

Kalinga University Atal Nagar (C.G.)



**SCHEME OF EXAMINATION
& SYLLABUS**

of

Diploma in Mining Engineering

UNDER

FACULTY OF ENGINEERING & TECHNOLOGY

w.e.f. Session 2021-22

Kalinga University, Raipur
Diploma in Mining Engineering
(3 Years Programme) w.e.f 2021-22 Session

SEMESTER -I (Common for all branches)						
Code No.	Paper	Credits	External Marks	Practical	Internal Marks	Total Marks
DIMI101	Communication Skills - I	3	70		30	100
DIMI102	Applied Mathematics	3	70		30	100
DIMI103	Applied Physics	3+1	70	50	30	150
DIMI104	Applied Chemistry	3+1	70	50	30	150
DIMI105	Engineering Drawing	3+1	70	50	30	150
DIMI106	Computer Fundamentals and Applications	2+1	50	50		100
DIMI107	Workshop Practice	1		50		50
	Total	22	400	250	150	800

Semester-II						
Code No.	Paper	Credits	Internal Marks	Practical I	End Semester Exam	Total Marks
DIMI201	Communication Skills – II	3	30		70	100
DIMI202	Elements of Mining Technology	5	30		70	100
DIMI203	Elements of Mine Surveying	5+2	30	50	70	150
DIMI204	Environmental Engineering	5	30		70	100
DIMI205	General Workshop Practice – I	2		50		50
	Total	22	120	100	280	500

Semester-III						
Code No.	Paper	Credits	Internal Marks	Practical I	End Semester Exam	Total Marks
DIMI301	Applied Mechanics	4+1	30	50	70	150
DIMI302	Basic Civil Engineering	3+1	30	50	70	150
DIMI303	Basic Mechanical Engineering	3+1	30	50	70	150
DIMI304	Mine Environmental Engineering	4	30		70	100
DIMI305	Strata Control and Roof Support	4	30		70	100
	Total	21	150	150	350	650

Semester-IV						
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Code No.	Paper	Credits	Internal Marks	Practical	End Semester Exam	Total Marks
DIMI401	Basic Electrical Engineering	4+1	30	50	70	150
DIMI402	Applied Geology	3+1	30	50	70	150
DIMI403	Mine Safety and Legislation	3	30		70	100
DIMI404	Mine Surveying	3+2	30	50	70	150
DIMI405	Wining and Working Coal	4	30		70	100
	Total	21	150	150	350	650

Semester-V

Code No.	Paper	Credits	Internal Marks	Practical	End Semester Exam	Total Marks
DIMI501	Advance Mining Geology	3+1	30	50	70	150
DIMI502	Mine Fires, Explosion, Inundation, Rescue and Recovery	3+1	30	50	70	150
DIMI503	Wining and Working Metals	3	30		70	100
DIMI504	Mine Machinery and Maintenance	3+1	30	50	70	100
DIMI505	Drilling and Blasting practices in mines	3	30		70	150
DIMI506P	Industrial Training	2			100	100
	Total	20	150	150	450	750

Semester-VI

Code No.	Paper	Credits	Internal Marks	Practical	End Semester Exam	Total Marks
DIMI601	Mine Economics and Beneficiation	3	30		70	100
DIMI602	Open -Cast Mining and Land Reclamation	3+1	30	50	70	150
DIMI603	Mine Management Legislation and General Safety	4	30		70	100
DIMI604	Advance Mine Surveying	3+1	30	50	70	150
DIMI605	Entrepreneurship Development	3	30		70	100
DIMI606	Major Project	6	50		100	150
	Total	24	200	100	450	750

SEMESTER-I

DIMI101

COMMUNICATION SKILL-I

UNIT-I

Passage for Comprehension:-

- (1) Language of Science
- (2) Robotic Revolution
- (3) Designing a Car
- (4) New Wonders of camera
- (5) Non-conventional sources of Energy
- (6) Our Environment
- (7) Entrepreneurship
- (8) Safety practices

UNIT-II

Short-Stories :-

- (1) Selfish Giant-Oscar Wilde
- (2) A Letter to God-Gregario Lapex Y-Fuentes An astrologer's Day –R.K. Naragyan

UNIT-III

Applied Grammar :-

- (1) Determiners
- (2) Auxiliaries
- (3) Tenses
- (4) Passive
- (5) Prepositions
- (6) Subject-verb Agreement

UNIT-IV

Letter Writing:-

- (1) Application (For Job/Leave)
- (2) Letter of Enquiry and replies
- (3) Letter for Order Placement
- (4) Letter of Complaints (To Editor/ Appropriate Authorities)

UNIT-V

Report Writing:-

- (1) Writing Progress – Report of a job
- (2) General outline for preparing A Project Report.

Reference Books

1. Communication Skill for Teaching Students Book-I. M/s Somalia Publications. Pvt. Ltd., Bhopal.
2. Living English Structure –W.S. Allen
3. Practical English Grammar (Exercises I by Thomson & Martinet)
4. English conversation practice by Grant Taylor.

APPLIED MATHEMATICS

UNIT-I

Algebra-

Determinants and Matrices-expansion

Determinants and Matrices-expansion of determinants(upto third order)using sarrus Rank, expansion method and pivotal condensation method. Properties of determinants ,solutions of equations (up to 3 unknowns)by Cramers's rule. Definition of matrix, addition, subtraction and multiplication of matrices(up to third order).inverse of a matrix by Adjoint method and elementary row transformations. Solution of equations(up to 3 unknowns)by Matrix method

UNIT-II

Logarithm - General properties of logarithms

Partial fractions- (linear factors, repeated linear factors ,non reducible quadratic factors)

To resolve proper fraction into partial fraction with denominator containing non repeated linear factors to resolve improper fraction into partial fraction

UNIT-III

Trigonometry - Trigonometric ratios of any angle relation between degree and radian

Fundamental identities examples based on fundamental identities factorization

And defactorization formulae inverse trigonometric ratios value of inverse trigonometric ratios

UNIT-IV

Vectors - Definition of vector and scalar quantities. addition and subtraction of vectors. Dot product and cross product of two vectors. Thumb rule, Angle between two vectors, application of dot and cross product in engineering problems

Circle - Equation of circle in standard form centre radius form diameter form

General equation of circle

UNIT-V

Complex Numbers - Definition, Real and Imaginary parts of a complex number, polar and Cartesian representation of a complex number and conversion from one to the other, conjugate of a complex number, modules and argument of a complex number.

Reference Books:-

- Mathematics for Polytechnic Volume I, TTTI Publication
- Applied Mathematics, EEB Publication , Bhopal
- Differential Calculus, By Gorakh Prasad
- Integral Calculus, By Gorakh Prasad
- Coordinate Geometry, By. S.L. Loney

APPLIED PHYSICS

UNIT-I Units and Dimensions: Physical quantities, Fundamental and derived units, Systems of units (FPS, CGS, MKS and SI units) , Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain) Principle of homogeneity , Dimensional equations and their applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration , Limitations of dimensional analysis

UNIT-II

Force and Motion: Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors. Force, resolution and composition of forces – resultant, parallelogram law of forces. Equilibrium of forces, Lami's theorem. Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion conversion of momentum, impulse and impulsive forces, simple numerical problems based on third law. Projectile, horizontal and oblique projections and equation of trajectory . Derivation of time of flight, maximum height and horizontal range , Circular motion, Relation between linear and angular velocity and linear acceleration and angular acceleration, Centripetal force (derivation) and centrifugal force, Banking of roads

UNIT-III

Work, Power and Energy: Work: definitions and its SI units, Work done in moving an object on horizontal and inclined plane (incorporating frictional forces). Power: definitions and its SI units, calculation of power in simple cases. Energy: Definitions and its SI units: Types: Kinetic energy and Potential energy, with examples and their derivation, Principle of conservation of mechanical energy (for freely falling boDIECs), transformation of energy from one form to another

Properties of Matter: Elasticity, definition of stress and strain , Different types of modulus of elasticity. Explanation of stress – strain diagram. Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure, manometers and barometer gauges. Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension . Fluid motion, stream line and turbulent flow, Reynolds number. Viscosity and coefficient of viscosity; derivation of terminal velocity; effect of temperature on viscosity.

UNIT-IV

Waves and vibrations: Generation of waves by vibrating particles , Wave motion with examples, Types of wave motion, transverse and longitudinal wave motion with examples . Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$). Sound and Light waves. Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Vibration of cantilever and beam, determination of time period of a cantilever. Free, forced and resonant vibrations with examples

Rotational Motion: Definitions of torque, moment of inertia, radius of gyration, Derivation of rotational kinetic energy and angular momentum, Conservation of angular momentum (qualitative). Theorems of parallel and perpendicular axes

Gravitation and satellites: Kepler's law of planetary motion, Newton's law of gravitation , Escape velocity (derivation), Satellites, Geo-stationary satellite

UNIT-V

Temperature and its measurement: Principles of measurement of temperature and different scales of temperature, Difference between heat and temperature on the basis of K.E. of molecules, Bimetallic and Platinum resistance

thermometer: their merits and demerits, Pyrometers – Disappearing filament optical pyrometer

Transfer of Heat: Modes of transfer of heat (conduction, convection and radiation with examples) Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method) , Properties of heat radiation, Stefan's law, Kirchhoff's law, Wien's law, Planck's black body radiation law, Prevost's theory of heat exchange

PRACTICAL

1. To find the thickness of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier caliper
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4. To find the surface tension of a liquid by capillary rise method
5. To determine and verify the time period of cantilever by drawing graph between load (w) and depression (D)
6. To determine the atmospheric pressure at a place using Fortin's Barometer
7. To determine the coefficient of linear expansion of a metal rod
8. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus

To find the coefficient of thermal conductivity of bakelite sheet (bad conductor) by Lee's Disc Method

RECOMMENDED BOOKS

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi
11. Applied Physics Vol. I&II H.C. Saxena & Prabhakar Singh
12. Applied Physics Vol. I&II D.Halliday & R.Rasnick
13. Engineering Physics – BVN Rao
14. Principles of Physics – K.K. Mohindroo
15. Basic Principles of Physics – Brij Lal Subramanyam .

APPLIED CHEMISTRY

UNIT-I

Language of Chemistry: Definition of symbol, formula, valency and chemical equation. Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound, Essentials of a chemical equation, balancing of a chemical equation by Hit and Trial method.

UNIT-II

Chemical Bonding: Electronic concept of valency, Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples to each

UNIT-III

Water: Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation. Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process. Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply

UNIT-IV

Solutions: Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight and gram equivalent weight with suitable examples Strength of a solution (i) Normality (ii) Molarity (iii) Molarity as applied in relation to a solution. Simple numerical problems related to volumetric analysis, Definition of pH, and different industrial applications of pH

UNIT-V

Electrolysis: Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples. Faraday's Laws of Electrolysis. Simple numerical problems based upon the laws of electrolysis, Different industrial applications of 'Electrolysis'. Elementary account of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2. Preparation of standard solution of oxalic acid or potassium dichromate
3. Determine the strength of a given solution of sodium hydroxide with the help of a standard solution of oxalic acid
4. Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid
5. Find the amount of chlorides in mg per liter in a sample of H₂O with the help of a solution of AgNO₃
6. Determine the degree of temporary hardness of water by O' Hehner's method
7. Estimate the amount of Cu in a sample of CuSO₄ using a standard solution of Na₂S₂O₃
8. Estimation of amount of iron in hematite ore volumetrically
9. Estimation of total alkalinity of water volumetrically
10. Determine conductance, pH of water sample using conductance bridge and pH meter

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. "A Text Book of Applied Chemistry-I" by SS Kumar; Tata McGraw Hill, Delhi
4. "A Text Book of Applied Chemistry-I" by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar
9. Engineering Chemistry by O. P. Agrawal.
10. Physical Chemistry by Glosstone.
11. Organic Chemistry by Sarkar and Rakshit.
12. Engineering Chemistry by M. M. Uppal Revised by S. C. Bhatia.
13. Modern Text Book of Applied Chemistry by P.C. Jain, Dr. G. C. Saxena and Dr.A. K. Goswami.

ENGINEERING DRAWING

UNIT-I

1. Introduction

- Introduction to drawing equipments, instruments and their uses
- Planning of drawing sheet as per I.S. 696 – 1972
- Indian standard practices of laying out and folding of drawing
- Different types of lines used in engineering drawing
- Standard practice for writing single stroke vertical and inclined capital and lower cases letters (practice to be done on sketch book)
- Standard practice of writing numerals (practice to be done on sketch book)

2. Dimensioning techniques and standard conventions

- Identification and representation of various symbols used in Mechanical and Electrical Drawing
- Drawing Identification and representation of various symbols of building elements, materials and sanitary fittings
- Principles, system and arrangement of dimensioning
- Practice problems of current method of dimensioning
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UNIT-II

1. Form associated with engineering curves

- Types of engineering curves
- Method of construction of Engineering Curves
- Practice problems of drawing various Engineering Curves.
- Importance of scale in Engineering drawing
- Types of scales- plain, diagonal etc.
- Practical problems for constructing various types of scale.

