brass 25 cm.	10	150	1500
7.	Mortise gauge wooden & brass 25 cm.	10	150	1500
8.	Caliper inside, steel 20 cm.	2	200	400
9.	Caliper outside , steel 20 cm.	2	200	400
10.	Compass steel 20cm.	2	100	200
11.	Devider steel 20 cm.	2	100	200
12.	Plumb	2	75	150
13.	Wooden bench vice steel 20 cm.	10	500	5000
14.	Bench hold fast steel 30 cm.	10	300	3000
15.	Bar clamp 2 m.	2	500	1000
16.	G clamp of flat spring steel 20x30 cm.	4	150	600
17.	Rip saw 40-45 cm.	10	200	2000
18.	Cross cut saw 40-45 cm.	2	200	400
19.	Tennon saw 30-35 cm.	10	200	2000
20.	Dovetail saw 30-35 cm.	2	150	300
21.	Compass saw 35 cm.	4	150	600
22.	Key hole saw or pad saw 30-35 cm.	2	150	300
23.	Bow saw	2	200	400
24.	Frame saw	2	200	400
25.	Chisel fish brand 1" to 1/8" firmer	3 set	250	750
	Dovetail	3 set	250	750
	Mortise	3 set	250	750
26.	Gauge or Golchi 1" to 1/8"	3 set	300	900
27.	Wooden jack plane complete	10	100	1000
28.	Wooden smoothing plane	10	250	2500
29.	Iron jack plane complete	10	200	2000
30.	Iron rebate plane complete	3	200	600
31.	Iron grooving plane complete	3	300	900
32.	Iron compass plane complete	3	350	1050
33.	Wooden moulding plane complete	3	500	1500
34.	Bradawl	3	350	1050
35.	Gimlet drills set	1 set	300	300
36.	Center bit	2	250	500
37.	Twist bit	2	200	400
38.	Auger bit	2	200	400
39.	Dovetail bit	2	200	400
40.	Counter shank bit	2	200	400
41.	Ratchet brace machine	2	300	600
42.	Grand drill machine 1/4"	2	600	1200
43.	Wooden hand drill burmi	5	700	3500
44.	Wooden mallet	10	100	1000
45.	Claw hammer	3	100	300
46.	Carpenters hammer	10	100	1000

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
47.	Cutting tool for Universal wood working machine	3 set	1500	4500
48.	Screw driver 18" & 15"	6	100	600
49.	Adze 500 gm.	10	100	1000
50.	Pincer 175 mm.	6	250	1500
51.	Plier 150 mm.	4	200	800
52.	Oil stone 8"	4	180	720
53.	Rasp file 12"	4	200	800
54.	Half round file 12"	4	200	800
55.	Round file 12"	4	200	800
56.	Triangular file 5", 4"	8	200	1600
57.	Water stone	4	80	320
58.	Carpentry work benches	4	4000	16000
59.	Band saw machine complete	1	60000	60000
60.	Circular saw machine	1	35000	35000
61.	Double Ended Electric Bench grinder	1	15000	15000
62.	Universal wood working machine	1	30000	30000
	misc. for foundation of machines	LS		20000
SHEET METAL, SOLDERING & BRAZING				
1.	Dividers - 15cm.	5	100	500
2.	Trammel 1 m.	1	80	80
3.	Angle protector	5	100	500
4.	Try square 30 cm.	5	80	400
5.	Centre punch	5	50	250
6.	Steel rule 30 cm. , 60 cm.,	5	25	125
7.	Sheet metal gauge	1	250	250
8.	Straight snips 30 cm.	2	500	1000
9.	Curved snips 30 cm.	2	600	1200
10.	Bench shear cutter 40 cm.	1	10000	10000
11.	Chisel 10 cm.	5	200	1000
12.	Hammer	5	300	1500
13.	Bench vice 13 cm.	5	2000	10000
14.	Plier	5	100	500
15.	Nose plier	5	120	600
16.	Sheet metal anvil/stakes	5	3500	17500
17.	Shearing machine 120 cm.	1	5000	5000
18.	Solder electric	2	1000	2000
19.	Solder furnace type	2	500	1000
20.	Brazing equipments and accessories	1	10000	10000
21.	Blow lamp	2	400	800
22.	Sheet bending machine	1	20000	20000
	Misc.	LS		10000

