



MATS UNIVERSITY
ARANG, RAIPUR (C.G.)



Scheme & Syllabus

(I-Semester)

Diploma

In

Mining Engineering



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



Scheme of Teaching & Examination

I – Semester

S. No.	Code	Subject	Total Credit	Periods per Week			Scheme of Marks	
				L	T	P	ESE	IM
1	DP100	Applied Mathematics-I	4	3	1	-	70	30
2	DP101	Applied Physics	3	3	0	-	70	30
3	DP102	Applied Mechanics	3	3	0	-	70	30
4	DP103	Computer Fundamentals and Its Applications	3	3	0	-	70	30
5	DP104	Environment and Ecology	3	3	0	-	70	30
6	DP105	Applied Physics Laboratory	1	-	-	2	30	20
7	DP106	Applied Mechanics Laboratory	1	-	-	2	30	20
8	DP107	Computer Fundamental Laboratory	1	-	-	2	30	20
9	DP108	Non-Conventional Energy Sources Laboratory	2	-	-	4	30	20
10	DP109	Workshop Practice – I	2	-	-	4	30	20
Total			23	15	1	14	500	250

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Mathematics-I
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	DP-100

COURSE OBJECTIVES

- To develop the use of algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with matrices, determinants and partial fractions. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools like binomial theorem, trigonometry and coordinate geometry and their usage.

UNIT-I ALGEBRA

LOGARITHMS- Definition of logarithm (Natural and Common logarithm.), Laws of logarithm. Examples.

PARTIAL FRACTION- Definition of polynomial fraction proper & improper. Fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. To resolve improper fraction into partial fraction.

UNIT-II DETERMINANT AND MATRICES

DETERMINANT- Definition and expansion of determinants of order 2 and 3. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns.

MATRICES- Definition of a matrix of order $m \times n$ and types of matrices. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. Transpose of a matrix. Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.

UNIT-III BINOMIAL THEOREM

Definition of factorial notation, definition of permutation and combinations with formula. Binomial theorem for positive index. General term. Binomial theorem for negative index. Approximate value (only formula)

UNIT-IV TRIGONOMETRY

TRIGONOMETRIC RATIOS- Trigonometric ratios of any angle, Relation between degree and radian, Fundamental identities, Examples based on Fundamental Identities, factorization and defactorization formulae, inverse trigonometric ratios Definition of inverse trigonometric, ratios, Principal. Relation between inverse trigonometric ratios. values of inverse trigonometric ratios.



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UNIT-V COORDINATE GEOMETRY

POINT AND DISTANCES- Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of collinearity.

STRAIGHT LINE- Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines condition of parallel and perpendicular lines. Intersection of two lines.

CIRCLE- Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. General equation of circle, its centre and radius.

VECTORS- Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) Dot (Scalar) product with properties. Vector (Cross) product with properties. applications of vectors work done and moment of force about a point & line.

COURSE OUTCOMES

- This course equips students to have basic knowledge and understanding in one field of materials, algebra, and trigonometry and coordinate geometry.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. 1 Mathematics for polytechnic, S. P. Deshpande Pune Vidyarthi Griha
2. 2 Mathematics for Polytechnic Volume I, TTTI Publication
3. 3 Applied Mathematics, EEB Publication, Bhopal
4. 4 Trigonometry S. L. Loney S., Chand Publication
5. 5 College Algebra Frc.G. Valles Charotar Publication
6. 6 Matrices Ayres Schuam series, McGraw hill



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Physics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 101

COURSE OBJECTIVE

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT-I

UNITS AND MEASUREMENTS

Fundamental units, Derived units, unit system, S.I. units – Their importance & notation, Base, S.I. units system & Abbreviations, Principle of vernier calipers, screw gauge & Speedometer. Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures. (Numerical on percentage error and significant figures)

UNIT-II

FORCE, MOTION & GRAVITATION

Equations of motion, Newton's law of motion, Force & its derivation from Newton's laws of motion, Composition and resolution of forces, Parabolic Motion, Horizontal projection and projection at an angle, time of flight, Horizontal range and maximum horizontal range, Simple Problems, Centripetal acceleration, centripetal and centrifugal forces, Concept of friction and its application. Application to banking of roads, Newton's law of Gravitation, Basic forces in nature, Gravitational field, Potential, Relation between "g" & "G", factors influencing "g" escape velocity, Kepler's Laws of planetary motion, satellites, Time period of satellites, simple pendulum.

UNIT-III ELASTICITY, SURFACE TENSION & VISCOSITY

Concept of elasticity, Deformation, Stress, Strain- its kinds and units, Hooke's law, elastic unit, elastic fatigue, Modulus of elasticity, Young's Modulus and its determination by Snell's method. Molecular forces, cohesive and adhesive forces, surface tension & surface energy, Reason for spherical shape of Rain Drops, Angle of contact, pressure difference a liquid surface excess pressure inside a liquid drop & soap bubble, shape of liquid surface In a capillary tube, Rise of liquids in a capillary tube, Determination of surface tension by capillary rise method. Effect of temperature on surface tension, examples of surface tension. Concept of viscosity & coefficient of viscosity, streamline and Turbulent flow.

UNIT-IV LIGHT, LASER AND SOUND APPLICATIONS OF LIGHT

Refraction and refractive index. Defects in image formation (Qualitative), Simple and compound microscope, astronomical and Galileo telescopes and their magnifying powers.

LASER - Properties of laser, spontaneous and stimulated emission, population inversion, optical Pumping, construction and working of He-Ne laser.



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APPLICATIONS OF SOUND–ULTRASONIC Production of ultrasonic waves by using magnetostriction and piezo – electric methods. Applications to drilling cold welding, cleaning, flaw detection and exploration.

ACOUSTICS-Reflection, refraction and absorption of sound waves by surfaces. Echo and reverberation.

UNIT-V MODERN PHYSICS

PHOTO ELECTRICITY- Concept of photon, Plank's hypothesis, properties of photon, photo electric effect, Characteristics of photoelectric effect, work function, Einstein's photoelectric equation(no derivation), photoelectric cell-construction ,working and applications

X-RAYS - Introduction to x-rays, types of x-ray spectra-continuous and characteristics, production of x-rays using Coolidge tube, minimum wavelength of x-rays, properties of x-rays, engineering, medical and scientific applications.