2. Orthographic projection of points, lines and planes

- Definitions of various terms associated with orthographic projections.
- Planes of projections
- Concept of Quadrants
- First and third angle method of projection
- Projection of line in different positions with respects to H.P. V.P. and X-Y line
- Projection of planes in different position with respect to reference planes
- Practice problems on projection of points, lines and planes.

UNIT-III

1. Projections of simple machine parts and components

- Procedure for drawing projections and sectional views of simple machine components
- Practice problems of sketching and drawing the projections and sections of simple machine components.

2. Projections of solids

- Types of solids and associated terminology
- Position of solid with respect to reference planes
- Drawing projections of solid in different position with respect to reference planes
- Practice problems to draw projections of solid in different positions.

UNIT-IV

1. Section of solids

- Concept of sectioning planes
- Auxiliary planes and true shape of section
- Practice problems for drawing projections and section of solids.

2. Development of surfaces

- Concept and importance of surface development in engineering field
- Development of surfaces for the following
- Cube
- Cylinder
- Prism
- Cone and Frustum cone
- Practice problems.

UNIT-V

1. Isometric projections 8

- Limitations of orthographic projections
- Definitions of the terms axonometric, oblique, Isometric and diametric projections
- Procedure for preparing isometric oblique
- Isometric view of geometrical solids and simple machine parts
- Practice problems.

2. Basics of CAD

- Computer hardware and software requirement for CAD
- Co-ordinate systems
- Set up for a CAD drawing
- Drawing objects like- Line, Circle, Arc, Ellipse, Regular Polygons, Polylines, Donuts etc.
- Editing Commands like- Move, Copy, Rotate, Scale, Fillet, Chamfer, Trim, Extend, Array, Mirror etc.
- Basic dimensioning, geometric dimensioning and tolerance
- Use CAD commands for simple orthographic and isometric drawings

Instructional Strategies

- Lecture Method
- Demonstration and use of instrument used in drawing.
- Classroom practices for different typical exercises.
- Use of computer for developing drawing
- OHP Transparencies for complicated drawing objects

Practical

- Problems on Scales and Letterings (One sheet)
- Problems on Curves (One sheet)
- Simple Orthographic Projections- One for First Angle and One for Third Angle Projection (Two sheets)
- Orthographic projections with sections (One sheet)
- Isometric projection for two objects (One sheet)
- Projection of Points and Lines (One sheet)
- Projection of Planes (One sheet)
- Projection of Solids (Two sheets)
- Section of Solids (Two sheets)
- Development of surface (Two sheets)
- Use CAD for orthographic projection (Five problems)
- Use CAD for isometric projection (Three problems)

Reference Books

1. I.S. 696. (Latest revision), BIS, India
2. Engineering Drawing, N.D. Bhatt, Charoter Publisher, Anand
3. Engineering Drawing & Machine Drawing, R. K. Dhawan, Kumar
4. Engineering Drawing , R.B. Gupta, Satya Prakashan, Delhi
5. Geometrical Drawing , P.S. Gill , ketson & Sons

Computer Fundamentals and Applications

UNIT-I

1. INTRODUCTION TO COMPUTERS

Generations Of Computer-

-First, Second, Third and Fourth generation.

Classification & applications of computers-

- Micro, Mini, Mainframes and Super-Computers.
- Applications of computers.

2. MICROCOMPUTER

Structure & Working Of Micro Computers

- Central Processing Unit.
- Memory Unit.
- Input & Output Devices.

Evolution Of Micro-Computers

- Comparative study w.r.t. Micro-processor, clock speed, data bus, Register size, storage capacity, peripheral interface of PC to Pentium-IV computer systems.

UNIT-II

1. DATA REPRESENTATION

Data Representation

-Bit, byte, Nibble, Word, Double word Codes: ASCII, Binary Coded Decimal (BCD) EBCDIC, GREY and EXCESS 3 code

.Number Systems

-Types of number systems-Binary, Octal, Decimal, Hexadecimal.

Conversions Of Number Systems And Its Operations

-Binary addition, subtraction

.-BCD addition, subtraction.

-1's complement and 2's complement methods of subtraction Floating point arithmetic.

UNIT-III

1. COMPUTER LANGUAGES

Classification And Characteristics Of Languages

-Machine language.

-Assembly language.

-High level language.

-Hardware, Software And Firmware Computer Hardware Classification Of Software

2. INTRODUCTION TO DOS OPERATING SYSTEMS

- **Micro-Soft Disk Operating System (Ms-Dos)**

-System files: BIOS, COMMAND.COM, CONFIG.SYS, Autoexec.bat file.

- **MS-DOS Commands**

-Internal Commands – dir, cd, md, rd, del, ren, date, time, vol.

And copy External commands– attrib, format, edit, find, diskcopy, backup & restore.

UNIT-IV

1.INTRODUCTION TO WINDOWS OPERATING SYSTEMS

Windows Operating System

- Concept of Windows-Arranging, Moving, Resizing, Opening, and Closing of windows
- .-Folder/File Management-Search, copy, delete and rename files and folders Windows Accessories: Notepad, Word Pad, Pad.

2.COMPUTER APPLICATIONS SOFTWARE.

- **Word Processing Software**
MS Word
- **Data Analysis Software**
MS Excel Introduction to Electronic Spreadsheet.
- **Presentation Software**
MS Power Point

UNIT-V

1. INTERNET APPLICATIONS

Introduction To Internet -Different Services Of Internet

- www
- Email
- Chat (textual/voice)
- Bulletin Boards
- Video conferencing
- FTP (uploading and downloading files)

WEB-SITE ACCESS AND INFORMATION SEARCH

- Browsers and search engines.

2. INTERNET CONNECTIVITY

Internet Connectivity

- Internet Service Provider (ISP)
- Internet accounts : Shell account, TCP/IP ISDN and Leased Line
- Account and its features.

Hardware Required

- MODEM and Terminal Adapters.
- System software: O.S. Loader, Linker, Interpreter, Compiler and Assembler Application Software.

List of Experiments/Demonstrations/Tutorials

- Study Of Input And Output Devices
- Study Of Storage Devices
- Practice On Internal And External Ms-Dos Commands
- Practice On Windows 95/98/2000

Starting Windows, Exploring the desktop, Arranging windows, My Computer, The start button, Creating Shortcuts, Practice on moving and sizing of windows.

Study of file organization: creating, copying, moving, renaming and deleting. -Practice on Windows Accessories – Notepad, Word Pad and Paint. Editing document & formatting text, Previewing and printing document/Image file. -Practice on Windows Explorer.

Recycle bin, Shutting down windows.

PRACTICE ON MS-WORD

Create and format document ,

Edit and Modify text-changing font size type and style.

Auto Text, AutoComplete, AutoCorrect, grammar and spellchecker, Find and replace of text.

Open save and print a document.

Insert, modify table.

PRACTICE ON MICROSOFT EXCEL

Create, save & format worksheet

Open and save worksheet file.

Edit & modify data.

Use formula and functions.

Split windows and freeze pans.

Create, edit, modify, print worksheet/charts.

PRACTICE ON POWERPOINT

Create, edit, insert, move, slides.

Open and save presentation.

Insert picture, slide layout, action button.

Present slide show.

PRACTICE ON INTERNET

Identification of type of Account. Connecting to internet.

Dial up access

Web browsing

Searching websites

Email services

Creating email accounts & Receiving and sending mails

Reference Books

1. Introduction to Computers, Iind Edition 1998 , Peter Norton's Tata McGraw Hills Publishing
2. The ABCs of Ms-Office 97 , Ist Edition, Gay Hart Davis
3. Computer Organization and architecture, IVth – Edition 1996 , William Stalling
4. Structured computer Organization , III rd – Edition 1997 , Andrews Tanenbaum Prentice Hall of India Pvt. Ltd, N. Delhi
5. Teach yourself..... windows 95, I st – Edition 1995 , A L Stevens Comer BPB Publication, N. Delhi
6. The Internet Book , II – Edition 200, Douglas E. Prentice Hall of India Pvt. Ltd, N. Delhi

WORKSHOP PRACTICE

1 Measurement, Identification and use of the various measuring tools & instruments.

- Linear measurements and measuring devices.
- Angular measurements and measuring devices
- Other measuring tools such as surface plate, Surface gauge, plate Safety in different shop of workshops.

2. Wood working (carpentry shop)

- 2.1 Identification of carpentry tools and their uses.
- 2.2 Perform various wood working operations.

3. Fitting shop.

3. 1 Identification of various tools used and the operations performed in fittingshop.

3.1.1 Perform various fitting operations.

3.1.2 Marking of job as per dimension.

3.1.3 Sawing.

3.1.4 Chipping .

3.1.5 Filling .

3.1.6 Taping .

3.1.7 Reaming.

3.1.8 Drilling.

3.2 Smithy Shop

3.2.1 identification of various tools and equipments used & their use.

3.2.2 Perform Various smithy operations.

3.2.3 Up setting .

3.2.4 Drawing down.

3.2.5 Bending

3.2.6 Setting down.

3.2.7 Welding.

3.2.8 Cutting .

3.2.9 Punching.

3.2.10 Fullering.

4. Sheet metal.

4.3.1 Identification and use of the various tools.

4.3.2 Perform various sheet-metal operations.

4.3.3 Shearing

4.3.4 Bending

4.3.5 Drawing

4.3.6 Squeezing.

4.3.7 Marking on sheet

4.3.8 Snipping.

4.3.9 Grooving

5 Welding Shop

5.1 Identification and use of the various tools and equipments.

5.2 Perform the arc welding and gas welding operations.

5.3 Perform the soldering and Brazing operations.

6 Machine shop

6.1 Identification and use of the various tools and equipments.

6.2 Classification of lathe and operation of lathe.

6.3 Plane turning

6.4 Taper turning

6.5 Treading

6.6 Drilling

6.7 Various attachment used in lathe.

Reference Books

(1) Workshop Technology (Vol-1) Hazra & choudhary .

(2) Workshop Technology – (Vol-1 & 2) Chapnan (3) Manufacturing process (Vol-1) Delela (4) Materials and Manufacturing Lindberg processes.

SEMESTER-II

COMMUNICATION SKILLS - II

Course Objective-

Language is the most commonly used and effective medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and be able to pursue the present course of study and handle the future jobs in industry. The objective of this course is to assist the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, develop grammatical ability, enhance writing skills, correspond with others, enhance skills in spoken English.

DETAILED CONTENTS

Unit-I

Prose Text Book

The following six chapters of A Book of English published by Mc millan India

Uncle Podger Hangs a Picture

Subash Chandra Bose

A Pair of Mustachios

Guru Gobind Singh

With The Photographer

Sir Jagdish Chandra Bose

There will be one general question from one of these six chapters.

Precise writing (selected from the prescribed 6 chapters of Prose Text Book)

Unit-II Grammar

- Antonyms change of words into different parts of speech
- Correspondence

Business letters such as:

Registration as supplier

Floating quotations and tenders

Quarry for product specification, price and other details etc from a firm/Company

Covering letter for quoting prices against a quotation/tender

Placing supply order

- Note-Making
- Interview Skills

Unit-III

Official letters such as:

- Letter to editor for placing an advertisement in the newspaper for purchase/selling of goods
- Letter to General Manager, Telephone Department for restoring a dead telephone/shifting a telephone
- Letter to Municipal Commissioner for improving water supply/ sanitation system in your locality
- Letter to State Electricity Board for repair of street lighting/ correction of bills etc.
- Letter to the supplier for rectifying or replacing a defective machinery/item of purchase
- Letter to Registrar, State Board of Technical Education for allowing to improve grades/marks in diploma examination

Unit-IV

- Report Writing
- Drafting a technical report of a visit to a factory, construction site, modern office, etc.
- Report writing on current general themes/topics related to economy, industry, social issues
- Elements of periodical progress report
- Inspection Note
- Write an inspection note after inspecting technical/industrial goods
- Write an inspection note after visiting a construction site or production shop
- Writing “Preface” and “acknowledgement” of a project report A paragraph on current topics/themes

Technology

Science

Economy

Politics

Social

General

- Drafting
- Press notes
- Memos/circulars
- Notices (lost and found: obituary/auction, etc)
- Telegrams
- Press releases
- Agenda and minutes of the meeting
- Personal resume/curriculum vitae

Unit-V

Communication Techniques

- Importance of communication
- Types of communication – verbal and non-verbal
- One way and two-way communication
- Process of communication – horizontal, vertical, upward, downward
- Essentials of good communication
- Level of communication – inter and intra personal, group to person, group to group
- Methods of effective oral, written and non-verbal communication, Horizons – tone, frequency, rate, volume, depth
- Barrier to communication and overcoming barriers
- Listening skill
- Use of audio visual aids for effective communication

Reference Books

Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons

The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India

New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,

New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,

A Practical English Grammar by Thomson and Marlinet

Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill

English Conversation Practice by Grount Taylor; Tata McGraw Hill

Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi

Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi

Communication Skills by Ms. R Datta Roy and KK Dhir, Vishal Publication, Jalandhar

Course Outcome –

1. Students will be better equipped in the skills essential for effective communication.
2. This course will instruct students about the in-depth knowledge of career oriented communication.