FITTING SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Bench vice jaw 10 cm.	10	600	6000
2.	Surface plate 45x45 cm.	2	4500	9000
3.	V. Block 10x7x4 cm.	5	700	3500
4.	Try square	10	100	1000
5.	Bevel protractor 30 cm.	1	250	250
6.	Combination set	1	3000	3000
7.	Divider	5	100	500
8.	Centre punch	5	80	400
9.	Calipers (Different sizes)	12	100	1200
10.	Vernier calipers 30 cm.	2	1500	3000
11.	Micrometer 0-25, 25-50 m.m.	4	1500	6000
12.	Vernier depth gauge	1	700	700
13.	Feeler gauge--15 blades	1	100	100
14.	Radius gauge	1	200	200
15.	Angle gauge	1	200	200
16.	Thread gauge	1	200	200
17.	Bench drilling machine 13 mm.	1	10000	10000
18.	Double ended electric grinder	1	8000	8000
19.	Drill set	1set	2000	2000
20.	Reamer set	1set	3500	3500
21.	Tap set	1set	3500	3500
22.	Adjustable wrenches (15 cm., 20cm. 30 cm.)	1set	1200	1200
23.	Allen key set	1set	700	700
24.	Spanners	6	100	600
25.	Work benches	6	4500	27500
26.	Power hacksaw	1	8000	8000
	Misc. Files, Dieset, Hexa frames etc.		LS	20000

WELDING SHOP

1.	Ellectric welding set oil cooled	1	20000	20000
2.	Industrial regulator type oil cooled arc welder	1	25000	25000
3.	Air cooled spot welder 7.5 KVA	1	30000	30000
4.	General accssories for air cooled spot welder of 7.5 KVA			15000
5.	Gas welding set with gas cutting torch and complete with all accessories	1	30000	30000
6.	Misc. work benches		LS	35000

PLUMBING SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Pipe vice 5 cm.	4	500	2000
2.	Chain wrenches	5	500	2500
3.	Ring spanner Set	5	250	1250
4.	Wheel pipe cutter	2	600	1200
5.	Water pump plier	4	100	400
6.	Pipe die set 2" set	2 set	1200	2400
7.	Pipe bending device	1	5000	5000
8.	Work benches	4	6500	26000
9.	Set of various types of plumbing fittings e.g. Bib cock		LS	4000

Cistern, Stop cock, Wheel volve,
Gat volve etc.
10. Misc. Hacksaw frame and others LS 4000

INTRODUCTION TO COMPUTER (Common to all Trades)

COMPUTER CENTRE

S.No.	DESCRIPTION	QTY.	APPROX. COST (in Rs.)
1.	Core-2 Quad Processor, 4GB RAM 1 GB SATA HDD, 19" TFT Monitor/ Server of Latest Specification OS-Windows 2007/2008/Latest Version	02 Server	1,20,000=00
2.	General Desktop Computer-Intel i5 60 node or Higher(with latest Specification Pre loaded latest Anti Virus with Life time Subscription, Licence Media and Manual with UPS 660 VA with latest window OS Including licence OR Computer of latest Specification With latest window os including licence		36,00,000=00
3.	Software :((Latest Version)		
	i. MS OFFICE 2010/Latest Version		LS LS
	ii. COMPILER 'C', C++, JAVA-7		LS LS
4.	Hardware		4,50,000.00 LS
	i. Switch-32 Port		02
	ii. Router		02
	iii. Hub		04(8 Port)
	iv. Ext. Modem		02
	v. Wireless N/W Adaptor		02
	vi. Series Access Point		02
	vii.LAN Cable Meter		05
	viii. LAN Cable Analyzer		05
	ix. Crimping Tool		15
	and all other accessories related to Networking		
5.	Scanner- Flat Bed A4/Auto Lighter (Bit depth 48)		02 20,000
6.	132 Column 600 CPS or faster 9 Pin dot matrix printer with 500 million character head life		02 50,000
7.	Laser Jet-A4 All In one 20 page per min (2 Each)		04 50,000
8.	Desk Jet-A4 Photo Smart (2 Each)		04 40,000
9.	5 KVA on line UPS with minimum 30 minute battery backup along with sealed maintenance free batteries. Provision for connecting external batteries with network connectivity.(For 2 Labs)		04 8,00000