COURSE OUTCOME

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS

1. Applied Physics Vol. I&II H.C. Saxena & Prabhakar Singh
2. Applied Physics Vol. I&II D.Halliday & R.Rasnick
3. Engineering Physics – BVN Rao

REFERENCE BOOKS

1. Principles of Physics – K.K. Mohindroo
2. Basic Principles of Physics – Brij Lal Subramanyam.
3. Physics-I V. Rajendran, Tata McGraw- Hill raw- Hill publication, New Delhi
4. Applied physics Arthur Beiser, Tata McGraw- Hill raw- Hill Publication, New Delhi
5. Engineering Physics by R.K.Gaur and S.L.Gupta, Dhanpat Rai Publication, New Delhi.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Mechanics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 102

COURSE OBJECTIVES

- To gain a fundamental understanding of the concepts of force, moments, moment of inertia.
- To study engineering properties of materials, force-deformation and stress-strain relationship
- To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition of forces.
- To analyze; determinate beams to determine axial forces, shear forces, bending moments.

UNIT-I FUNDAMENTAL CONCEPTS

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

UNIT-II FORCES AND FRICTION

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.

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. Ladder and wedge friction. Friction in Journal bearings Method of reducing friction.

UNIT-III CENTROID AND CENTRE OF GRAVITY

CENTROID- Definition of centroid, moment of an area about an axis, centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite geometrical figures.

CENTRE OF GRAVITY- Definition, centre of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids (No hollow solids shall be considered).

UNIT-IV SIMPLE LIFTING MACHINES

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.



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TRANSMISSION OF POWER- Transmission of power through Belt, Rope and Gears, Ratio of tension on tight and slack sides. Spur, Helical & Bevel gear, Rack and Pinion gear. Gear Trains- Simple, Compound, Reverted.

UNIT-V KINETICS AND KINEMATICS- Kinetics of particle, motion under constant force, Newton's Laws of Motion. D' Alemberts principle. Motion under constant torque, Flywheel. Kinematics in Cartesian and polar coordinates. Angular displacement, Angular Velocity, Angular Acceleration. Motion under gravity.

COURSE OUTCOME

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

TEXT BOOKS

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. Engineering Mechanics, Beer – Johnson, Tata McGraw Hill, Delhi

REFERENCE BOOKS

1. Engineering Mechanics, Basu, Tata McGraw Hill, Delhi
2. Applied Mechanics, R. S. Khurmi, Dhanpat Rai & sons, Delhi
3. Fundamental of Applied Mechanics, Dhade, Jamdar & Walawalkar, Vidhyarthi Gruh Prakashan, Pune
4. Engineering Mechanics, Timoshenko & Young, McGraw Hills Publication, New Delhi

MATS UNIVERSITY, RAIPUR (C.G.)

MATS School of Engineering & I.T



MATS UNIVERSITY

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SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Computer Fundamentals and Its Applications
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 103

COURSE OBJECTIVES

- This course will introduce student to the field of computer science and the fundamentals of computer.
- It is specifically designed for students with no prior programming experience, and touches upon a variety of fundamental topics.
- The goal of the computer science curriculum is to provide students with the knowledge and tools that will allow them to design and implement effective, economical, and creative solutions for the needs of individuals, society, and the high-tech economy.

UNIT-I COMPUTER APPRECIATION

Definition of electronic compute, history, generation, characteristics & application of computers, classification of computers, RAM, ROM, computer, hardware, CPU, various I/O devices, peripherals, storage media, software, definition and concepts.

UNIT-II DATA COMMUNICATION & NETWORKS

Computer networks, networking of computers, introduction to LAN, WAN, MAN, network topologies, basic concepts in computers networks, introduction to GPRS, CDMA, GSM & FM technologies.

UNIT-III FAMILIARIZATION WITH OPERATING SYSTEM

Introduction to computer Operating System (Dos, 2000/Xp), Introduction to Dos structure, system files, batch files & configuration files, Booting the system from hard disk. Brief Introduction to Dos internal & external commands, Familiarization with windows structures, its use and application.

UNIT-IV COMPUTER APPLICATIONS SOFTWARE

Word processing software - MS-WORD, Data analysis software - MS-EXCEL Introduction to electronic spreadsheet, Presentations software - MS-POWER POINT

UNIT-V INTERNET TECHNOLOGY

What is Internet, Equipment Required for Internet connection (MODEM and Terminal Adapters)
Sending & receiving Emails, Browsing the WWW, Creating own Email Account, Internet chatting (textual /voice), Bulletin Boards, Video conferencing, FTP (uploading and downloading files), Web-Site Access and Information Search, Browsers and search engines.

COURSE OUTCOME

- Compare and contrast various types of computers.
- Explain the purpose of CPU and how it works.
- Describe how information is stored in memory.



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- Know about various types of software's and its applications.

TEXT BOOKS

1. Introduction to Computers- Peter Norton's, Tata McGraw Hills Publishing Co.l Ltd. N. Delhi, IInd Edition, 1998
2. Vikas Gupta , Comdex Computer Course Kit First , Dreamtech publication
3. Henry Lucas Information Technology for management 7th Tata Mc-Graw Hills

REFERENCE BOOKS

1. B.Ram, Computer Fundamentals Architecture and Organisation , Revised 3rd , New Age International.
2. Computer Today S.K.Basanbhara, Galgotia Publication, 1 st Edition, 2000
3. Computer Organization and Architecture, William Stalling, Prentice Hall of India Pvt.Ltd ,N.Delhi, IV th - Edition, 1999.
4. Structured computer Organization , Andrews Tanenbaum, Prentice Hall of India Pvt.Ltd, N.Delhi, III rd- Edition, 1997



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Environment and Ecology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 104

COURSE OBJECTIVE

- This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it.
- Environmental ethics and its protection through lectures, presentations, documentaries and field visits.

UNIT-I CONCEPTS OF ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES

Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals. Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative).

UNIT-II BIODIVERSITY AND ITS CONSERVATION

Biodiversity at global, national and local levels: India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.

UNIT-III ENVIRONMENTAL POLLUTION

Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

UNIT- IV ENVIRONMENTAL BIOTECHNOLOGY AND ENVIRONMENTAL MONITORING

Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto-remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques.

UNIT-V

SOCIAL ISSUES AND ENVIRONMENT

Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics



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COURSE OUTCOMES

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Critically analyze technical subject matter (written or oral) for scientific merit apply learned environmental knowledge and understanding to solve technical /research problems in new contexts.

TEXTBOOKS

1. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. A. K. Chatterji, “Introduction to Environmental Biotechnology”, Prentice Hall of India, New Delhi, 2006.
2. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II, Enviro Media.
3. Nebel B. J., “Environmental Science”, Prentice Hall of India, New Delhi, 1987.