ELEMENTS OF MINING TECHNOLOGY

UNIT – 1 INTRODUCTION

History of mining Industry and mineral wealth of India. Specially related with Chattishgarh.

Selection of site for opening mine

MODES OF ENTRY

Different types of modes of entry. inclined, shaft, audit. Condition suitable to selection of a suitable mode of entry. Factors governing, shape, size and site of modes of entry. Compressions, suitability and advantages of each type of mode of entry.

UNIT – 2 SINKING OPERATIONS

Sinking of shaft in a normal coal strata. Marking of centre of shaft. Temporary supports/lining permanent lining. Firing shots in sinking shaft. Introduction of special methods of shaft sinking.

UNIT – 3 DRIFTING AND TUNNELING

Introduction about drifting and tunneling. Methods of drifting and tunneling. Manual methods of drifting and tunneling. Mechanized methods of drifting and tunneling. Ventilation drilling, blasting and mucking. Transportation systems in drifts and tunnels.

UNIT - 4 INTRODUCTION TO METHODS OF WORKING

Open cast mining condition suitable for limit of quarrying advantage and disadvantage

Manual Quarrying, layouts. Semi mechanized and machines used, layouts, and related regulation.

Introduction to different methods of coal mining, Bord and pillar method of working, condition suitable for general layouts, percentage of extraction, development, preparation for depillaring, depillaring operation, related regulation.

Longwall methods of working suitability, favorable condition, longwall advancing method, layouts of single unit and double unit longwall face. Longwall retreating method, layout of single unit and double unit faces, related regulation.

REFERENCE BOOKS :

Sl.No.	Title	Author, Publisher, Edition & Year
1.	Mining Environment and Ventilation	G.B. Mishra
2.	Selection Installation & Maintenance of mine pumps.	Rakesh & Lal
3.	Elements of Mining Technology Vol I & II	D.J. Deshmukh
4.	izkjafEHkd [kfudeZ	ch0ds0 flag

ELEMENTS OF MINE SURVEYING

DETAILED COURSE CONTENTS:

UNIT - 1: INTRODUCTION

Introduction to surveying, Definition and object of surveying Primary division of survey Classification of survey Principles of surveying Linear measurements Angular measurement Units of measurements, Linear and Angular Purpose of survey, degree of precision required for the purpose; nature and extent of survey, sources of error, time available for both field and office work, cost for survey. Measurements of distances

- A) Methods of determining the distances.
 - (i) Direct (ii) Commutative methods.
- B) Direct measurements - methods and instruments used for measuring distance.
- C) Pacing, Passometer, Pedometer, Odometer, Speedometer, Perambulator, Judging distance, Time measurement.

UNIT – 2 : CHAIN SURVEYING

Purpose of chain surveying, principles of chain surveying. Equipments used in chain surveying. chain, tapes, ranging rods, arrows, pegs, mallet, cross, optical square, construction of optical square and uses. Different operations in chain surveying, ranging-direct and indirect, chaining on flat and sloping ground, offsetting perpendicular and oblique. Conducting chain survey over the given area. Recording field data. Plotting the chain survey. Conventional signs Obstacles in chaining. Errors in chain surveying. Corrections for in-correct length of chain. Simple examples on corrections. Test and Adjustments of chain.

UNIT – 3 : COMPASS SURVEYING

Purpose of compass surveying. Construction and working of prismatic compass. Uses of surveyors and prismatic compass, Constructional details of surveyor's compass. Setting up the compass and taking observations Concept of (i) Meridians; true, Magnetic and arbitrary meridians (ii) Bearings- True, Magnetic and arbitrary, magnetic dip and declination. Systems of measuring the bearings - whole circle bearing, reduced bearing (Q.B.), numerical problems on conversions of bearing. Fore bearing back bearing of a line. Concept of a traverse - open and closed traverse. Traversing with prismatic compass. Local attraction causes detection error and corrections. Local attraction causes detection error and corrections. Checks for and open and closed traverse. Calculation of included angles from bearing. Problems on effect of local attraction. Closing errors, plotting a traverse by included angles and deflection angles method. Error, precautions and adjustments in compass surveying.

UNIT - 4 : PLANE TABLE SURVEYING

General Introduction Purpose of plane table surveying. Equipments used in plane table surveying, plane table. Alidade - plane and telescopic. Operation of plane table, centering, level or orientation. Important precautions while plane table surveying. Introduction about methods

of plane table survey : (i) Radiation (ii) Intersection (iii) Traversing (iv) Resection.
Advantages and disadvantages of plane table surveying.

UNIT - 5 : COMPUTATION OF AREAS AND VOLUMES

Computation of areas and volume of Irregular shapes by Simpson's Rule and by Bowditch Rule.
Calculation of Volume of Heaps.

LIST OF PRACTICALS / TUTORIALS:

1. To lay a chain line in the field.
2. To range a chain line by 3 ranging rod system and checking it with the Line ranger.
3. To take offsets by tape on either side of a chain line by swinging method and its booking.
4. To take offsets by Open cross staff and checking its accuracy by Optical square.
5. To conduct a chain triangulation survey of an area by erecting - (a) Base line (b) Check line (c) Type line and its plotting.
6. To Perform the temporary adjustments of a Prismatic compass and taking bearings of given lines.
7. To conduct compass traverse survey for closed traverse, taking fore bearing and back bearing of each line and calculation of Included angles.
8. To conduct a plane table survey by - (i) Radiation method (ii) Intersection method (iii) Traversing method and calculation of area by various method.

Reference Books:

Sl.	Title	Author, Publisher, Edition & Year
1.	Surveying & Leveling, Vol-I	Kanetkar & Kulkarni
2.	Advance Surveying	Alam chand
3.	Surveying, Vol-I	B.C. Punamia
4.	Mine Surveying, Vol-I & II	S. Ghatak
5.	Surveying, Vol-I	Arora

ENVIRONMENT ENGINEERING

UNIT-I

INTRODUCTION AND GLOBAL WARMING

The Environment, the impact of human being upon the environment, the impact the Environment upon human beings, Improvement of Environment quality, the role of the Environmental engineer. Global warming – reasons.

AIR QUALITY: DEFINITIONS, CHARACTERISTICS & PERSPECTIVES

Air pollution-Historical overview, global Implication of Air pollution, Units of measurement, sources of pollutants.

CLASSIFICATION OF POLLUTANTS – Particulates, hydrocarbons,

carbon monoxide, Oxide of Sulphur, Oxides of Nitrogen, photochemical oxidants, Indoor air pollution Measurements of above pollutants.

Air quality managements concepts.

UNIT-II

METROLOGY AND NATURAL PURIFICATION PROCESS

Elemental properties of the atmosphere – Scales of motion, Heat pressure, wind, moisture, Relative humidity. Devices used for the measurement of above properties. Influence of Metrological phenomena on air quality & dispersion, pressure system & Dispersion Winds & dispersion moisture and dispersion, modeling. Effects of Air pollution metrological conditions-changes on the Mesoscale & Microscale, changes on Microscale.

ENGINEERED SYSTEMS FOR AIR POLLUTION CONTROL

Atmospheric cleansing processes, Approaches to contaminant control. Central devices for particulate contaminants Gravitational settling chambers, centrifugal collectors, wet collectors, Fabric filters (Baghouse filters) Electrostatic precipitators (ESP) control devices for gaseous contaminants- absorption, condensation, combustion, Automotive emission control.

UNIT-III

ENGINEERED SYSTEMS FOR RESOURCE AND ENERGY RECOVERY

Processing techniques – Mechanical size alteration, Mechanical component separation, Magnetic & Electromechanical separation, Dewatering and Dewatering. Materials recovery systems – Material specifications, processing and recovery systems. Recovery of biological conversion products- Composting (Aerobic conversion), Anaerobic Digestions. Recovery of Thermal conversion products – Combustion of waste materials, Incineration with heat recovery, use of refuse Derived fuels (RBF), Gasification, pyrolysis. Recovery of energy from conversion products energy – Recovery systems, Efficiency-factors, Determination of energy output and efficiency. Materials and energy-Recovery systems.

NOISE POLLUTION AND CONTROL

Sources of noise pollution, control of noise pollution, unit of noise measurement, Noise intensity level- allowable limit for different situations. Noise measurement, The problem of noise pollution and legal measures for its control.

UNIT-IV

INDUSTRIAL WASTES

Industrial Waste treatment – Economics of waste treatment benefits of pollution abatement (primary, secondary and intangible benefits), difficulties in achieving, pollution abatement through industrial waste treatment, theories of waste treatment of specific – industrial waste such as textile, dairy paper and pulp, and distillery waste.

ENVIRONMENTAL AND POLLUTION CONTROL LAWS

Air (prevention and control of pollution) Act, 1981 and Air (prevention and control of pollution) Rules 1982-short title, extent and commencement, definitions. The environment (Protection) Act 1986-short title, extent and commencement Definitions-Measures to protect and improve environment.

UNIT-V

Air Pollution from thermal power plants, Nuclear power plants, Fertilizer and chemical plants, Acid rain, Methods of prevention

WATER CONTAMINATION IN OCEAN – Reasons, its effects, method of prevention.

REFERENCE BOOKS

1. Air pollution by Perkins.
2. Liquid waste of industry, theories, practices and treatment by Nelson L. Vamerow.
3. Management of solid waste in developing countries by Flintoff.
4. Environmental Engineering (International edition) by Peavy, Howards. (Mc Graw H Series in Environmental engineering)
5. Air Pollution – Its origin and control by Kenneth Work and Warner. (W.H.O. Publication)
6. Industrial waste by Namit.
7. Thermal Environment by Burgess H. Jennings.
8. Environment & Pollution control law by Vijay Malik (EBC publishing Pvt. Ltd.) Lucknow.
9. Environment protection-Problems, Policies administration, Law edited by Paras Diwan Deep & Deep Publications.

General Workshop Practice - I

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced.

The students should prepare sketches of various tools/jobs in their practical

The following shops are included in the syllabus:

1. Carpentry and Painting Shop-I
2. Fitting Shop
3. Welding Shop-I
4. Electric Shop –I
5. Smithy Shop or Electronic Shop-I
6. Sheet Metal Shop

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering and Automobile Engineering, will do Smithy Shop instead of Electronic Shop- I
2. The branches e.g. Electronics and Communication Engineering, Computer Engineering and Information Technology will do Electronic Shop-I instead of Smithy Shop. 26

1. Carpentry and Painting Shop -I

1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).

1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.

Job I Marking, sawing, planning and chiseling & their practice (size should be mentioned)

1.3 Introduction to various types of wooden joints, their relative advantages and uses.

Job II Preparation of half lap joint

Job III Preparation of Mortise and Tenon Joint

1.4 Demonstration of various methods of painting wooden items.

Job IV Preparation of wooden surface before painting including primer coating

Job V Painting Practice by brush/spray

Job VI Preparation of surface, before Painting such as cleaning, sanding, putty. Procedure and application of primer coat and painting steel items.

1.5 Safety precautions in carpentry shop

2. Fitting Shop

2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.

2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.

2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or square piece of an accuracy of $\pm 0.5\text{mm}$

Job III Filing practice (production of flat surfaces). Checking by straight edge.

Job IV Making a cutout from a square piece of MS Flat using hand hacksaw.

2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).²⁷

3. Welding Shop – I

3.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.

(b) Safety precautions during welding

(c) Hazards of welding and its remedies

3.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.

Job I Practice of striking arc bending and tacking while using electric arc welding set.

Job II Welding practice on electric arc welding for making uniform and straight weld beads

3.3 Various types of joints and end preparation.

Job III Preparation of butt joint by electric arc welding.

Job IV Preparation of lap joint by electric arc welding.

Job V Preparation of corner joint by using electric arc welding.

Job VI Preparation of Tee joint by electric arc welding.

4. Electric Shop – I

4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.

4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.

Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

Job II Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.

4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier

4.4 Introduction to lead-acid battery, identification of parts and its working.

Job III Installation of inverter with battery and to connect two or more batteries in series and in parallel (knowledge of a.c. and d.c.)

Job IV Charging of a battery and testing it with the help of hydrometer and cell tester²⁸

5. Smithy Shop

5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.

5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

5.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge a L-hook.

Job II To prepare a job involving upsetting process

Job III To forge a chisel

Job IV To prepare a cube from a M.S. round by forging method.

6. Sheet Metal Shop

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.

6.1 Introduction and demonstration of hand tools used in sheet metal shop.

6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. shearing machine, bar folder, burring machine, powerpress, sheet bending machine.

6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.

6.4 Study of various types of rivets, steel screw etc.

Job I Shearing practice on a sheet using hand shears.

a) Practice on making single riveted lap joint/double riveted lap Joint.

b) Practice on making single cover plate chain type, seam joint and riveted butt joint

Reference Books:

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

SEMESTER-III

Applied Mechanics

DETAILED CONTENTS:

UNIT – 1 Fundamental Concepts

- ✍ Definition of Mechanics, Statics, Dynamics, Kinetics, Kinematics.
- ✍ Concept of space, mass, particle, body, rigid body.
- ✍ Scalar, vector, fundamental units, derived units.