10.	Split Air Conditioner 1.5 tones capacity with ISI mark along with electronic voltage stabilizer with over voltage and time delay circuit	08	35,0000
11.	Room preparation and furniture	LS	
12.	19" rack, 24-port switch. connector RJ-45 Cat-6 cabling for network	LS	10,0000
13.	2 KVA Inverter Cum UPS	02	6,0000
14.	Fire Extinguisher (2 Kg.)	04	15000
15.	Fire Extinguisher (5 Kg.)	04	25000
16.	Vacuum Cleaner	02	25000
17.	LCD Projector 3000 Lumen with all Accessories	02	350000
18.	Pen Drive 16 GB	10	10000
19.	DVD Writer External	02	10000
20.	HDD External 500 GB	02	15000
21.	PAD (Latest Configuration)	02	15000
22.	Broadband For Internet (Speed Min. 8mbps)	04	LS
23.	USB Modem	02	8000
24.	Generator 15 KVA Water Coolant	01	450000

MINE SURVEYING LAB

A. Linear Measuring Instruments

- | | |
|-----------------------|---------------------|
| 1. i) Metre Chain | -30 |
| ii) Gunter's Chain | -66 ft |
| iii) Engineer's Chain | -100 ft |
| 2. Steel Band | -200 ft |
| 3. Tape | |
| i) Inver Tape | -30m, 50m |
| ii) Steel Tape | -30m |
| iii) Metallic Tape | -30m |
| 4. Arrow | -40cm. (each) |
| 5. Wooden Peg | -15cm (each) |
| 6. Ranging Pole | -1.8m, 4m, 6m |
| 7. Off Set Rod | -3m |
| 8. Plumb Bob | -500gm, 100gm, 50gm |
| 9. Optical Square | |
| 10. Spring Balance | |

B. Compass

- i) Prismatic Compass

C. Theodolite

- i) Vernier Theodolite
- ii) Microptic Theodolite
- iii) Wild T2

D. 1. Level

- i) Dumpy Level
- ii) Tilting
- iii) Precise Level

2. Levelling Staff

- i) Inver Precision Levelling Staff
- ii) Telescope Levelling Staff

E. Dial

- i) Microptic Dial
- ii) Miner's Dial

F. Tacheometer

- G. i) Plane Table with Stand
 - ii) Alidade = metal (brass or gunmetal) or box wood straight edge or ruler = 50 cm long
- or
- iii) Microptic Alidade
 - iv) Trough compass or a circular box compass with two double tubes at right angle to each other mounted on a square base plate.
- or
- v) Sprit level (2" x 1/2" x 1/2")
 - Plumbing fork or U frame

- H. i) Planimeter (Determining the area of a given figure or plan area)

or

- ii) Electronic planimeter

I. Box Sextant

J. Clinometer's (Indian pattern clinometer)

K. Abney Level

L. For Enlarging and Redusing plan

- i) Proportional Compass
- ii) Pentagraph
- iii) Edeograph

M. Thermometer

-(00-50C0, 0C0-100C)