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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester : I
Branch : Diploma in Mining Engineering
Subject : Applied Physics Laboratory
Total Theory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP 105

LIST OF EXPERIMENTS

1. To use Vernier Caliper for the measurement of dimensions of given object.
2. To use Micrometer Screw Gauge for the measurement of dimensions (Length, Thickness, Diameter) of given object.
3. To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
4. To determine the value of "g" using simple pendulum.
5. To determine Young's modulus of elasticity of the material of given wire using Searl's apparatus.
6. To determine surface tension of water by capillary rise method.
7. To determine coefficient of viscosity of given fluid (Glycerin) using Stoke's Method.
8. To determine coefficient of viscosity of a fluid by Poiseuille's method.
9. To determine refractive index of the material of prism using graph.
10. To determine focal length of concave mirror & convex lens.
11. To determine focal length of combination of two lenses.
12. To determine mechanical equivalent of heat by using Joules colorimeter.
13. To determine the velocity of sound by using resonance tube.
14. To verify characteristics of photoelectric cell.
15. Use of Thermocouple as a thermometer for the measurement of unknown temperature (Boiling Point of Water)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Mechanics Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 106

LIST OF EXPERIMENTS

1. Verification of law of triangle of forces.
2. Verification of law of Parallelogram of forces.
3. Verification of law of Polygon of forces
4. To verification of Lami's theorem.
5. Demonstration of Non-concurrent, Non-Parallel forces (Funicular diagram)
6. Verification of Law of Moments.
7. Determination of coefficient of friction for surfaces of different materials on-
a) Horizontal Plane b) Inclined Plane
8. Draw – V-T diagram's for different combinations of-
a) Velocities b) Uniform accelerations
9. Find-out Mechanical advantage, Velocity Ratio and Efficiency for following
1. Machines- a) Simple Screw b) Differential Wheel & Axle c) Simple Purchase Crab d) Differential Pulley Block.
10. Demonstration of use of inclined plane as a lifting machine.
11. Experimental location of center of gravity of plane plate of uniform thickness.
12. Comparison of coefficient of friction of various pair of surfaces and determination of angle of repose.
13. To verify equilibrium of parallel forces – simply supported beam reactions.
14. To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency. Also check the reversibility of a machine
a) Worm and worm wheel or Differential axle and wheel
b) Weston's differential pulley block or Geared pulley block
c) Single purchase crab or Double purchase crab
d) Simple screw jack.
e) Two sheave and three sheave pulley block.
16. Graphical solutions on graph paper of the following:
a) Concurrent force system: Two problems
b) Parallel force system: Two problems
c) Reactions of a beam having vertical point loads & UDL: Two problems



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma Mining Engineering
Subject	:	Computer Fundamental Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 107

LIST OF EXPERIMENTS

1. **PRACTICE ON WINDOWS 7/8:** 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.
2. **PRACTICE ON MS-WORD:** Create and format document, - Edit and Modify text- changing font size type and style, AutoText, 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.
3. **PRACTICE ON POWERPOINT:** Create, edit, insert, move, slides - Open and save presentation- Insert picture, slide layout, action button - Present slide show.
4. **PRACTICE ON:** Identification of type of Account. - Connecting to internet, Dial up access, - Web browsing,-Searching websites.
5. **PRACTICE ON:** Information searching - Email services Creating email accounts & Receiving and sending mails



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester : I
Branch : Diploma in Mining Engineering
Subject : Non-Conventional Energy Sources Laboratory
Total Theory Periods : 28
Total Tutorial Periods : 00
Total Credits : 02
Code : DP 108

LIST OF EXPERIMENTS

1. Study of Solar Radiation by using Pyrometer.
2. Study of Solar Distillation or Solar Still.
3. Study of solar water pumping
4. To study the constructional details of a box type solar cooker.
5. Prepare delicious food by using solar cooker.
6. Study of Thermo siphon solar water heating system.
7. Study of Forced circulation solar water heating system
8. Study of Solar Street Lighting and Lanterns.
9. Study of Bio gas plant.
10. Study of Horizontal Wind Mill
11. Study of Fuel cells.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	Diploma in Mining Engineering
Subject	:	Workshop Practice – I Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	DP 109

LIST OF EXPERIMENTS

1. Measurement Identification and use of the various measuring tools & instruments.
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 fitting shop.
 - 3.2 Perform various fitting operations.
 - 3.3 Marking of job as per dimension.
 - 3.4 Sawing.
 - 3.5 Chipping.
 - 3.6 Filing.
 - 3.7 Taping.
 - 3.8 Reaming.
 - 3.9 Drilling.
4. Welding Shop
 - 4.1 Identification and use of the various tools and equipments.
 - 4.2 Perform the arc welding and gas welding operations.
 - 4.3 Perform the soldering and Brazing operations.



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Scheme & Syllabus

(II-Semester)

Diploma

In

Mining Engineering



MATS UNIVERSITY

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Scheme of Teaching & Examination

II – Semester

S. No.	Code	Subject	Total Credit	Periods per Week			Scheme of Marks	
				L	T	P	ESE	IM
1	DP200	Applied Mathematics-II	4	-	1	-	70	30
2	DP201	Applied Chemistry	3	-	0	-	70	30
3	DP202	Engineering Drawing	2	-	0	-	70	30
4	DP203	Basic Electrical and Electronics	4	-	1	-	70	30
5	DP204	Communication Skills	3	-	0	-	70	30
6	DP205	Applied Chemistry Laboratory	1	2	-	2	30	20
7	DP206	Engineering Drawing Laboratory	2	4	-	4	30	20
8	DP207	Basic Electrical and Electronics Laboratory	1	2	-	2	30	20
9	DP208	Communication Laboratory	1	2	-	2	30	20
10	DP209	Workshop Practice – II Laboratory	2	2	-	2	30	20
Total			23	15	2	12	500	250

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Mathematics-II
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	DP 200

COURSE OBJECTIVES

- To develop the use of calculus techniques, this is needed by engineers for practical applications.
- To familiarize the student with statistics and complex numbers. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their

UNIT-I FUNCTION AND LIMIT

FUNCTION- Definitions of variable, constant, intervals such as open, closed, semi-open etc. Definition of Function, value of a function and types of functions, Simple Examples.

LIMITS- Definition of neighborhood, concept and definition limit. Limits of algebraic, trigonometric, exponential and logarithmic functions with simple examples

UNIT-II DERIVATIVES

Definition of Derivatives, notations. Derivatives of Standard Functions Rules of Differentiation. (Without proof). Such as Derivatives of Sum or difference, scalar multiplication, Product and quotient. Derivatives of composite function (Chain rule). Derivatives of inverse and inverse trigonometric functions. Derivatives of Implicit Function, Logarithmic differentiation Derivatives of parametric Functions. Applications of Derivative.