Composition & Resolution of Forces

- ✍ Force- concept, definition, unit, graphical representation.
- ✍ Concept of system of forces- non-coplanar, coplanar, concurrent, non-concurrent & parallel forces.
- ✍ Composition & Resolution of forces.
- ✍ Free body diagrams, law of parallelogram, Varignon's theorems.
- ✍ Equilibrium of Coplanar concurrent forces, parallel forces & non-concurrent forces, Lami's Theorem.
- ✍ Moment of a force and Couple.

UNIT – 2 : Centroid & Moment of Inertia

- ✍ Location of centroid and center of gravity.
- ✍ Centroid of regular plane and compound areas.
- ✍ Center of gravity of simple solids.
- ✍ Moment of Inertia of plane areas.
- ✍ Perpendicular & Parallel. Axes theorems.

Friction

- ✍ Rough & Smooth surfaces, concept of friction.
- ✍ Types of friction, Coloumb's law of friction, Co-efficient of friction, angle of friction, angle of repose.
- ✍ Friction on inclined plane, Screw and Nut friction.
- ✍ Ladder and wedge friction.
- ✍ Friction in Journal bearings
- ✍ Method of reducing friction.

UNIT – 3 : Work, Power & Energy

- ✍ Definition and unit of Work done, Power and Energy.
- ✍ Forms of Energy- Kinetic and Potential Energy.
- ✍ Principle of Conservation of power and energy.
- ✍ Power of engine and pumps, mean effective pressure, power measurement.
- ✍ Relation between Heat & Mechanical work, relation between Electrical & Mechanical energy.

Kinematics

- ✍ Kinematics in Cartesian and polar coordinates.
- ✍ Concept of speed, velocity, acceleration, radial and transverse velocity, particle under uniform and non-uniform acceleration, tangential and normal acceleration.
- ✍ Angular displacement, Angular Velocity, Angular Acceleration.
- ✍ Motion under gravity.

UNIT 4 :Kinetics

- ✍ Kinetics of particle, motion under constant force, Newton's Laws of Motion.
- ✍ Momentum and energy principles, Impulses and angular momentum.
- ✍ D' Alemberts principle.
- ✍ Motion under constant torque, Flywheel.

Simple liftingmachines

- ✍ Load, Effort, Mechanical advantage, Velocity ratio, Efficiency and relation between them.
- ✍ Law of Machine, Reversibility of Lifting machine.
- ✍ Study of Machines- Differential wheel & axel, Weston differential pulley block, Simple Screw Jack, Worm & Wheel, Single and Double purchase Winch, System of pulleys.

Reference Books

Sl. No.	Title	Author and Publisher
1	A Text Book of Applied Mechanics	R.S. Khurmi, S. Chand & Company Ltd., New Delhi
2	Applied Mechanics	I. B. Prasad, Khanna Publisher, New Delhi
3	Applied Mechanics	Ramanathsn, Dhanpat Rai and Sons, New Delhi
4	Engineering Mechanics	Timoshenko & Young, Mc Garawhills Publication
5.	Engineering Mechanics	S. Rajshekaran & G. Sankarsubramaniam, Vikas Publishing House Pvt. Ltd. NewDelhi
5	Strength of Material and Mechanics of Structure	Punamia, Standard Publisher Distributor New Delhi

PRACTICAL

- ✍ Verification of law of triangle of forces.
- ✍ Verification of law of Parallelogram of forces.
- ✍ Verification of law of Polygon of forces.
- ✍ Verification of Lami's Theorem by Jib crane method.
- ✍ Demonstration of Non-concurrent, Non-Parallel forces (Funicular diagram)
- ✍ Verification of Law of Moments.
- ✍ Determination of C.G. of a given lamina.
- ✍ Determination of coefficient of friction for surfaces of different materials on-
 - a) HorizontalPlane
 - b) InclinedPlane
- ✍ Draw – V-T diagram's for different combinations of-
 - a) Velocities

Uniform accelerations

Find-out Mechanical advantage, Velocity Ratio and Efficiency for following machines-

- a) SimpleScrew
 - b) Differential Wheel & Axle
 - c) Simple PurchaseCrab
 - d) Differential PulleyBlock
- ✍ Demonstration of use of inclined plane as a lifting machine.

BASIC CIVIL ENGINEERING

DETAILED COURSE CONTENTS

S. No.	Topics	Content
1	FLUID PROPERTIES	Properties of liquid, definition of liquid, action of shear forces on solids and liquid, type of fluids, ideal fluid, real fluid, definition of hydrostatics, hydro kinematics and hydro dynamics.
2	HYDROSTATICS:	Pressure intensity, PASCAL's law, variation of hydraulics, absolute pressure and gauge pressure, pressure gauges, types of pressure measuring devices.
3	HYDRO KINEMATICS	Principle of conservation of mass and its application, continuity equation, types of flows. Steady unsteady, laminar, and turbulent, uniform and non-uniform flow. Streamlines and their characteristics. Reynold's number.
4	HYDRODYNAMICS	Bernoulli's theorem, energy's possessed by flowing liquid, potential energy, kinetic energy, pressure energy, datum head velocity head and pressure head Bernoulli's equation, venturimeter, orifice meter and pitot tube.
5	BRICKS	Requirement of good bricks, types of bricks, laboratory tests for bricks, field-tests for bricks manufacturing process of bricks.
6	STONES AGGREGATES	Requirement of a good building stone, tests for stones, selection of stones for different civil works, coarse and fine aggregates, natural and artificial aggregates. Grading of aggregates, fineness modulus.
7	CEMENT	Composition of cement, types of cement, laboratory test and field test on cement.
8	STEEL AND STEEL PRODUCTS	Composition of steel, change in properties due to alloying, impurities in steel. Steel alloys, defects in steel, steel sections, testing of M.S., Bar.
9	TIMBER AND TIMBER PRODUCT	Hard wood and soft wood, characteristic of good timber, defects in timber, preservatives, seasoning of timber.
10	FOUNDATIONS	Necessity of foundations, bearing capacity and safe bearing capacity, types of foundation, shallow foundation and deep foundation, selection of type of foundation, procedure to give layout, different terms. Centre line plan, foundation plan checking accuracy of layout, utility of control point.
11	MASONRY	Brick Masonry, Necessity of bonds in brick masonry, and their type, mortars used in brick masonry, stone masonry, types of stone masonry, dry stone masonry, revetment.

PRACTICAL

LIST OF EXPERIMENTS

1. Verification of Bernoulli's Theorem
2. Calibration of given venturimeter
3. Calibration of given Orificemeter
4. Grading of coarse aggregates and fine Aggregates
5. Compressive strength of Bricks
6. Determination of Water Absorption of Bricks
7. Fineness test on cement
8. Determination of initial setting and final setting time of cement
9. Determination of Normal Consistency of cement

E) SUGGESTED INSTRUCTIONAL STRATEGIES: Lecture method
Demonstration
Experimentation
s Field Practice

F) SUGGESTED LEARNING RESOURCES:

Reference Books:

- | | | |
|---------------------------|---|-------------------|
| 1. Building construction | - | By Sushil Kumar |
| 2. Building Material | - | By S.C.Rangwala |
| 3. Soil Mechanics | - | By S.N.Awasthy |
| 4. Soil Mechanics | - | By Dr.B.C.Punamia |
| 5. Fluid Mechanics | - | By R.S.Khurmi |
| 6. Estimating and costing | - | By B.N.Dutta |

BASIC MECHANICAL ENGINEERING

DETAILED COURSE CONTENTS:

UNIT -1 MECHANICAL PROPERTIES & SIMPLE STRESS & STRAIN:

- ✍ Definition of different mechanical properties – elasticity plasticity, ductility, toughness, brittleness, hardness, malleability.
- ✍ Tensile, Compressive & Shear Stress & Strain.
- ✍ Different Elastic Moduli.

DESIGN OF SIMPLE COMPONENT:

- ✍ Cotter joint, knuckle joint, Flange Coupling &
- ✍ Single row riveted joint.

UNIT - 2 HYDROSTATICS:

- ✍ Physical properties of a fluid, Pascal's law.
- ✍ Calculation of total force & center of Pressure for a rectangular plate.

HYDRODYNAMICS:

- ✍ Continuity equation of flow.
- ✍ Bernoulli's equation.
- ✍ Venturimeters & its uses
- ✍ Flow through pipes.

UNIT -3 BASICS OF THERMODYNAMICS:

- ✍ Properties, Processes, Basic laws of thermodynamics,
- ✍ Thermodynamic cycles.
- ✍ I.H.P., B.H.P., M.M.P., F. H.P. Simple calculations.

STEAM & GAS POWER PLANTS:-

- ✍ Boilers: Basics, Classification and Construction.
- ✍ Boiler Mounting & Accessories.
- ✍ Rankine cycle.
- ✍ Working principles of Turbine, Compressor, Condenser & Pumps.

UNIT -4 I.C. ENGINES:

- ✍ Auto, Diesel and Dual cycles.
- ✍ Working principles of two stroke & four stroke petrol engine.
- ✍ Working principles of two stroke & four stroke diesel engines.

MECHANICAL DRIVES:

- ✍ Fundamentals of Rope, Chain & Belt.
- ✍ Clutch, gearbox, working principle & related simple problems.

UNIT -5 MATERIALHANDLING:

- ✍ Types of handling equipment.
- ✍ Determination of handling equipment requirement
- ✍ Factor affecting the choice of handling equipment.

MAINTENANCE:

- ✍ Maintenance method.
- ✍ Types of maintenance, their importance and field of applications.

ReferenceBooks

Sl. No.	Title	Author, Publisher, Edition & Year
1	Text book of hydraulics	R.S. Khurmi
2	Text book of thermodynamics	R.S. Khurmi
3	Text book of design & mechanics of machine	R.S. Khurmi
4.	Text book of Basic Mechanical Engineering	R.K. Rajput

(a) Others:

- ✍ Models, charts, Transparencies, Video films etc..
- ✍ Desktop models of boilers, engine, mechanical devices and simple machine components.
- ✍ Charts showing details of different mechanical components.
- ✍ Design data book.
- ✍ Lab manual
- ✍ CD's.
- ✍ ISI-Codes.

PRACTICAL

LIST OF PRACTICALS / TUTORIALS:

- ✍ Study of boiler mountings and accessories.
- ✍ Study of Simple & Compound gear trains and calculation of speed ratio.
- ✍ Study of Flat and V belts.
- ✍ Study of different type of industrial chains and ropes.
- ✍ Study of Cutter joint, knuckle joint and different types of Couplings.
 - ✍ Study of different types of Bolted & Riveted joints.

MINEENVIRONMENTALENGG.

DETAILED COURSECONTENTS:

UNIT - 1 MINE ATMOSPHERE

- 1.1 Pollution of mine atmosphere
- 1.2 Mine gases.
- 1.3 Origin and occurrence of mine gases.
- 1.4 Effects and detection of mine gases.
- 1.5 Methane drainage
- 1.6 Monitoring system of mine environment
- 1.7 Analysis of mine air

UNIT – 2 HEAT AND HUMIDITY

- 2.1 Heat and humidity in mine atmosphere and their effects
- 2.2 Cooling power of mine air
- 2.3 Assessment of comfort conditions
- 2.4 Air conditioning of mines, surface, underground and divided installations
- 2.5 Spot coolers

UNIT – 3 MINE VENTILATION SYSTEM

- 3.1 Object and standard of ventilation
- 3.2 Degree of gassiness of mines, composition of mine air
- 3.3 Measurement of air quantity, pressure and velocity
- 3.4 Law of air flow in mines, flow of air in ducts and mine roadways, resistance of air ways, Chezy's and Atkinson's equations
- 3.5 Equivalent resistance and equivalent orifice of mine
- 3.6 Regulations related with above topics, ecological and environmental laws related to mines
- 3.7 Dust monitoring
- 3.8 Mechanical ventilation, different types of fans used in mines, theoretical characteristics of centrifugal and axial flow fans, forcing and exhaust fans, relations between pressure quantity and power of fan, numerical calculation, fan drift, their constructional feature, auxiliary and booster fans, constructional feature, splitting of air current, advantage of splitting, reversal of air current

UNIT – 4 NATURAL VENTILATION

- 4.2 Thermodynamics of natural ventilation
- 4.3 Distribution and control of air current
- 4.4 Accessories of ventilation used in mines – Door, regulator, stoppings, air lock, air crossing, brattice

UNIT – 5 MINE LIGHTING

- 5.1 Lighting sources in mines, cap lamps, constructional feature of lamps
- 5.2 Underground lighting
- 5.3 Flameproof and intrinsically safe lighting
- 5.4 Lamp room layout, lamp room organization, care and maintenance of cap lamps

ReferenceBooks:

Sl.No.	Title	Author, Publication, Edition &Year
1.	Elements of Mining Technology Vol.2	D.J.Deshmukh
2.	Mine ventilation	G.B.Mishra

STRATA CONTROL AND ROOF SUPPORT

DETAILED COURSE CONTENTS:

UNIT – 1 SUPPORTS

- 1.1 Timber & Steel supports
- 1.2 Examination of Roof
- 1.3 Roof Bolting
- 1.4 Roof stitching
- 1.5 Cable Bolting
- 1.6 Method of supporting Roadways
- 1.7 Supporting under different Conditions Viz: Pit bottom, crossing , junctions, faulted area, longwall faces, depillaring areas and stopping areas.
- 1.8 Support loads, Systematic Support Rules.
- 1.9 Support plan
- 1.10 Support withdrawal

UNIT -2 POWERED SUPPORTS

- 2.1 Powered supports
- 2.2 Principle of Operation of Power supports
- 2.3 Classification of Power supports

- 2.4 Designation of Power Supports
- 2.5 Major Application of Power supports
- 2.6 Hydraulic fluids

UNIT -3 STOWING

- 3.1 Principal methods of stowing
- 3.2 Their relative merits and applicability
- 3.3 Hydraulic stowing
- 3.4 Pneumatic Stowing
- 3.5 Mechanical Stowing
- 3.6 Hand Packing
- 3.7 Face arrangements
- 3.8 Pipe wear
- 3.9 Pipe Jams

UNIT -4 STRATA CONTROL

- 4.1 Basic concepts of ground movement.
- 4.2 Rock Pressure due to narrow and wide excavation
- 4.3 Failure of roof and floor
- 4.4 Measurement of Strata movement
- 4.5 Definition of Rock burst, Bumps, Gas outbursts, Pot holes

UNIT -5 SUBSIDENCE

- 5.1 Basic concept of Subsidence
- 5.2 Damage and loss due to Subsidence
- 5.3 Vertical and lateral movements and their estimation
- 5.4 Angle of fracture and angle of draw
- 5.5 Factors affecting subsidence
- 5.6 Subsidence Control
- 5.7 Protection of surface Structures
- 5.8 Introduction of Protection Pillars including shaft pillars..