Drawing Instruments

1. Drawing Board

2. T. Square

3. Drawing Instrument Box

4. Beam Compass

5. Straight Edge (steel)

7. Engineering Scale

8. Diagonal Scale

9. Parallel Ruller

10.Protector

11.Set Square

12.Off Set Scale

13.Acre Comb

Geology Lab

1. Horse Shoe Magnet
2. Geological Hammers
3. Mineral showing optical characters
4. One set of 60 minerals showing colour luster 1"x1"
5. Blow pipe equipment consisting 28 items of apparatus
6. Crystal Models of wood approx. 3"x5"
7. Geological map of Jharia coal field
8. Geological Raniganj coal field
9. Geological map of India
10. Geological Bihar and Orissa
11. Clinometer compass
12. Steel yard balance
13. Magnifying Lens
14. Contact Goniometer
15. Typical Indian Rock 4"x 3"
16. Indian mineral specimen trimmed 3"x2"
17. Mineral of the Mohs hardness in box
18. One set of 14 Nos. wooden models
19. Steel yard Balance
20. Polarizing microscope with optical equipment
21. Quartz wedge code word
22. Mica Plate Kometer
23. Structure & form collection of 30 minerals
24. Cleavage collection of minerals
25. Minerals in industry
26. Spring balance
27. Models showing set of fields
28. Igneous rocks
29. Important vertebrate fossils'
30. Microsection of important mineral
31. Micro set of important rocks
32. Prospecting Hammer with chisel end 2
33. One set of 10 Nos. of fault models Type 'b' in diff. colours wood
34. Rocks-granodiorite, pyroxinite olivine, basalt, arkose, gneiss
35. Minerals-Labradorite
36. Minerals size 3"x2"- inter red
37. Albite 3"x2"
38. Microcline 3"x2"
39. Sodalite 3"x2"
40. Biotite 3"x2"
41. Phlogopite 3"x2"
42. Ilmenite 3"x2"
43. Limonite 3"x2"
44. Malachite 3"x2"
45. Mineral-Lepidolite 7x5cm specimen
46. Specimen Mineral lignite 7x5 cm
47. Specimen Mineral peat 7(5 cm
48. Silver ore 7x5 specimen
49. Specimen Mineral gold quartz 7x5
50. Rock specimen 4"x3" approx. granite Singhlihum
51. Seynrite 4"x3" approx.
52. Diorite 4"x3" approx.
53. Gabbro c.g. 4"x3" approx.
54. Peridotite 4"x3" approx.
55. Nephelene Syenite 4"x3" approx.
56. Dumite 4"x3" approx.
57. Lamprophytes 4"x3" approx.
58. rhyolite pink pavgahd 4"x3" approx.
59. Dacite 4"x3" approx.

60. Truchite 4"x3" approx.
61. Decon Trap Rock.- 4"x3" approx
62. Inter Trappean Rock 4"x3" approx.
63. vindhyan sandstone 4"x3" approx.
64. sand stone 4"x3" approx.
65. Kaimur sand stone 4"x3"approx.
66. Phylite 4"x3" approx.
67. Makrana marble (white) 4"x3" approx.
68. Slate (kangra) 4"x3" approx.
69. specimen of mineral 7.5x5 cm. approx.
70. Rocks 10x7.5 cm. approx.
limestone, trachyte, Syenite, bronzite, pyroxenite, Basalt
with zeolites.
71. printed blank labels- 4"x3" and 3"x1".

Rock Mechanics Lab

1. Core drilling machine
2. Cutting Machine with diamond saw.
3. lapping machine.
4. Universal testing machines of different capacities.
5. Direct shear apparatus.
6. point load strength test apparatus .
7. Prot dia Konov apparatus.
8. Slake durability apparatus.
9. Porosimeter
10. Electric oven
11. Hydraulic pump.
12. Physical balance.
13. strain indicator with strain gauges.
14. Center hole hydraulic jack.
15. Vibration monitor.
16. Rebound hammer.
17. Extensometer.
18. Load cell.

Mining machinery and Mining technology lab

1. Miners safety helmets.
2. Mask dust trap complete with filter bag.
3. Spare Filter bag to above.
4. pen Knives
5. Walker Steel Yard Balance with well polished wooden case.
6. miners safety hats.
7. Diamond drill rods.
8. Siemens Drill 280 r.p.m.
9. Pick Boxes.
10. Chain links
11. Rivet bush and rivet pins.
12. Cutter picks
13. set screws
14. suction hose.
15. E rod spear ,E rod recovery tap, E rod coupling tap

- +16. 24" pipe wrench
17. Siskol Bit Grade M for coal
18. Siskol Bit Grade M for stone
19. Diamond drill rod 2'-3"
20. AXL starting core barrel 1.5".
21. EXL Bit & shell recovery tap.
22. AX cross chopping Bit.
23. AXL Block Bit
24. EXL Block Bit
25. M & C 3 puller with 5" dia roller including board for 18" belt.
26. AX Double Type Slojvel type core barrel 10 long
27. AX casing with coupling 5' long
28. AX Flush coupled casing with coupling 10' long
29. AX casing shoe
30. Sylvester pit prop with draver complete with 3ft.
31. Pikrase size L 5HP 400/440 VHTs
32. M.S. coal tub 4'X3'X3'
33. K.E.W. make wheels
34. Friction Roller with block
35. Jim crow for 24 lbs rails