UNIT-III INTEGRATION

Introduction, Definition, Method of substitution, Integration by parts, Integration by Partial Fraction Method, Integration of the form and Reduction Formula., Definite Integral – Introduction

UNIT-IV STATISTICS

Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. Graphical representation (Histogram and Ogive Curves) to find mode and median Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation. Comparison of two sets of observations.

UNIT -V COMPLEX NUMBER

Definition of Complex number. Cartesian, polar, Exponential forms of Complex number. Subtraction, Multiplication and Division). De-Moivre's theorem (without proof) Examples based on it, roots of complex numbers, roots of unity, Euler's form of Circular functions, hyperbolic functions and relations between circular & hyperbolic functions



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COURSE OUTCOMES

- This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.

TEXT BOOKS

1. Introductory Method of Numerical Analysis, Sastry S. S. (, PHI)
2. Mathematical Statistics, Ray and Sharma

REFERENCE BOOKS

1. Modern Algebra Sharma and Seth (Ram Prasad and Sons)
2. Mathematics for polytechnic, S. P. Deshpande, Pune Vidyarthi Griha
3. Applied Mathematics, EEB Publication, Bhopal.



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Chemistry
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 201

COURSE OBJECTIVES

- To make the students conversant with atomic structure.
- Principles of electrochemical reactions, acids and bases.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT-I ATOMIC STRUCTURE

Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr's Theory, Definition, Shape of the orbitals & distinction between Orbits & Orbitals, Hund's Rule, Filling Up of the Orbitals by Aufbau's Principle (till Atomic no. 30), Definition & types of valency (Electrovalency & Covalency), Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds.

UNIT-II ELECTRO CHEMISTRY

ACIDS AND BASES- Concept of acids and bases, their strength in ionization constant. PH value, acid base titration, choice of indicators. Hydrolysis, Buffer solution. **ELECTROLYSIS** - Concept of electrolysis. Kohlrausch law, Ostwald dilution laws, Transport no. Faraday's law of electrolysis. Engineering applications (electrometallurgy, electroplating & electrorefining)

UNIT-III SOLUTIONS & COLLOIDS

Solute, solvent, solution & colloids. Particle size and colloidal state Types of colloidal solution, reparation of colloids, properties of colloidal solutions, Origin of change on colloidal particles, precipitation of Coagulation of colloidal solution. Protective colloids and Gold number, Emulsions cleansing action of soaps, Detergents, Gels.

UNIT-IV METALS

Occurrence of Metals, Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Mechanical Properties of metals such as Hardness, Toughness, Ductility, Malleability, Tensile strength, Machinability, Weldability, Forging, Soldering, Castability. Stages of Extraction of Metals from its Ores in detail i.e. Crushing, Concentration, Reduction, and Refining. Physical Properties & Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W.

UNIT-V FUELS AND EXPLOSIVES

Classification of fuels, solid fuels, liquid fuels, gaseous fuels, characteristics of a good fuel, calorific value, Determination of calorific value by Bomb calorimeter, Explosives- classification and application.



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LUBRICANTS, PAINTS AND VARNISHES- Lubricant- meaning types, theory of lubrication, properties of good lubricants with special emphasis on Flash, Fire point, pour point and cloud point. Specification number and viscosity, Paints and Varnish – Constituents, properties and uses.

COURSE OUTCOMES

- The knowledge gained on solutions, fuels, energy sources and atomic structure will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS

1. Jain & Jain- Engineering Chemistry, Dhanpat Rai and Sons
2. Engineering Chemistry by O. P. Agrawal.
3. S. S. Dara, Engineering Chemistry, S. Chand Publication

REFERENCE BOOKS

1. Vedprakash Mehta, Polytechnic Chemistry by Jain brothers
2. Physical Chemistry by Glosstone.
3. Modern Text Book of Applied Chemistry by P.C. Jain, Dr. G. C. Saxena and Dr.A. K. Goswami.



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ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Drawing
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	DP 202

COURSE OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT-I INTRODUCTION, ENGINEERING CURVES AND SCALES

Introduction to drawing equipment's, 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)

ENGINEERING CURVES AND SCALES: Types and 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.

UNIT-II 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 (limited to first quadrant), Projection of planes with respect to reference planes, Practice problems on projection of points, lines and planes.

UNIT-III PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projection of simple solids – cube, prism, cylinder, cone and pyramids, Sectional view – need for sectional view – cutting plane – cutting, plane line-representation as per I.S. code- hatching – section of simple solids, cube, prism, cylinder, cone.

UNIT-IV ISOMETRIC PROJECTIONS

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.

UNIT-V

NUTS & BOLTS- Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts, keys and couplings.



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COURSE OUTCOMES

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces. perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS

1. I.S. 696 (Latest revision). BIS, India.
2. Engineering Drawing, N.D. Bhatt, Charotar Publisher, Anand.
1. 3 Engineering Drawing & Machine Drawing, R. K. Dhawan, Kumar, S. Chand & Co.
2. 4 Engineering Drawing, R.B. Gupta, Satya Prakashan, Delhi.

REFERENCE BOOKS

1. Geometrical Drawing, P.S. Gill , ketson & Sons.
2. Machine Drawing, By P.S. Gill, ketson & Sons.
3. Engineering Drawing Gujral & Shende, Khanna Pub. N.Delhi.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Basic Electrical and Electronics
Total Theory Periods	:	60
Total Tutorial Periods	:	01
Total Credits	:	03
Code	:	DP 203

COURSE OBJECTIVES

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To impart knowledge of communication.
- To explain the principles of digital electronics.
- To impart knowledge of communication.

UNIT-I D.C. CIRCUIT

Ohm's Law, series and parallel circuit, various basic definitions related to dc circuit/network, Source transformation and network reduction technique, ideal and practical current and voltage sources, Kirchhoff's laws and its application.

ELECTRIC INDUCTION- Faraday's Laws, Lenz Law; Thumb rule, Fleming's rules.

UNIT-II A.C. CIRCUIT

Principles of A.C. Circuits, Definition of cycle, frequency, amplitude and time period. Instantaneous, RMS and maximum value of sinusoidal wave; form factor and Peak Factor, average values, Concept of Phase and Phase difference, Concept of resistance, inductance and capacitance in simple A.C. Circuit. Power factor and improvement of power factor by use of capacitors.

MEASURING INSTRUMENTS

Principle and construction of instruments used for measuring current, voltage, Power and energy.

UNIT-III TRANSFORMERS

Introduction to single line diagram of power system (generation, transmission and distribution), What is transformer and its importance in power system, classification of transformer in detail, Working, Principle and construction of single phase transformer, Transformation ratio, emf equation, losses and efficiency, Auto-transformer, Applications of various transformer.