Reference Books

Sl.No.	Title	Author, Publisher, Edition & year
1.	Strata Control in Mines	Chang and Peng
2.	Winning and Working of Coal	R.T. Deshmukh and D.J.Deshmukh
3.	Modern Coal Mining Practices	R.D. Singh
4.	D.G.M.S. Circulars (Tech.) 1995 Onwards	
5.	Longwall Mining	Syed. S. Chang and Peng

SEMESTER-IV

DIMI401

BASIC ELECTRICAL ENGINEERING

Unit I

Application and Advantages of Electricity:

- Difference between AC and DC
- Various applications of electricity
- Advantages of electrical energy over other types of energy

Basic Quantities of Electricity

- Definition of voltage, current, power and energy with their units
- Name of the instruments used for measurement of quantities given in 5.1
- Connection of the instruments in 5.2 in electric circuit

Unit II

Various Types of Power Plants:

- Elementary block diagram of thermal, hydro and nuclear power stations
- Brief explanation of the principle of power generation in above power stations

Elements of Transmission Line:

- Pictorial diagram of a three-phase transmission and distribution system showing transformers, supports, conductors, insulators and earth wire etc.
- Brief function of accessories of transmission lines
- Earthing of lines, substation and power station - need and practices adopted

UNIT III

Distribution System:

- Distinction between high and low voltage distribution system
- Identification of three phase wires, neutral wires and the earth wire on a low voltage distribution system
- Identification of the voltage between phases and between one phase and neutral
- Distinction between three phase and single phase supply

Supply from the Poles to the Distribution Board:

- Arrangement of supply system from pole to the distribution board
- Function of service line, energy meter, main switch, distribution board

UNIT IV

Domestic Installation:

- Distinction between light and fan circuits and single phase power circuit, sub circuits
- Various accessories and parts of installation, identification of wiring systems
- Common safety measures and earthing
- Introduction to BIS code of safety and wiring installation

Unit V

Electric Motors and Pumps:

- Definition and various application of single phase and three phase motors
- Connection and starting of three phase motors by star delta starter
- Conversion of horse power in watts or kilowatts
- Type of pumps and their applications

PRACTICALS

1. Use of Megger:

Objective: To make the students familiar with different uses of megger

2. Connection of a three phase motor and starter including fuses and reversing of direction of rotation.

Objective: Students may be made familiar with the equipment needed to control a three-phase motor. The students must experience that by changing any two phases, the direction of rotation is reversed.

3. Connection of a lamp, ceiling fan, socket outlet, geyser, floor grinder, voltage stabilizer etc.

Objective: Students may be made familiar with the different types of equipment and circuits used in the domestic installations

4. Trouble shooting in a three-phase motor

Note: The teacher may create anyone of the following faults

- (a) Loose connections
- (b) Blown fuse
- (c) Tripped overload protection
- (d) Incorrect direction of rotation
- (e) Single phasing
- (f) Burnt winding to be simulated by a loose connection behind a terminal box.

Objective: The students must be able to detect the most common faults, which may occur in a three-phase motor, using megger wherever necessary

5. Trouble shooting in a domestic wiring system.

Note: The teacher may introduce a fault in the existing wiring system of a classroom or workshop like

- (a) blown fuse
- (b) loose connection
- (c) faulty components/accessories etc.

Objective: Students must be able to detect common faults which may occur in a domestic wiring system

6. Treatment of electric shock

Note: The teacher may give a demonstration how an electric shock must be treated.

Objective: Students must be trained to treat the persons suffering from an electric shock

7. Study of a distribution Board

Note: Students may be asked to study the distribution board in the institution and note down all accessories.

Objective: Students must be made familiar with the distribution board

8. Connections and reading down an energy meter

Objective: Students may be asked to connect an energy meter to a load and calibrate reading

9. Demonstration in electrical machine laboratory

Objective: Students may be shown different types of electrical machines and their starters and should be told that the three phase induction motors are most commonly used.

10. Study of submersible motor pump set:

Objective: To tell use of the set in water supply and irrigation works.

APPLIED GEOLOGY

DETAILED COURSE CONTENTS:

UNIT - 1 PHYSICAL GEOLOGY

- 1.1 Solar system, origin of the earth, various hypotheses related to origin of earth.
- 1.2 Age of the earth, various methods of age determination, radioactive methods and their advantages.
- 1.3 Interior of the earth – crust, mantle and core.
- 1.4 Weathering - physical weathering and chemical weathering. Exfoliation and spheroidal weathering.
- 1.5 Work of wind – Erosion, Transport and Deposition ventifacts, Pedestal rocks, Sand dunes and Loess.
- 1.6 Work of Rivers: Erosion Transport and Deposition, water falls, Meanders, oxbow lakes, Alluvial, fans, flood plains, Delta.
- 1.7 Earth quakes : Seismograph, earthquake waves, classification of earthquakes, elastic rebound theory, Richter scale of earthquake intensity, Distribution of earthquakes
- 1.8 Volcano: Types of volcanoes, Volcanic products, Volcanic cones, distribution of volcanoes.

UNIT – 2 MINERALOGY

- 2.1 Definition, Physical properties of minerals – Color, Streak, Luster, hardness, Habit, Cleavage, Fracture.
- 2.2 Identification of common minerals- Orthoclase, Plagioclase, Augite, Hornblende, Biotite, Muscovite, Olivine, Quartz, Asbestos, Calcite, Dolomite, Corundum, Gypsum, Talc.

UNIT – 3 PETROLOGY

- 3.1 Classification of Rocks- Igneous, Sedimentary and Metamorphic.
- 3.2 Igneous rocks – Acid and basic rocks, Textures of Igneous rocks- Glassy, Vesicular, Porphyritic, Coarse grained, Medium grained, Fine grained and Cryptocrystalline. Classification – Plutonic, Hypabyssal and volcanic rocks. Tabular Classification Igneous bodies- Batholithic, Laccolith, sill and Dyke, Lava flows, Common Igneous rocks – Granite, Syenite, Gabbro, Basalt, Trachyte and Rhyolite.
- 3.3 Sedimentary rocks - definition , Classification, mechanically formed, Organically formed and chemically formed rocks, Sedimentary structures, Stratification, Lamination, graded bedding. Current bedding and ripple marks, common Sedimentary rocks- Conglomerate Sandstone, Shale, Mine stone and Breaccia.
- 3.4 Metamorphic rock – Definition, Agents of metamorphism- Heat, Uniform pressure, Directed Pressure, Chemically active fluids and gases. Structures and textures of Metamorphic rocks – Slaty, Schistose, Gneissose and Granulose. Common Metamorphic rocks – Slate, Schist, Gneiss, Quartzite and Marble.

UNIT– 4: STRUCTURAL GEOLOGY

- 4.1 Dip and Strike, Apparent dip and True dip.
- 4.2 Folds- Elements of folds, Anticline and Syncline, Limbs, Axial of folds, Types of folds- Symmetrical, Asymmetrical, Overturned, Recumbent, Isoclinal, Plunging folds, Anticlinorium, Synclinorium , Open fold, Close fold ,Dome and Basin.
- 4.3 Faults – Fault Terminology, Fault- Plan, Hade, Dip and strike, Throw, Heave, Slip, Hanging wall and foot wall. Classification of faults- Normal and reverse faults, Dip fault, strike fault and Oblique faults, High and low angle faults , Parallel faults, Steps- faults, Graben, Horst, Radial faults, Peripheral faults.
- 4.4 Unconformities- definition, Types – Angular unconformity, Disconformity, Nonconformity.
- 4.5 Joints- Classification- Strike joints, Dip joints, Oblique joints, Bedding joints, Master Joints, Sheet Joints and columnar joints.

Reference Books:

Sl.No.	Title	Author, Publisher, Edition & Year
1	A Text book of Geology	K.M. Banger
2	Engineering and General Geology	Prabin Singh
3	Laboratory Manual of Geology	Ajay Kumar Sen.
4	Sedimentary rocks	Pettijohn
5	Elements of Mineralogy	Rutley's
6	Introduction to Physical Geology	A.K. Dutta
7	Structural Geology	P. Billings
8	The Principal of Petrology	Tyrrel
9	A Text book of Geology	P.K. Mukharjee
10	A Text book of Mineralogy	Dana
11	Handbook of Geology	eqdy?kks'
12	Handbook of Petrology	vfcckilkvnxoky
13	Handbook of Structural Geology	Vjsy, of>axju

PRACTICAL

1. Identification of Minerals in hand specimen -Asbestos, Augite, Biotite, Calcite, Corundum, Dolomite, Gypsum, Hornblende, Muscovite , Kaolinite Orthoclase, Plagioclase, Quartz, Talc.
2. Identification of Rocks –
 - (i) Granite, Rhyolite, Syenite, Gabbro, Basalt, Trachyte.
 - (ii) Conglomerate, Sandstone, Shale, Limestone.
 - (iii) Slate, Schist, Gneiss, Quartzite, Marble.
3. Geological map reading and drawing simple Geological section -
 - (i) Geological maps of inclined beds.
 - (ii) Geological maps of Unconformity
 - (iii) Geological maps of Folds.

MINE SAFETY AND LEGISLATION

UNIT- 1 RELEVANT PROVISIONS OF MINES ACT, 1952

- 1.1 Preliminary Definitions.
- 1.2 Mining Boards and committees.
- 1.3 Provisions as to health and safety.
- 1.4 Hours and limitations of employment.
- 1.5 Provisions regarding leaves & wages.
- 1.6 Regulations, Rules & by laws

UNIT-2 RELEVANT PROVISIONS OF MINES RULES, 1956

- 2.1 Preliminary Definitions
- 2.2 Committees.
- 2.3 Provisions regarding health and sanitation, Medical examination of persons employed, workman inspector and committees.
- 2.4 Provisions regarding first aid and Medical appliance.
- 2.5 Employment of persons.
- 2.6 Provisions as to leave with wages.
- 2.7 Welfare committees.
- 2.8 Provisions regarding accident, classification as per annexure I and II.
- 2.9 Equipments of first aid room and first aid station as per II and III schedule.
- 2.10 Abstract of the mines act & rule from (1) to (42) as per V schedule.

UNIT-3 RELEVANT PROVISIONS OF COAL MINES REGULATIONS, 1957

- 3.1 Definitions
- 3.2 Duties and responsibilities of persons employed in mines.
- 3.3 Provisions regarding plans and sections.
- 3.4 Provisions as to mines working.
- 3.5 Provisions regarding precautions against danger from fire, dust, gas and water.
- 3.6 Ventilation.
- 3.7 Provisions as to explosives and shot firing
- 3.8 Miscellaneous provisions as to symbols for mine plan and section, systematic support rules as per II and III schedule.

UNIT-4 GENERAL SAFETY IN MINES

- 4.1 Knowledge of vocational training of persons employed in a mine.
- 4.2 Refresher course for mining persons.
- 4.3 Pit safety committee, formation, function and organizations

Reference Books –

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Mines Act, 1952 up-to-date	DGMS
2.	Mines Rules, 1555 up-to-date	DGMS
3.	Coal Mines Regulations, 1957 up-to-date	DGMS
4.	Legislation in Indian mines- A critical appraisal	Rakesh and Prasad

MINESURVEYING

DETAILED COURSE CONTENTS:

UNIT -1 MINERS DIAL

- 1.1 Introduction and general description.
- 1.2 Taking bearing & observations with a dial.
- 1.3 Method of dial Traversing -
 - i) Loose or free needle methods.
 - j) Fast or fixed needle methods
- 1.4 Measurement of Included angles
- 1.5 Fixing of under ground survey station.
- 1.6 Transfer of survey station from floor to roof and from roof to floor.
- 1.7 Setting of instrument under roof station.
- 1.8 Under ground traversing with a dial.
- 1.9 Marking of centre line of a gallery.
- 1.10 Marking of centre line in a given direction.