36. Tub-Re Railer (R.H. & L.H.)
37. Coricoddia type PB 3/
38. AB-10 Air circuit Breaker
39. Non-HP circuit Breaker type
40. Barker Daries wiriding rop cappel
41. 16" sheare pully Block
42. Cromrl well Miners safety size 7 1/8
43. Meco chock release 6"X30"
44. Little Demon Magneto L.T.
45. M.E.6 Battery type Explore
46. Victor Midget Gate end box 440 volt.
47. Birams Air Meter.
48. combined pivot & static tube overall.
49. Whirling Hygrometer.
50. Leather Sling Case.
51. Celsins Tables.
52. Standard Kata.
53. Victors.
54. Blagdon Durham Manually.
55. Downtx Duke.
56. Anderson Boyes CH4/E.
57. Hydraulic Burster.
58. Hydraulic Pump Complete with Tools.
59. 2 ft.& 4'6" long special section drill rod.
60. 15' length-1/4" bore hose.
61. 3.5" dia cutter head with pilots.
62. Split shank drilling bits with core type.
63. Set of tools for siemer drill.
64. Velox mines approved electrical safety torch.
65. Projection lamp 750W,115V for 16mm projection.
66. Sound Lamp 3/4 amps 4V for 16mm projection.
67. Combrian Flint Relights lamp type No-4,6 & 8.
68. 10 Type Charger
69. 10 Type Frame.
70. Leather Belts-36",42"& 48".
71. G-W Cap Lamps.
72. Bed ford JYE- 179" WB chassis channel
73. Yorkshire patent star model 2c Haulage
74. MSA all purpsoe work gloves
75. Flap
76. Winding rope socket
77. Dust Mark Respirator
78. Assembly of roof Belts of different type
79. Rock Drills
80. lubricator
81. hose pipe of 3/4"
82. Pusher Leg
83. Drill rod
84. Pneumatic pick bore
85. Detachable Drill Bits
86. Drill steel For bits
87. Tricone Rock roller drill bit with A.P.I. thread
88. Auxiliary Axial mine fan
89. Starter with ammeter and voltmeter
90. Air compressor
91. Air pipe
92. Pressure gauge
93. Electric motor starter
94. Jekey Dustractor CMRS design for jack hammers only
95. Aneroid Barometer open dile
96. Thermadyne velometer, model
97. Kata thermometer
98. Portable Methenometer

- 99. Air nozzle
- 100 Anemometer.
- 101.Flame proof safety lamp.
- 102.Whirling Hygromter
- 103.Haulage couplings
- 104.Haulage Clipes

LIST OF LABORATORY EQUIPMENT(Energy Conservation)

Sr. No	Particulars	Qty	Estimated Cost (Rs)
1.	Multimeter	1	17,000
2.	Power Analyzer	1	20,000
3.	Luxmeter	1	5,000
4.	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25,000
5.	Centrifugal pump, 1 kW	1	15,000
6.	Variable Frequency drive	2	50,000
7.	Water Flow meter	1	10,000
8.	Pressure Gauge	1	2,000
9.	Experimental Set up for Valve Throttling vs VFD	1	50,000
10.	Compressor, 20 cfm, single-stage	1	50,000
11.	Air leakage meter	1	18,000
12.	Blower (2 HP)	1	8,000

7. LEARNING RESOURCE MATERIALS

1.	LCD Projector with Screen	1	--	20000
2.	Handicam	1	--	30000
3.	Cutting, Binding & Stitching equipment.	1	--	30000
4.	Desk Top Computer with Internet Core i5/i7- 760, Processor, Genuine Windiw 7, Professional 18 inch HD, Flat Panel Monitor Optical Mouse, Key Board & all related media or latest version	1	--	40000
5.	Home Theater Support Disc type CD. CDR/CDRW DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3	1	--	25000
6.	Commerical P A System 16 W-220W output, AC & 24V DC Operated, 5 Mic. & 2 Auxilary input, Speaker output 4 Ohm, 8 Ohm, 17 V & 100 V	1	--	20000
7.	Interactive Board	1	--	50000

Note :

1. This center will be only one at the institute level irrespective of all branches.

STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

1. Presentations of Case Studies
2. Debate competitions
3. Poster competitions
4. Industrial visits
5. Visual Aids

COURSE OUTCOMES

After studying this course, a student will be able to co-relate and apply fundamental key concepts of energy conservation and energy management in industry, commercial and residential areas. A student will be able to:

- Define principles and objectives of energy management and energy audit.
- Understand Energy Conservation Act 2001 and its features.
- Understand various forms & elements of energy.
- Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- Identify areas of energy conservation and adopt conservation methods in various systems.
- Evaluate the techno economic feasibility of the energy conservation technique adopted.