UNIT-IV ELECTRICAL MACHINE

D.C. MACHINES-Working, Principle and construction of D.C. machines (D.C. motor and generator), Classification of D.C. machines, Application of D.C. Machines.

A.C.MOTOR- INDUCTION MOTOR- Working, principle and construction of 3phase induction motors, Type of induction motor slip ring and squirrel cage. Slip and torque speed characteristics of induction motor. Application of 3phase induction machines Concept of single phase induction motors and its applications.



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UNIT-V BASIC ELECTRONICS

Difference between conductor, insulator and semi-conductor and its properties. Basic idea of semiconductors P and Ntype, Diodes, Zener diodes and their applications, Transistor PNP and NPN, their characteristics and uses. Characteristic and application of thyristors, Introduction: - rectifier, inverter, chopper, cyclo-converter. Characteristics and applications of servo motors.

COURSE OUTCOMES

- Ability to identify electronics components and use of them to design circuits.
- Ability to fabricate electrical circuits.

TEXT BOOKS

1. A Text book of Basic Electrical Engineering, Sahadev and Chaturvedi.
2. A Text book of Basic Electrical Engineering, B. L. Thereja. Vol-I

REFERENCE BOOKS

1. A Text book of Basic Electrical Engineering, B. L. Thereja. Vol-II
2. Basic Electrical Engineering by I. J. Nagrath, (T.M.H.)
3. Cotton, H. "Advance Electrical Technology," ISSAC Pitman, London



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Communication Skills
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 204

COURSE OBJECTIVES

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.

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(9) Taming the Atom Radar and its Uses (10) A Volcano (11)Precision – A Measure of Progress (12) Laser

UNIT-II APPLIED GRAMMAR

(1)Determiners (2)Auxiliaries (3)Tenses (4)Conditional (5)Passive (6)Prepositions (7)Subject-verb Agreement (8)Clauses & Connectors (9) Basic Sentence (10) Pattern(11) Infinitives(12) Narration (13)Common Errors(14) Modifiers (15) Paragraph Writing

UNIT-III LETTER WRITING

THEORY: Introduction Purposes of Letters, Characteristics of a Letter, Mechanics and Style, Types of Business Letters: - Letter of Enquiry, Answer to an Enquiry .

WRITING SKILLS: (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-IV REPORT WRITING

Writing Progress – Report of a job, General outline for preparing a Project Report.

UNIT-V TECHNICAL WRITING

A Communication Skill , Basic facts of Technical Writing ,.

FEATURES OF TECHNICAL WRITING- Features of Technical Writing, Style: Literary and Technical, Mechanics of Technical Writing.

FORMS OF TECHNICAL WRITING - Forms, Writing Definitions, Writing Technical Descriptions, Writing Technical Descriptions of Processes, Writing Instructions .

WRITING TECHNICAL REPORTS- (a). Qualities of a Good Report (b). Forms of Reports (c). Types of Report



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COURSE OUTCOMES

- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.

TEXT BOOKS

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

REFERENCE BOOKS

1. English Conversation Practice by Grant Taylor.
2. Grammar & Composition by P R Sarkar, Anand Marg Publication, Easter, Matropolition Calcutta.
3. Essentials of English & Business Communication by Rajendra Pal,J.S Korlahalli S.Chand & Sons, New Delhi.



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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Applied Chemistry Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 205

LIST OF EXPERIMENTS

1. Identification of two cat ions and two anions in a given sample of ore/powder/mixture.
2. To determine percentage of copper in a given sample by Brass titration.
3. Qualitative Analysis of **any five Solutions**, Containing One Basic & One Acidic Radical.
4. To determine percentage of Iron in a iron salt by redox titration.
5. To Determine the % of Fe in the Given Ferrous Alloy by KMnO_4 Method.
6. Calorimetric estimation of metals in a given sample of an alloy.
7. Measurement of Ph of different solutions.
8. Proximate analysis of a sample of coal.
9. To find out the Flash point/Fire point of dry/non drying oils.
10. Determination of Calorific value (C.V.) of solid fuel by Bomb Calorimeter



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SCHOOL OF ENGINEERING & I.T.

Semester : II
Branch : Diploma in Mining Engineering
Subject : Engineering Drawing Laboratory
Total Theory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP 206

LIST OF EXPERIMENTS

1. Problems on Scales and Letterings (One sheet).
2. Problems on Curves (One sheet).
3. Simple Orthographic Projections- One for First Angle and One for Third Angle Projection (Two sheets).
4. Orthographic projections with sections (One sheet).
5. Isometric projection for two objects (One sheet).
6. Projection of Points and Lines (One sheet).
7. Projection of Planes (One sheet).
8. Projection of Solids (Two sheets).
9. Section of Solids (Two sheets).
10. Development of surface (Two sheets).



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Electrical and Electronics Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 207

LIST OF EXPERIMENTS

1. To study the symbolic representation of various elements & sources used in electric circuit.
2. To Study various instruments & devices used in electric laboratory.
3. To verify ohm's law
4. To study series & parallel connection of electric circuit
5. To verify kirchhoff's law.
6. To determine value of R & L of choke coil.
7. To determine the efficiency of a transformer by direct loading test.
8. To study the auto transformer.
9. To study the various parts of DC machine.
10. To study the constructional details of three phase induction motor.
11. To study & draw VI characteristics of SCR.
12. Demonstrate the function of diode as a rectifier.
13. To study & testing of common electrical appliances. e.g. ceiling fan, water heater, grinder etc.
14. To calibrate of energy meter using voltmeter and ammeter.



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Communication Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 208

LIST OF EXPERIMENTS

1. LISTENING SKILLS

Teacher reads an unseen passage or plays an audio file once. Students have to answer the questions after listening to the passage.

2. MAKING PRESENTATIONS

The list of the topics should be displayed during practical session. Students select a topic each through lottery. Presentation should be for five minutes. All the presentations of the students have to be completed before the end examination.

3. RECORD

Students have to answer the questions given in the activities in the students' lab manual in a separate notebook or a record book. In the same notebook or record book, they shall answer the questions given in the assignments.

4. GROUP DISCUSSION

Before commencing the Discussion the groups and their topics should be displayed. The students shall be divided on the basis of roll number or as per the convenience of the teacher. Each group may consist of five or six students. The Group Discussion may be conducted simultaneously for two or three groups.