LEVELLING

- 2.1 Introduction, purpose of levelling.
- 2.2 Definition and terminology.
- 2.3 Different types of levels.
- 2.4 Principle and constructional details of Dumpy and Tilting level.
- 2.5 Levelling staves , types of staves.
- 2.6 Graduation and least count types of diaphragms.
- 2.7 Adjustment of levelling instruments – Temporary and permanent.
- 2.8 Concept of datum, Back sight, Fore sight, Station, Change point, height of instrument
- 2.9 Level book, Booking of levels, Reduction of level.
- 2.10 Height of instrument or collimation, Rise and fall, Arithmetical check.
- 2.11 Differential levelling and check levelling.
- 2.12 Problems on reduction of level.
- 2.13 Balancing or equalizing of back sight and fore sight distance.
- 2.14 Types of levelling.
- 2.15 Errors in levelling and precaution to minimize the errors.
- 2.16 Practical problems in levelling work as – Levelling across summits and depression, Across a wall.
- 2.17 Degree of precision in levelling, closing error and its adjustment.
- 2.18 Testing and adjusting of Dumpy and Tilting levels.
- 2.19 Permanent adjustment of levels.
- 2.20 Methods of Traversing and plotting of traverse.

UNIT-2 COUNTERING

- 3.1 Introduction and concept.
- 3.2 Purpose of counterling.
- 3.3 Object of counterling.
- 3.4 Horizontal equivalent.
- 3.5 Counter interval.
- 3.6 Factors affecting counter interval.

- 3.7 Characteristic of counters.
- 3.8 Method of counterung – Direct method, Indirect method.
- 3.9 Interpolation of contours methods:
 - i) Estimation method,
 - ii) Arithmetical method.
 - iii) Graphical method
- 3.10 Plotting of contour maps.
- 3.11 Use of contour Maps

SUBSIDENCE SURVEY

- 4.1 Definitions.
- 4.2 Fixing of survey station.
- 4.3 Transfer of colliery benchmark to the subsidence area.
- 4.4 Determination of position of a survey station (longitudinal) displacement.
- 4.5 Determination of reduced level of survey station.
- 4.6 calculation of Subsidence – Lateral displacement, Vertical displacement.
- 4.7 Precautions during subsidence survey.
- 4.8 Preparation of subsidence plans and section.

UNIT – 3 THEODOLITE

- 5.1 Introduction
- 5.2 Classification of theodolite -
 - a. Transit and non –transit theodolites
 - b. Vernier theodolites
 - c. Micro-optic theodolites
 - d. Electronic theodolites.
- 5.3 Essential parts of the transit vernier theodolites.
- 5.4 Definition and the terms used.
- 5.5 Fundamental axis of theodolites and their relationship.
- 5.6 Temporary adjustment of theodolites
 - i) Setting over the stations
 - ii) Levelling up the instrument
 - iii) Elimination of parallax and focusing of object.
- 5.7 Method of taking readings – Vernier reading, calculation of least count
- 5.8 Measurement of horizontal and vertical angles – General method, Repetition method, Reiteration method
- 5.9 Booking of readings
- 5.10 Method of traversing, plotting survey work

DIP, STRIKE AND BORE HOLE PROBLEMS :

- 6.1 Definition of borehole surveying
- 6.2 Purpose of borehole surveying
- 6.3 Definition of dip, strike, true and apparent dip
- 6.4 Relation between true dip, apparent dip and angle between them
- 6.5 Numerical problems on dip, strike and borehole surveying

UNIT – 4 MINE PLANS AND SECTIONS

- 7.1 General requirement of mine plans
- 7.2 Types of plans and their scale
- 7.3 Symbols used in mine plans

- 7.4 Preparation of plans and sections
- 7.5 Plotting of traverse
- 7.6 Checking accuracy of old mine plans
- 7.7 Planimeter and its uses
- 7.8 Enlargement and reduction of plans
- 7.9 Mines regulations concerning above topics

Reference Books –

Sl.No.	Title	Author, Publisher, Edition & year
1.	Surveying and leveling ,vol I & II	T.P. Karnetkar
2.	Surveying , vol I & II	B.C. Punamia
3.	Advance Surveying , Vol I & II	Alam Chand
4.	Advance surveying	D.C. Clark
5.	Surveying , vol I & II	Arora

PRACTICAL

LIST OF PRACTICAL / TUTORIALS:

2. To take the bearing of given lines and measure the included angles by the verniers of theodolite.
3. To traverse the area by loose needle method with magnetic compass.
4. To traverse a given area by fast needle method with magnetic compass.
5. To sketch and describe a dump level.
6. Use and application of a micro level.
7. Find out the reduced level of different points with a given datum.
8. To carry out differential levelling and check the work by the levelling.
9. To draw a longitudinal profile along with a chain line.
10. To draw a cross section across given chain line.
11. To draw a contour of given area by direct and indirect methods.
12. To conduct a complete subsidence survey in a given area.
13. To calculate the contours of required reduced level and to plot the subsidence work with a suitable scale.
14. To sketch and describe a transit vernier theodolite.
15. To measure the horizontal angle by repetition method with a theodolite.
16. To measure the horizontal angle by reiteration method with a theodolite.
17. Study of mine plans & sections.

WINNING ANDWORKING COAL

UNIT - 1 INTRODUCTION TO PIT TOP AND PIT BOTTOM LAY OUT.

- 1.1 Ideal pit top and pit bottom layout.
- 1.2 Tub circuit
- 1.3 Study of pit top and pit bottom lay outs of important U/G mines of India.

UNIT - 2 BOARDS AND PILLAR METHOD OF WORKING

- 2.1 Board and Pillar method of Working under following.
 - (a) Working thin seams.
 - (b) Working thick seams.
 - (c) Working very thick seams in Sections.
 - (d) Working contiguous thick seams.
 - (e) Working below ponds, reveres, railways etc.
 - (f) Working seams liable to spontaneous heating and / or highly gassy.
- 2.2 Mechanised board and pillar working
 - (a) With SDL / tub combination LHD/Tub Combination. SDL/ Chain conveyor combination
 - (b) Scraper// loader
 - (c) Continuous miner-road headers, dint headers layouts.
- 2.3 Advantages of panel system over board and pillar.

UNIT - 3 LONGWALL METHOD OF WORKING

- 3.1 Suitable working conditions
- 3.2 Comparison between Advancing and Retreating method of longwall working.
- 3.3 Layout of single unit and double unit faces, roof support in the system.
- 3.4 Single ended drum. Double ended drum. layouts, sumping method.
- 3.5 Ploughs- applicability construction layout.
- 3.6 Mechanised long wall mining

- A- Layout
- B - Conveyors
- C- Drum Shearer

UNIT - 4 INTRODUCTION TO HORIZON MINING

- 4.1 Conditions, suitability and limitation.
- 4.2 Methods of working.
- 4.3 Study of some horizon mining cases of India.

UNIT -5 THICK SEAM WORKING

- 5.1 Multi section working with stowing (ascending order)
- 5.2 Multi section working in descending order.
- 5.3 Multi section working with thick coal partings and caving.
- 5.4 French method of working thick seam.

5.5 Problem in mining thick seam, choice of thick seam mining methods inclined slicing, horizontal slicing, diagonal slicing, transverse slicing, sublevel caving, Blasting gallery method, cable bolting method of thick seam extraction.

Reference Books–

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Mines planning for coal	S.P. Mathur
2.	Surface Mining Technology	Sameer Kumar
3.	Modern Coal mining Technology	-- --
4.	Coal Mine Ground Control Vol- II	Syed. S. Peng
5.	Under ground Winning of coal	T.N. Singh
6.	Mine Working Part I & II	H.N. Karmkar
7.	Elements of Mining Technology, Vol.I	D.J.Deshmukh

SEMESTER-V

ADVANCE MINING GEOLOGY

DETAILED COURSE CONTENTS:

UNIT – 1 INDIAN STRATIGRAPHY

- 1.1 Geological Time scale, Principles of stratigraphy, Principle of correlation, Stratigraphic classification of Indian rock formations.
- 1.2 Physiographic division India, peninsular India, Indo-gangetic plan and extra peninsular India.
- 1.3 Archaean system – A brief account of the Dharwar system, Sausor group, Iron-ore group, Archaean rocks of Rajasthan, economic minerals of Archaean rocks.
- 1.4 Cuddapah system – Cuddapah rocks of cuddapah basin Andhra pradesh, Delhi system, economic minerals of cuddapah rocks.
- 1.5 Vindhyan system - A brief account of the vindhyan rocks of North India, economic minerals of vindhyan rocks.
- 1.6 Gondwana system - A brief account of the gondwana rocks of India, economic minerals of gondwana rocks.
- 1.7 Deccan traps - A brief account of the deccan traps of India, economic importance of deccan traps.
- 1.8 Fossils – Definition, mode of occurrence, use of fossils.

ORE DEPOSIT

- 2.1 Concept of mineral, Gangue and Tenor of ores, a brief outline of the classification of ore deposits.
- 2.2 Magmatic ore deposit – Early magmatic, Late magmatic.
- 2.3 Pegmatic deposits, Sublimation deposits, Contact metasomatic deposits,
- 2.4 Hydrothermal deposits – classification of hydrothermal deposits, cavity filling deposits, types of cavity filling deposits, replacement deposits, types of replacement deposits.
- 2.5 Sedimentation deposits, Evaporation deposits, Residual deposits, Mechanical concentration deposits (Placer deposits), types of placer deposits.
- 2.6 Oxidation and super gene enrichment deposits, metamorphic deposits.
- 2.7 Control of ore deposition – Structural controls, stratigraphic control, physical and chemical controls.

UNIT -2 COAL AND PETROLEUM

- 3.1 Rank of coal, classification of coal – Peat, Lignite, Bituminous, Anthracite and Cannelcoal. 86

- 3.2 Banded constituents of coal, chemical properties of coal, structural features of coal seams.
- 3.3 Origin of coal – In situ theory, Drift theory, formation of coal preservation, Biochemical change, Carbonization and metamorphism.
- 3.4 Occurrence of coal in India, A brief outline of the lower gondwana fields.
- 3.5 Petroleum, origin of petroleum, migration of petroleum, oil traps, types of oil traps, petroleum deposits of India.

ORES AND MINERAL DEPOSITS OF INDIA

- 4.1 A brief account of the origin, occurrence, distribution in India and economic use of the following ores and minerals – Gold, Iron-ore, Manganese ore, Copper ore, Lead and Zinc ore, Aluminum ore, Chromite and Mica.

UNIT 3 GROUND WATER

- 5.1 Elementary idea of ground water, occurrence of ground water, zone of aeration, saturation, water table, hydrological properties of rocks porosity and permeability, Aquifer.

PROSPECTING METHODS

- 6.1 Ground prospecting methods – A brief outline of the various prospecting methods, surface prospecting methods, Geological mapping, and Trenching, Pitting, Auguring and wash boring and drilling.
- 6.2 Geophysical prospecting methods – Elementary study of gravity, magnetic, electrical resistivity and seismic methods of geophysical prospecting.

UNIT -4 REMOTE SENSING

- 7.1 Remote sensing an introduction, application in various fields, G.P.S.(Global Positioning System), G.I.S.(Geographic Information System).

Reference Books –

Sl.No.	Title	Author, Publisher, Edition and Year
1.	A text book of Geology	K.M.Banger
2.	Engineering and general Geology	Prabin Singh
3.	Ore deposits of India	Gokhle and Rao
4.	Geology of India and Burma	Krishnan M.S.
5.	Ground water and tube well	S.P.Garg
6.	Mineral Economics	Sinha and Sharma

7.	Industrial minerals	R.K.Sinha
8.	Geology of India	D.N.Wadia
9.	Ground water hydrology	Todd
10.	Economic mineral deposits	A.M Batteman
11.	Ground water	Tolman
12.	Geology of Petroleum	A.I.Levorsen
13.	Petroleum resources and development	Khan
14.	Hydrology	G.Mahajan
15.	Petroleum Geology	North F.K.
16.	A text book of Geology	P.K.Mukharjee
17.	A text book of Remote sensing	S.S.Agrawal
18.	Dictionary of Remote sensing	S.M.Rashid
19.	vkfFkZd Hkw foKku	O;kl
20.	vkfFkZd Hkw foKku	

PRACTICAL

LIST OF PRACTICALS / TUTORIALS

1. Sketching and describing the various geomorphological and structural models.
2. Constructing the geological cross section from geological maps
 - i) Maps showing unconformity
 - ii) Maps showing Folds
 - iii) Maps showing Faults
 - iv) Maps showing Igneous intrusions
3. At least three exercises on maps of completion of outcrops.
4. Study of common ore minerals in hand specimen – Al, Fe, Cr, Mg, Mn, Zn, Pb, Sn, Sb, Cu, and Arsenic.