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

REFERENCE BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi&Shashank Jain published by TERI. Latest Edition
5. **Important Links:**
 - (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. www.beeindia.gov.in.
 - (ii) Ministry of New and Renewable Energy (MNRE), Government of India. www.mnre.gov.in.
 - (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. www.upneda.org.in.
 - (iv) **Central Pollution Control Board (CPCB)**, Ministry of Environment, Forest and Climate Change, Government of India. www.cpcb.nic.in.
 - (v) **Energy Efficiency Services Limited (EESL)**. www.eeslindia.org.
 - (vi) Electrical India, Magazine on power and electrical products industry. www.electricalindia.in.

ANNEXURE- IV QUESTIONNAIRE

INSTITUTE OF RESEARCH, DEVELOPMENT AND TRAINING U.P. KANPUR -208024

SUBJECT: Questionnaire for ascertaining the job potential and activities of diploma holder in Mining Engineering.

PURPOSE: To design and develop Three Year diploma curriculum in Mining Engineering.

NOTE: 1. Please answer the questions to the points given in the questionnaire.
2. Any other point or suggestion not covered in this questionnaire may be written on a separate paper and enclosed with the questionnaire.

1. Name of the organisation: _____

2. Name & Designation of the officer _____
filling the questionnaire _____

3. Name of the department/section/ _____
shop _____

4. Important functions of the _____
department/section/shop _____

5. Number of diploma holder employees _____
under your charge in the area of Mining Engineering.

6. Please give names of modern equipments/machines handled by a diploma holder in Mining Engineering.

1.	2.	3.
4.	5.	6.

7. What proficiencies are expected from a diploma holder in Mining Engineering.

1.	2.	3.
4.	5.	6.

8. Mention the approximate percentage of the following desired in Diploma teaching.

1. Theoretical knowledge	-----%
2. Practical knowledge	-----%
3. Skill Development	-----%

9. Do you think " on the job training" / Industrial training

should form a part of curriculum. (Yes/ No)

if yes then

- (a) Duration of training -----
(b) Mode of training 1. Spread over different semesters
2. After completion of course
3. Any other mode

10. What mode of recruitment is followed by your organisation.

1. Academic merit
2. Written test
3. Group discussion
4. Interview
5. On the job test.

11. Mention the capabilities/ Qualities looked for while recruiting diploma holder in Mining Engineering.

- (a) Technical knowledge -----
(b) Practical skill -----
(c) Etiquettes and behaviour -----
(d) Aptitude -----
(e) Health habit and social background -----
(f) Institution where trained -----

12. Does your organisation have any system for the survey of Home articles of different countries/States. Yes/No

13. Does your organisation conduct field survey to know users views regarding. Yes/No

1. Home Articles for different age groups and sex.
2. Effect of climatic conditions
3. Any other
If yes ; Please give brief account of each.

14. Which type of assignment do you suggest for an entrepreneur in Mining Engineering.

15. In which types of organisations can a diploma holder in Mining Engineering can work or serve.

- | | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |

16. Job prospects for the diploma holder in Textile Engineering. the next ten years in the state / country.

17. In your opinion what should be the subjects to be taught to a diploma student in Mining Engineering.

Theory Practical

18. Kindly mention particulars regarding topics/areas which should be given more emphasis in the curriculum .

- | | Theory | Practical |
|-----|--|-----------|
| 19. | Kindly state whether your organisation can contribute towards improvement of curriculum in above field.
If yes : Please give names of experts in your organisation to whom contact. | Yes/ No |
| 20. | Kindly give your valuable suggestions for being considered at the time of finalisation of curriculum. | |
| 21. | What changes in technologies are to be incorporated in the development of curriculum in Mining Engineering. | |

(Signature)

Kindly mail the above questionnaire duly filled to:-

Lal Ji Patel
Text Book Officer
Institute of Research, Development & Training, U.P.
Govt. Polytechnic Campus
Kanpur-208024

(Please note that all information in this survey is confidential for the use of curriculum design only)