5. SPEAKING SKILLS

Teacher asks the students questions individually. Topics for this activity are:

- | | |
|----------------------------|---------------------------------------|
| ● Introducing Oneself | ● Describing Events |
| ● Describing Objects | ● Speaking from Observation / Reading |
| ● Reporting Past Incidents | ● Interview Skills |



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	Diploma in Mining Engineering
Subject	:	Workshop Practice – II Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 209

LIST OF EXPERIMENTS

1. Smithy Shop

- 1.1 Identification of various tools and equipments used & their use.
- 1.2 Perform various smithy operations.
- 1.3 Up setting.
- 1.4 Drawing down.

2. Moulding Shop

- 2.1 Identification and use of the various tools.
- 2.2 Perform various sheet-metal operations.
- 2.3 Shearing
- 2.4 Bending

3. Machine shop

- 3.1 Identification and use of the various tools and equipments.
- 3.2 Classification of lathe and operation of lathe.
- 3.3 Plane turning

- 1.5 Bending

- 1.6 Setting down.

- 1.7 Welding.

- 1.8 Cutting.

- 1.9 Punching.

- 2.5 Drawing

- 2.6 Squeezing.

- 2.7 Marking on sheet

- 2.8 Snipping.

- 2.9 Grooving

- 3.4 Taper turning

- 3.5 Treading

- 3.6 Drilling

- 3.7 Various attachment used in lathe.



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Scheme & Syllabus

(III-Semester)

Diploma

In

Mining Engineering



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Scheme of Teaching & Examination

III - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP300	Mathematics	3	0	-	70	30	3
2.	DP361	Surveying-I	3	0	-	70	30	3
3.	DP362	Mine Development Drilling & Blasting	3	0	-	70	30	3
4.	DP363	Engineering Geology	3	0	-	70	30	3
5.	DP364	Mechanics of Structures	3	0	-	70	30	3
6.	DP365	Mine Environment Engineering-I	3	0	-	70	30	3
7.	DP366	Surveying-I Laboratory	-	-	2	30	20	1
8.	DP367	Mine Development Drilling & Blasting Laboratory	-	-	2	30	20	1
9.	DP368	Engineering Geology Laboratory	-	-	2	30	20	1
10.	DP369	Mechanics of Structures	-	-	2	30	20	1
Total			18	4	8	540	260	22

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mathematics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 300

COURSE OBJECTIVES:

- To develop logical understanding of the Differential calculus and Differential equation.
- The students can develop mathematical skill to apply mathematical principals in solving problem from vector calculus and multiple integrals.
- To make aware students about the importance of Mathematics to solve Engineering problems.

UNIT- I DIFFERENTIAL CALCULUS

Successive differentiation, Leibnitz Theorem, Rolle's Theorem, Taylor's Theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

UNIT-II ORDINARY DIFFERENTIAL EQUATION

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type. Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation, Legendre polynomials and their properties

UNIT-III PARTIAL DIFFERENTIATION

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT IV VECTOR CALCULUS

Directional derivative, Gradient, Divergence and Curl, Line, Surface and Volume integrals, Green's, Gauss's & Stoke's theorem (without proof) and applications

UNIT-V MULTIPLE INTEGRAL

Beta and Gamma functions - Elementary properties, Double and Triple Integrals, Change of order of Integration, Application to area and volume.



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COURSE OUTCOME:-

- Students understood the foundations of mathematics like differential calculus and ordinary differential calculus.
- Students are able to perform basic computations in higher mathematics.
- Students are able to read and understand problems related to vector calculus.
- Students are able to write and understand basic proofs of partial differential equation and multiple integrals.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar &J.N.Wartikar Vol-II –Pune Vidyarthi GrihaPrakasan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Surveying-I
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 361

COURSE OBJECTIVES:

- Technical observations commence with scientific glances necessity skills of majoring various objects.
- A newly admitted student of this special stream needs to be taught the various objectives and methods of measuring land forms.
- Mine Surveying” included in the curriculum to enable students to acquire knowledge of various type of surveying methods.

UNIT-I INTRODUCTION

Purpose of engineering surveys, Principles of surveying, Various instruments used for length and angular measurements, Plane and geodetic surveying.

UNIT-II CHAIN SURVEYING

Types of chain and tapes Study of 20m and 30 m chain, Accessories in chain surveying, Ranging methods- direct ranging, indirect/reciprocal ranging, Use of line range, Chaining on plane and sloping ground, Obstacles in chaining, offsets, Types of offsets, Use of offsets Instruments used to take offsets, Recording field book, chain traversing, base line, tie line, check line, and chain triangulation, Errors in chaining, tape and their correction, Symbols and signs to indicate ground features.

UNIT-III COMPASS SURVEYING

Types of compass prismatic and surveyors compass, Bearing of lines fore bearing and back bearing, Whole circle bearing and reduced bearing systems, Local attraction and its detection, Magnetic declination and dip Calculation of - exterior and interior angle, Closed and open traverse, closing errors, Graphical adjustment of closing error.

UNIT-IV LEVELING AND CONTOURING

Meaning of various terms used in leveling, Types of levels and their uses, Dumpy level, tilting level, quick set level, Auto-set level and digital level, Description of dumpy level, Temporary adjustment of level, Fundamental lines of levels and their relationships. Recording level book, Computation of reduced level by H.I. method and rise and fall method.



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UNIT – V PLANE TABLE SURVEYING

Principles of plane table surveying, Plane table and its accessories, setting of plane table, Methods of plane table surveying, Suitability of each method, Plane table survey by radiation, Intersection and traversing, Advantages and disadvantages of plane table surveying.

COURSE OUTCOMES:

- Apply basic principle of surveying for access to mine deposits.
- Conduct chain surveying at given situation.
- Conduct compass surveying at given situation.
- Conduct dial surveying at given situation.
- By applying the principle of surveying compute area and volume of given shape and size.

TEXT BOOKS

1. Surveying- Vol.I, by B.C. Punamia
2. Surveying & Labelling. Vol-I by T.P.Kanethar & S.V.Kulkarni.

REFERENCE BOOKS

1. Metalliferous Mine Surveying : Frederick Winniberg
2. Surveying – by Husain & Nagnas



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mine Development Drilling & Blasting
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 362

COURSE OBJECTIVES:

- A mining engineer is responsible for exploring the economically viable mineral using mining operations in different hydro-geological conditions.
- Mine operations include mine planning, drilling, blasting, excavation and transportation of ores.
- The purpose of “Elements of Mining Technology” is to provide understanding of fundamentals of mining and its terminology

UNIT-I MINE ENTRY

General concepts of Mine Development (entry to the deposit both shallow and deep seated) selection of mine entry & comparison between shaft, incline & adit

UNIT-II SHAFT SINKING

Shaft Sinking -selection, sinking layout, sinking methods (marking of holes, drilling, and blasting, mucking, lining), sinking cycle, special method of sinking, deepening. Drifting, Inclines & declines.