DIMI502

MINE FIRES, EXPLOSION, INUNDATION, RESCUE AND RECOVERY

- UNIT-1 MINE FIRES–
- 1.1 Factors responsible for mine fire.
 - 1.2 Causes of mine fire.
 - 1.3 Accidental fire, spontaneous heating; factors responsible for spontaneous heating.
 - 1.4 Incubation period, crossing point, ignition point.
 - 1.5 Precaution against spontaneous heating.
 - 1.6 Preventive measures against mine fires.
 - 1.7 Fire stoppings-purpose, constructional details.
 - 1.8 Opening of a sealed of area.
- UNIT-2 GASEXPLOSION
- 2.1 Types of gas explosion.
 - 2.2 Causes of fire damp explosion.
 - 2.3 Upper and lower limit of fire damp explosion ; coward's diagram.
 - 2.4 Precaution against fire damp explosion.
 - 2.5 Study of some important gas explosion in Indian coal mines.
- UNIT -3 DUSTEXPLOSION
- 3.1 Upper and lower limit of inflammability of dust.
 - 3.2 Index of inflammability.
 - 3.3 Causes of formation of dust and causes of coal dust explosion.
 - 3.4 Study of some important dust explosion cases in Indian coal mines.
 - 3.5 Precaution & preventive measures against dust explosion.
 - 3.6 Stone dust quality of stone dust; stone dusting; stone dust barriers.
 - 3.7 Water barriers, handling of stone dust.
 - 3.8 Use of chemicals and chemical foams against coal dust hazards, health hazards due to coal dust,
 - 3.9 Measurement of coal dust concentration in general body of air.
- UNIT -4 INNUNDATION
- 4.1 Sources of dangerous accumulation of water in mines.
 - 4.2 Factors responsible for innundation in mines.
 - 4.3 Precautions and preventive measures for innundation.
 - 4.4 Precaution for approaching water logged areas and working below water logged area.
 - 4.5 Dams – Purpose, site of dam, types of dam and their constructional details.
 - 4.6 Study of some important innundation cases in Indian mines .

4.7 Additional precaution in rainy season in the mines located near by the rivers.

UNIT -5 MINE RESCUE AND RECOVERY WORK

5.1 Rescue apparatus, self breathing apparatus, reviving apparatus, Drager

BG – 4 self contained breathing apparatus, Maxaman- reviving apparatus, self contained, self rescuer – Fenzy biocell, Oxybocks, RZ-25,

Universal tester for testing of drager BG-174 and BG-4, Quester-II and

Quester-III, Computerised testing machines, Drager power pump.

5.2 Rescue stations – equipments used in rescue station, rescue organisation and working, training of officials.

5.3 Method of rescue and recovery work

5.4 Emergency organisation and rescue plan

5.5 Recovery of mines after explosion, fire and inundation

5.6 Sealing of fire area (u/g fire)

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Elements of mining technology –Vol-II	D.J. Deshmukh
2.	Mine Disaster and Mine rescue	M.A.Ramlu

PRACTICALS:

1. To study, sketch and explain different types of fire stoppings and their constructional details.
2. To study, sketch and describe about stone dust and stone dust barriers.
3. To study, sketch and describe different types of dams.
4. To visit Rescue Station, study and explain different types of rescue apparatus.
5. To study, sketch and describe First Aid Station and Fresh Air Base.

DIMI503

WINING ANDWORKINGMETALS

UNIT -1 IRREGULAR DEPOSITS

(Metalliferousores)Nature of oredeposits.Mode of oredepositCode, veinetc

UNIT -2 MODE OFENTRY

shaft-shape and size, circular, rectangular oreelliptical.InclineInclinedshaft.haft filling

UNIT-3 PREPARATORYWORK

formation of stations, cross cuts, ore bins, greizzliesetc.Level and raise winz connections, oreblocks.Transportation of Broken ore from stope tosurface.Primary crushing underground

UNIT -4 STOPING

Various methods of stoping, their suitebilities conditions of applicability andmethodsofstoping.Openstopes.Under hand, over hand and breaststopping.Supported stopes–

1. Cut and fillstopping
 2. Shrinkagestopping
 3. Square setstopping
 4. Sub levelstopping
 5. Gloryholes
- Caving methods of stoping.
- a. Sub levelcaving.
 - b. Blockcaving
 - c. Topslicing
 - d.

UNIT -5 STUDY OF IMPORTANT METALLEFEROUS U/GMINES

Kolar gold mines- problems of deepmining.
Manganese ore mine- Bherveli (Balaghat).
Mosabani coppermines.
Khetri coppermines.

Reference Books –

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Mines planning for coal	S.P. Mathur
2.	Surface Mining Technology	Sameer Kumar DGS
3.	MordernCoal mining Technology	-- --
4.	Coal mine ground control Vol- II	Syd. S. Peng
5.	Under ground Winning of coal	T.N. Singh
6.	Mine Working Part I & II	H.N. Karmkar

DIMI504

MINE MACHINERY&MAINTENANCE

H) DETAILED COURSE CONTENTS:

UNIT-1

WIREROPES

Types of wire ropes- winding, haulage and guideropes.
constructional details of wire ropes; ropelaying.
Testing of wire ropes: calculation of size of ropes: factor of safety: ropetroubles.
capping and recapping ofropes.
splicing of haulage ropes: factor of safety.
Care and maintenance of wire ropes in use and it storage.

WINDING

Different type ofwinders.
Head gear: head gear sheave, different type of rope cattles, suspension gear, rope cattles, safetyhooks.
Breaks-post brake, cage and its fitting kep gears, rigid & flexible rope guides: suspension of ropeguides.
Over wind & over speedprevention.
Factors governing height of the head-gear: dead load: live load and windpressure.

UNIT-2

COAL FACEMECHANISATION

Face mechanisation (B & P)classification
Electric coaldrill
Loaders-Powers loaders, operation anduse.
L.H.D. and S.D.L ., operation anduses.
Longwall face mechanisation
stage loads, AFC,Crush

GATE ENDBOX

Purpose of re-motecontrol.
General Principle of working of gate end box .
Protection of machineries through re-mote control.
Flame

proof and intrinsicsafety.

CHAPTER-5 COMPRESSED AIR

MACHINES

Compressed air power, comparison, andcompressors.
Different kind of compression andcompressors.
Calculation of work done and H.P. for given pressure and quantity of freeair.
Efficiency of compressors.

Advantage and limitation of compressed air power over electrical power.

Compressed air machines used in mines drills : air leg, pneumatic picksetc.

UNIT - 3

INTRODUCTION TO AERIAL ROPEWAYS

Different types of aerial ropeways.

Monocable and bicable ropeways.

Suitability and use.
UNIT -4 CONCEPT OF PREVENTIVE MAINTENANCE
7.1 Concept of preventive maintenance and its importance.
MINE TRANSPORTATION SYSTEM

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Elements of Mining Technology	D,J. Deshmukh
2.	Science and Art of Mining Digest	C.M.P.D.I. Pub.
3.	Mine Transport	Karelin
4.	Heat Engine	Pandya & Shah
5.	Course in mining Geology	R.N.P.Arogyswamy

PRACTICALS

1. To study, sketch and describe different types of wire ropes used in mines.
2. To study, sketch and describe different types of winding systems used in mines.
3. To study, sketch and describe electric coal drills, power loaders, long wallface machineries, stage loaders, AFC, crushers, etc.
4. To describe the layout, plan of operation and safety measures of any mechanization observed during training in mines.

DIMI505

DRILLING AND BLASTING PRACTICES IN MINES

UNIT - 1 EXPLOSIVE ENERGY AND BREAKAGE MECHANISM

Explosive energy, work energy, waste energy . Breakage mechanism, various theories of rock breakage

Type of explosive , - low explosive, high explosive, Permitted explosive. Detonators, types of detonators, detonating fuses, Electric detonator, advantage, precautions in handling

Misfires, precautions, statutory provisions related to shotfiring

UNIT-2 SURFACE BLASTING

Factors affecting blast design, selection of various blast parameters, Burden, Spacing, Stemming distance, Sub grade drilling, depth of hole, bench height, diameter of hole, Different types of explosives used in o/c mines, Liquid Oxygen, ANFO, O.C.G., Slurries, SMS, Emulsion explosive Deck charging and column loading, calculation of charge per hole and powder factor, controlled blasting, special blasting technique. Secondary blasting – Pop shooting and Plaster shooting Ground vibration measurement – its limitations

UNIT -3 UNDERGROUND BLASTING

Various cuts, Burden, spacing, depth of hole, stemming of hole, precaution during blasting. Solid blasting practice.

UNIT- 4 ROCK FRAGMENTATION

Mechanism of rock fragmentation, factors affecting rock fragmentation, Techniques to improve rock fragmentation

UNIT- 5 ENVIRONMENTAL IMPACT OF BLASTING

Back break, Over break, fly rock, Ground vibration-measurement, Prediction & control measures, air blast, noise

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Elements of mining technology –Vol-I	D.J. Deshmukh
2.	Explosive & Blasting Practice in mines	Sameer Kumar Das
3.	Open cost mining	Sameer Kumar Das
4.	Explosive & Blasting Practice in mines	Pradhan
5.	Open cost mine working	B. Ghosh

DIMI506

INDUSTRIAL TRAINING

RATIONALE:

Industrial Training is one of the most essential components for a diploma graduate in Mining and Mine Surveying. The sole purpose of industrial training is to expose the students to “real life” situations. Different aspects of mining such as geology, exploration, selection of method of working, selection of machines for mining, environmental controls and measures, safety in mines and various statutory provisions can only be understood when the students are exposed to different mine workings. Students will cover different coal and metal mines both underground and opencast in such a way that at the end of the completion of diploma programme, they are conversant with different mining conditions. Industrial training also opens avenues of new learning to the students and apply them during their project and industrial training presentations.

SEMESTER-VI

MINE ECONOMICS AND BENEFICIATION

UNIT- 1 GENERAL ECONOMICS

Economic terms

- a) Wealth
- b) Value:
 - (i) value in use and.
 - (ii) value in exchange.
- c) Goods.
- d) Price.
- e) Income.
- f) Investment.
- g) Saving.

Consumption and its importance

- a) consumption-satisfaction-needs.
- b) Types of consumption.
- c) importance of Consumption.

Wants- wants and economic activities, classification of wants-

- a) Law of diminishing utility
- b) Law of equi-marginal utility.

Utility- Meaning measurement, marginal and total utility.

Demand- definition, demand schedule and demand curve.

- a) Law of Demand.
- b) Extension and contraction in demand.
- c) Increase and decrease in demand.
- d) Elasticity of demand.

Supply.

- a) Supply of price.
- b) Supply schedule.
- c) Supply curve
- d) Supply function.
- e) Law of supply.
- f) Elasticity of supply.

Capital- Meaning, definition-

- a) Characteristics of capital.
- b) Wealth and Capital.
- c) Capital and labour.
- d) Capital and lands.
- e) Importance and function of Capital.

Money:

- a) Definition of money.
- b) function of money.
- c) Classification of money.

UNIT-2 MINE ECONOMICS-

Mineral industry - its role in national economy.

- a) Indian mineral resources and their statistics.
- b) Mineral policies.
- c) Conservation of minerals including coal company.

Constitution of companies under companies act.

- a) Types of companies.
- b) Private and public sector, merits and demerits.
 - i) Govt. undertakings.
- c) Nationalisation of coal industry formation of CIL and its subsidiaries.
- d) Elementary introduction of the following companies.
 - i) HCL
 - ii) BGML
 - iii) BALCO
 - iv) MOIL
- e) Labour
 - i) Efficiency of labour.
 - ii) Labour welfare.
 - iii) Social securities.
 - iv) Trade unions.

UNIT -3 SAMPLING-

a. Methods and importance of sampling.

- b. Size of samples.
- c. Class of samples.
- d. Different methods of sampling.
- e. Surface sampling.
- f. Under ground sampling.
- g. sampling of alluvial deposits.
- h. Errors in sampling.

Salting

- a. Method of salting
- b. safe guards against salting.
- c. Sampling records.
- d. Computation for tonnage—
 - Average assay value
 - Average sloping width
 - Clear width
 - Willing width
 - Length average
 - Average of block and total average
 - Prismoidal averaging

UNIT- 4 VALUATION

a) Methods of valuation

- b) Cases requiring valuation risk in calculation of mines

- c) Calculation of life of amine
 - d) Valuationreports
 - e) Mine as a wastingassets
 - f) Redemption of capitaldepriciation
- Valuation of mineral property and preparation ofreport

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Industrial economics	V.C.Sinha and Pushpa Sinha
2.	Mineral economics	R.K.Sinha and N.L.Sharma
3.	Mineral and mine economics	R.T.Deshmukh
4.		

DIMI602

OPEN CAST MINING AND LAND RECLAMATION

UNIT 1- OPEN CAST MINING

Classification of O.C. mine, manual, semi mechanized & mechanized.
Scope and limitation of O/C mines, Advantages and disadvantage of O/C mining.
Factors deciding the O/C mining.
Machineries used in O/C mines.

UNIT 2- OPENING OF O/C MINE

box cut and access trenches.
lay out and design – bench, dimensions, height and width, overall pit slope;
stability, general layout of O/C mine.
Drainage in pit and slope.
Suitability & limitations of O/C Machineries.

UNIT 3- REMOVAL OF STRATA

By scrapers, Dozers, Graders, Draglines for soft strata. shovels and haul packs surface miners and bucket wheel excavators.
By drilling and blasting for hard strata; primary & secondary blasting.
Blast hole pattern; burden, spacing, diameter and depth of blast holes.
Drilling blast holes and drill machines.
Blast hole geometry, toe formation, sub grade drilling, crater theory.
Different types of explosive used in O/C mines liquid oxygen, ANFO, OCG, slurries, side mixed slurry (SMS), Emulsion explosive
Deck charging, & column loading; calculation of powder factor/ charge factor. calculation of charge /hole, control blasting technique- Special blasting technique. detonators- blasting fuses, detonating fuses, Electric detonators, Nonel & Raydet's detonators. Secondary blasting – pop shooting and plaster shooting, snake holing, Ground vibration measurement- its limitations.

UNIT 4- LOADING MACHINERIES

Different machines used for loading – shovels, dragline, Multi bucket excavators, front end loader, pay loader and cranes- their application, scope & capacity.
Time study and calculation of out-put with shovel, dumper & dragline.

UNIT 5- TRANSPORTATION

Rail transport; trackless transport, Dumpers, conveyors; spreaders, transport haul road gradient width and slope. Dumps-site, slope and prevention of double handling. CHAPTER 6- LAND RECLAMATION

Physical restoration of mined out areas. Slope stabilization.
Various methods for land reclamation; afforestation

cultivationetc.

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Elements of mining technology Vol -I	D.J. Deshmukh
2.	Surface mining technology	Sameer Das
3.	Explosive & Blasting practice in mines	Sameer Das

PRACTICALS

1. To study and discuss the advantages and disadvantages of open castmining.
2. To study and describe the factors deciding the open castmining.
3. To list the machinerries used in open castmining.
4. To study and design different types of mine entries in open castmines.
5. To study and design layout of open cast minesfor
 - i. manualmines
 - ii. mechanized Mines for the givenproduction.
6. To study and describe different combinations of loading andtranspiration machines
7. To study and calculate the output with given numbers of shovel, dumpersand draglines.
8. To study and describe methods of landreclamation.

MINE MANAGEMENT LEGISLATION AND GENERAL SAFETY

UNIT- 1 MANAGEMENT

General principles of scientific management.

Managerial function of the following in brief-

- a) Planning.
- b) Organising
- c) Staffing
- d) Direction and control.
- e) Motivation

Work study in brief-

- a) Motion study
- b) Time study

UNIT-2 SAFETY

Accidents.

- a) Classification
- b) causes
- c) Remedial measures and Provisions in regulation.
- d) Cost of accident
- e) Report writing.

UNIT-3 LEGISLATION

Prevention and control of pollution Acts and rules (Air and water) Environment (Protection Act 1986 Provisions applicable to mining operation only.

Provisions of reclamation mined out land and afforestation as per forest conservation Act 1980.

Authority of pollution control Board over mining Industry and returns to be filed to board.

Provisions of land requisition for mining operations. The land revenue Code of the state and procedure for the same.

Elementary Knowledge about the Provisions of mineral concession rule 1960 and mine and mineral (Regulation & Development) Act 1957.

MINE MANAGEMENT LEGISLATION AND GENERAL SAFETY

BOOK RECOMMENDED –

1. Mines Act.
2. Coal mines Regulations.
3. Metalliferous Mine Regulations
4. Minerules.
5. Indian dispute Act.
6. Environment (Protection) Act 1986.
7. Environment (Protection) Rules 1986.
8. Indian forest Act 1927.
9. The hazardous wastes Act 1988.
10. Forest conservation Act 1980.
11. Commentaries on water air pollution and Environment (Protection) Laws.
12. Mineral concession rules 1960.
13. Mines and Mineral (Regulation and development Act 1957.
14. Land revenue code.
15. Contract labour and abolition rule.
16. Rescuerules.
17. V.T. Rules.
18. Trade Union Act.

ADVANCE MINESURVEYING

UNIT- 1 RECTANGULAR COORDINATE SYSTEM

- Definitions; latitudes & departures.
- Partial latitude and partial departures.
- Calculation of Partial latitude and partial departures
- Total latitude and total departures
- Calculation of Total latitude and total departures
- Calculation of length & bearing from total coordinates.
- Calculation of Area by Partial coordinate
- Calculation of Area by total coordinates Methods
- National grid system.
- To join colliery survey with N.G.

TACHEOMETRY

- General
- Stadia Diaphragm and its principle.
- Theory of anallatic lens.
- Determination of Multiplier and additive constant.
- Tacheometric survey.

UNIT - 2 CURVE

- Definition & properties of circle.
- Types of Curves.
- Nomenclature of a simple circular curve.
 - Elements of simple curve (Circular)
 - PI Interval, Degree of curve.
 - Classification of curve ranging method.
 - Methods of simple circular curve ranging.

- a. Chain and tape
 - i. By successive bisection of arc.
 - ii. by taking perpendicular offsets from tangents.
 - iii. by taking perpendicular offsets from long chord
 - iv. Chord and off set method.
- b. Instrumental methods.
 - i) Chord and angle method (tangential angle method)
 - ii) by taking angles from single station (Ranking method)
 - iii) by taking angles from two stations.

- D. U/ G cu rv e ra ng in g m et hods.
- i) chord and off set methods
 - ii) Chord and angle methods

Super Elevation.

Numerical Problems on simple circular curve.

CHAPTER- 4 TRIANGULATION SURVEY

Definition & principle of Triangulation survey.

Classification of Triangulation survey

Fixing of Stations.

Selection of site for Baseline.

Sequence of operation before base line measurement.

Equipments required for base line measurement.

measurement of baseline

Correction required in base line measurement.

Prolongation of a base line.

Adjustment of horizontal angles.

Colliery Triangulation

Precautions in Measuring angles and baseline.

Triangulation and Precise traversing.

True north determination (App. Method)

Methods of determining true north astronomical Method.

determination of True north in day time by observing sun.

Method of determining latitude and longitude of a survey

station

Definition of astronomical survey and Important terms , of

determination

azimuth by astronomical observation.

UNIT – 3 STOPESURVEYING

Definition and Introduction, purpose of stopesurvey.

Methods of stope surveying for flat, moderate indianed of steeply indined oredeposits.

OPEN CAST MINE SURVEYING

fixing of stations aroundboundary.

fixing of stations onbenches.

taking techeometric observation to check the position of stations.

Levelling operation to determine the R.L. of Stationpoints.

to conduct traverse survey to determine the exact position of stations.

To conduct off set survey to determine the position ofbench.

UNIT- 4 CORRELATION SURVEY

Purpose of correlationsurvey.

classification of methods oforientation.

Direct methods of traversing.

Assumed bearing method (Two shaftmethod).

Exact alignmentmethod.

Approximate alignmentmethod.

Wiessqudrilateral method.

Special chain of tapemethod.

Precise magneticmethod.

Gyrotheodolitemethod.

Correlation with national grid and local scalefactor.

DRIFT AND FAULTPROBLEM

Definition , fault, normal, reverse and trans current fault,fault planehade of fault , throw, want heave, excess.

Numerical problems on drift andfault.

INTRODUCTION TO MODERN SURVEY TECHNIQUES

9.1 Digital theodolite , electronic distance measuring equipment, Geodimeter; Tellurometer, Total station , Diatomite, software's related to mine surveying.

CHAPTER- 10 INTRODUCTION TO AERIAL PHOTOGRAPHY

General Principle; Phototheodolite; Stero photographic surveying;aerial surveying- field of application ; Vertical and oblique photographs; aerial photography; preparation ofphotographical maps by simplemethods;

Reference Book

Sl.No.	Title	Author, Publisher, Edition and Year
1.	Mining Suveying Vol-I& II	S.Ghatak
2.	Surveying and levelingVol-II	Kanetkar andKulkarni
3.	Surveying Vol-II	B.C. Punamia
4.	AdvanceSurveying	Alam chand
5.	Advance mineSurveying	D.C. Clark
6.	Surveying Vol-I& II & III	Arora

PRACTICAL

- | | |
|------------|---|
| measuring | <ol style="list-style-type: none"> 1. To traverse an area by included angle method. 2. To traverse an area by deflection angle method. 3. To traverse an area by Continuous azimuth method. 4. To determine the height of an electric pole / building tower by vertical angle from a single station. |
| measuring | <ol style="list-style-type: none"> 5. To determine the height of an electric pole/building tower by vertical angle from a Two station. |
| given | <ol style="list-style-type: none"> 6. To determine the constant of given theodolite. 7. To determine the distances from the Instrument stations to the stations. |
| intercept. | <ol style="list-style-type: none"> 8. To traverse an area by measuring horizontal angles and staff 9. To range a curve by successive bisection of arc. 10. To range a curve by taking perpendicular off sets from tangents. 11. To range a curve by taking perpendicular off sets from long chord. 12. To range a curve by chord of off sets method. 13. To range a curve by chord and angle method. 14. To range a curve by measuring from single station. 15. To range a curve by measuring angles from two stratification. 16. To prolong a given base line up to a given length. 17. To Measure a given base line and apply necessary correction on it. 18. To Conduct a triangulation survey in an given area. 19. To Conduct correlation survey by exact alignment method. 20. To Conduct correlation survey by direct method of traversing. 21. To Conduct correlation survey by approximate alignment method. |

- necessary
22. To Conduct correlation survey by quadrilateral method.
23. To calculate the coordinate of given station points by taking observation and plot the same by rectangular coordinate system.
- traverse by
24. To calculate the length and bearing of closing line of given taking necessary observations.
- coordinate method
25. To calculate the area of a given closed traverse by total by taking necessary observations.
- Total
26. Demonstration of modern survey equipments ,EDM, Tacheomate, station etc.

ENTREPRENEURSHIP DEVELOPMENT

D) DETAILED COURSE CONTENTS:

CHAPTER-1 Entrepreneurial Development

- Definition of entrepreneurship,
- Characteristics of entrepreneurs,
- Factors influencing entrepreneurship,
- Need for promotion of entrepreneurship and small business
- Entrepreneurial Environment
- Environmental analysis.
- Government policies for setting up new small enterprises
- Opportunities in service industries.

CHAPTER-2 Forms of Business Organization

- Forms of ownership
- Sole Proprietorship
- Partnership
- Cooperative society
- Joint – stock company
- Private Limited Companies
- Public Limited Companies

CHAPTER-3 Institutional support to SSI

- Institutional setup
- Industries centers,
- Industrial estates
- Institutional support at National level
- Institutional support at State level
- Commercial banks and financial institutions

CHAPTER-4 Planning a SSI

- What is planning?
- Types of planning
- Importance of planning
- Steps in planning
- Steps in planning a SSI
- Technical dimensions for setting up an enterprise

CHAPTER-5 Management of Small Business Firm

- Functional areas of small business firm

- Fundamentals of Management
- Managerial effectiveness
- Essential data for effective control of small business
- Resource management
- Office management
- Employees Welfare & safety
- Factory rules and Labour Laws related to SSIs
- Sales Tax and Income Tax laws related to SSIs

CHAPTER-6 Project selection, Formulation & Appraisal

- Project selection & formulation
- Scope of project report
- Content & Format of Project report
- Need of Project Appraisal
- Steps of Project Appraisal

CHAPTER-7 Problems of Small industries

- Power shortages
- Project planning
- Finance
- Raw material
- Production constraints
- Marketing
- Personal constraints
- Regulations

CHAPTER-8 Entrepreneurial Motivation Training

- Achievement Motivation
- Creative thinking
- Risk taking abilities

E) SUGGESTED INSTRUCTIONAL STRATEGIES:

- **Lecture Method.**
- **Industrial visits.**
- **Simulation**
- **Roleplay**

- Interaction with successful entrepreneurs
- Demonstration.
- Games

F) SUGGESTED LEARNING RESOURCES:

(a) Reference Books:

Sl. No.	Title	Author, Publisher, Edition & Year
1.	Starting your own Business, A step-by-step Blue print for the First-time Entrepreneur	Stephen C. Harper, Mc Craw-Hill
2.	Harward Business Review on Entrepreneurship	Harvard Business School Press
3.	Entrepreneurship Development in small scale proceedings of National Seminar, DCSSI, New Delhi	Patel V.G.
4.	Entrepreneurship : Strategies & Resources	Abrams Grant Pass, Oregon: Oasis Press
5.	The Business Planning Guide	David H. Bangs Upstart Publishing Company, In Chicago
6.	Entrepreneurship development in India	Dr. C.B. Gupta Dr. N.P. Srinivasan
		Sultan Chand & Sons