UNIT-III DRILLING & BORING

Drills & Drilling for underground mining (coal and non-coal): Types of drills, drilling accessories, drill ability of rocks, managing drilling in production mines, dust control and safety during drilling etc.

UNIT-IV EXPLOSIVE & DETONATORS

Explosives – for Underground coal & metal mining Definitions of explosives, constituents of explosives, Classification of explosives (i) Low & High Explosives (ii) Permitted & Non permitted explosives. Detonators & Accessories- Different types of detonators, advantage of delay detonators. Exploders: Different types, construction and safety features of exploders. Common causes of accidents from explosives, Misfired shots, blown through & blown out shots, causes & Dangers, remedial measures required.

UNIT-V BLASTING TECHNIQUE

Blasting practices in Mines- Solid blasting: Blasting-off-solids, - advantages and disadvantages, precautions and restrictions, pattern of shot holes. Shot-firer tools Preparation of charge Procedure for firing Direct & Indirect consideration of factors - Calculation of explosive quantity, powder factor,



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detonator factor. Transportation & storage of explosive, Magazine layout, construction & safety features. Handling of explosives.

COURSE OUTCOMES:

- Apply the basic mining terminology with reference to given context.
- Select suitable mode of entry into a mine as per given conditions.
- Select suitable method of shaft sinking in a given condition.
- Identify and select suitable method of drilling/boring in a given situation.
- Identify suitable method of mining in a given situation.

TEXT BOOKS

1. Element of Mining Technology Volume-I, D.J. Deshmukh
2. Open cast mine working- B.Ghosh

REFERENCE BOOKS

1. Blasthole drilling Technology, by B.V. Gokhale, Multi Fields, Bombay
2. Explosives & Blasting Techniques, Dr G. K. Pradhan, Mintech Publications, Bhubaneswar.
3. Explosive & Blasting Practices in Mines, Dr S. K. Das, Lovely Prakashan, Dhanbad



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Geology
Total Theory Periods	:	48
Total Tutorial Periods	:	01
Total Credits	:	03
Code	:	DP 363

COURSE OBJECTIVES:

- Discuss the size, shape, mass & density of earth, age of earth, internal structure of earth, earthquake and volcanism.
- Explain physical properties of the mineral.
- Brief discussion of igneous rock, sedimentary rock and metamorphic rock.
- Discuss the folds, faults, joints, geological maps.

UNIT-I MINERALS

Minerals, their physical properties and chemical properties. The detailed study of certain rock forming minerals with respect to the physical properties.

UNIT-II ROCKS AND ROCK DEFORMATION

Their origin, structure, texture, classification of rocks in brief and their suitability as Engineering materials, dip and strike of bed, Folds, Faults, joints, unconformity and their classification, causes and relation to engineering behavior of rock masses.

UNIT-III EARTHQUAKE

Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, reservoir related, earthquake problem and its preventive measures, distribution of seismic zones in India.

UNIT-IV LANDSLIDES AND LAND SUBSIDENCE

Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures.

UNIT-V ENGINEERING GEOLOGICAL SITES SELECTION

Engineering Geological considerations for site selection of Dams and Reservoirs, Tunnels, Bridges and Highways, Geological Maps, concept of geological maps, important terminology used for map and making a section from the map.



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COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on shape, size, mass & density of earth, age of earth, structure of the earth.
- The students are expected to possess ability to identify, formulate, and solve engineering problems in properties of minerals, structural geology, types of rocks and geological maps
- The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for Engineering Geology.
- Work effectively as an individual and as a member of multidisciplinary team

TEXT BOOK:

1. Human Values and Professional Ethics by R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010
2. Engineering And General Geology by: K.M. Banger

REFERENCE BOOKS

1. Physical And Engineering Geology : S.K. Garg
2. A Text Book of Geology : P.K. Mukherjee
3. Geology and Engineering: Leggot, R.F. (Mc-Graw Hill, New York) 2. Geology for Engineers: Blyth, F.G.M. (Arnold, London)
4. Civil Engineering Geology: Cyril Sankey Fox (C. Lockwood and son, U.K.)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mechanics of Structures
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 364

COURSE OBJECTIVES:

- Discuss the stress and strain relationship, Mohr's Circle, principal stress and principal strain, tension and compression in composite bars.
- Derive the bending stresses in beams and plates.
- Determine the slope and deflection of beams by deflection methods, area moment and conjugate beam methods.

UNIT-I INTRODUCTION

Type of structures, Structural components like slab beam, Column and footing, Strength & stiffness to resist failure., Concept of stress and strain, Types of stress and strain, Elasticity, elastic body, Internal resistance, Elongation and contracts in length, Tensile test on mild steel, Working stress and factor of safety, Lateral strain, Poisson's ratio, Change in lateral dimensions and volume, Modulus of rigidity, Relationship between C, E and K., Suddenly applied load and corresponding stress/strain, Strain energy, Resilience, proof resilience, modulus of resilience.

UNIT-II COMPOUND STRESSES AND STRAINS

Stresses on inclined plane with different stress conditions, Principal planes and principal stresses, Analytical method and Graphical method using Mohr's stress circle method., Types of support with reaction, Types of beam – statically determinate/ indeterminate, Cantilever, Simply supported, overhanging beams, Computation of support reactions for point loads and U.D.L, Definition of B.M. and S.F. Sign convention beam., S.F & B.M diagrams for cantilever beam, Simply supported and overhanging beam, Point of contraflexure and its location, Deflected shape of the beam, Relation between B.M. and S.F. and Rate of loading.

UNI-III SLOPE AND DEFLECTION OF BEAMS

Concept of slope and deflection and their interrelation, Necessity of evaluation of slope and deflection, Mecealcy's Method for determination slope and deflection, Maximum values for U.D.L and point loads for Simply supported, cantilever and fixed beams

UNIT-IV FIXED BEAM

Concept, Advantages & drawbacks, Computation of fixed end moments for a fixed beam for following loading (i) single point load central/eccentric (ii) two point loads (iii) U.D.L. over entire span., Drawing of B.M. diagrams indicating the maximum +ve and -ve values.



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UNIT-V COLUMN

End conditions and equivalent length, Radius of gyration and slenderness ratio, Classification mode of failure, Euler's and Rankin's formula, Use of Euler's and Rankin's formula in solving various problems.

COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on relation between stress & strain, Mohr's circle, principal stress & principal strain.
- The students are expected to possess ability to identify, formulate, and solve engineering problems in bending stresses in beams and plates, deflection of beams and knowledge in fluid statics & fluid dynamics.
- The students are expected to possess ability to use the techniques, skills and modern engineering tools necessary for mechanics of solid & fluid mechanics.
- Work effectively as an individual and as a member of multidisciplinary team.

TEXT BOOKS

- Strength of Materials – R.K. Rajput (S. Chand & Co.)
- Mechanics of Materials – B.C. Punmia (Laxmi Publication)

REFERENCE BOOKS

1. Mechanics of Structures (Vol. – I) – S. & Gere (CBS Publishers)
2. Strength of Materials – Timoshenko,
2. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mine Environment Engineering-I
Total Theory Periods	:	48
Total Tutorial Periods	:	01
Total Credits	:	03
Code	:	DP 365

COURSE OBJECTIVES:

- Explain the origin, occurrence, effects, and detection of various mine gases.
- Discuss the air conditioning of surface mines and underground mines.

UNIT - I MINE ATMOSPHERE

Mine Atmosphere; Mine gases, Origin and occurrence of mine gases - Pollution of mine atmosphere - Standards of ventilation - Degree of gassiness of mines. Composition of mine air Regulations related Mine Ventilation as per CMR & MMR provisions.

UNIT- II GAS DETECTORS

Gas detectors, Uses, – principle on which designed, determination of percentage of gas with them- Recent techniques of gas detection – remote sensing devices, continuous recorders, monitors, infra-red spectrometers, sensors-Carbon Monoxide detection – Warm blooded birds, chemical detectors, Multi gas detector.

UNIT- III VENTILATION SYSTEM

Mine Ventilation system & Natural Ventilation - Measurement of air quantity, pressure and velocity; Law of air flow in mines, flow of air in ducts and mine roadways, resistance of air ways, Chezy's and Atkinson's equations; Equivalent resistance and equivalent orifice of mine:

UNIT-IV MECHANICAL VENTILATION

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' C011Structional feature, splitting of air current, advantage of splitting, reversal of air current

UNIT-V NATURAL VENTILATION

Natural Ventilation and its measurements; Thermodynamics of natural ventilation. Distribution and control of air current; Accessories of ventilation used in mines --- Door, regulator, stoppings, air lock, air crossing, brattice.



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COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on origin, occurrence, effects, and detection of various mine gases, air conditioning of surface and underground mining.
- Work effectively as an individual and as a member of a multidisciplinary team.

TEXT BOOKS

1. H.L.Hartman, Mine Ventilation and Air Conditioning, Wiley Publication, 1999.
2. A.Skochinsky and Komorov V., Mine Ventilation, MIR Pub., Moscow

REFERENCE BOOKS

1. Mine Ventilation by Prof. S.P.Banerjee
2. Mine Ventilation by Prof G.B.Mishra
3. Paryavaran Addhyan: KL Tiwari and Jadhav
4. DGMS circular
5. Element of Mining Volume- I II & III – D.J. Deshmukh



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Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Surveying-I Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 366

LIST OF EXPERIMENTS

1. Determination of location of a point with the help of Two-point problem.
2. Determination of location of a point with the help of Three-point problem.
3. To plot a transverse of area by chain survey.
4. To plot a transverse of area by prismatic compass (open)
5. To plot a transverse of area by prismatic compass (close)
6. To workout relative elevation of various points on area by performing profile leveling.
7. To determine the elevation of a point with respect to reference by fly leveling.
8. Study of minor instruments.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mine Development Drilling & Blasting Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 367

LIST OF EXPERIMENTS

1. Sketch and describe mine inclines top lay out with direct haulage.
2. Sketch and describe about pit top layout.
3. Sketch & describe blasting pattern in shaft sinking.
4. Sketch and describe the usual method of drivage of gallery in coal mine showing usual at Tenements of pumps, transport (direct rope haulage) and ventilation in dip faces.
5. Sketch and describe different type of exploder.
6. Describe with Sketch different type accessories of blasting such as safety fuse, detonating fuse, Nonel.
7. Sketch and describe burn cut, wedge cut & fan cut.
8. Sketch and describe different type of electric detonator.
9. Blast vibration definitions.



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Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Geology Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 368

LIST OF EXPERIMENTS

1. Megascopic description of Granite , Pegmatite ,Synite
2. Megascopic description of Basalt , Gabbro , Charnokite , Dolerite
3. Megascopic description of Limestone , Sand-Stone ,Shale
4. Megascopic description of Conglomerate , Marble,Slate
5. Megascopic description of Phyllite ,Clay
6. Megascopic description of Quartzite , Schist ,Gneiss
7. Megascopic description of Talc , Gypsum ,Calcite
8. Megascopic description of Feldspar , Quartz ,Corundum
9. Megascopic description of Garnet , Muscovite ,Pyrite
10. Megascopic description of hematite , Megnatite ,Bauxite
11. Megascopic description of Galena , Beryl ,Chalcopryrite
12. Study of structural models of Fault , Fold and Unconformity
13. Study of simple geological map



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III
Branch	:	Diploma in Mining Engineering
Subject	:	Mechanics of Structures Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 369

LIST OF EXPERIMENTS

1. Determination of compressive strength of cement cube.
2. Determination of tensile strength of cement cube.
3. Determination of fineness of cement by sieving method.
4. Determination of fineness of cement by Blain Apparatus.
5. To determine uniaxial tensile test of mild steel.
6. To determine Izod Charpy Value of given mild steel.
7. To determine the Rockwell Hardness of given material.
8. To determine Compressive strength of wood: (a.) Along the fiber and (b.) Across the fiber.
9. To study the cupping test machine and determination of Erichser value of mild steel sheet.
10. To determine the modulus of rigidity of material of given shaft.



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Scheme & Syllabus

(IV-Semester)

Diploma

In

Mining Engineering



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Scheme of Teaching & Examination

IV - Semester

S.No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP460	Surveying –II	3	0	0	70	30	3
2.	DP461	Engineering Geology-II	3	0	0	70	30	3
3.	DP462	Surface Mining	3	0	0	70	30	3
4.	DP463	Mine Environment Engineering-II	3	0	0	70	30	3
5.	DP464	Surveying –II Laboratory	-	-	2	30	20	1
6.	DP465	Mine Environment Engineering-II Laboratory	-	-	2	30	20	1
7.	DP466	Engineering Geology-II Laboratory	-	-	2	30	20	1
8.	DP467	Surface Mining Laboratory	-	-	2	30	20	1
9.	DPP6XX	Professional Elective I	3	0	-	70	30	3
10.	DPOXX	Open Elective I	3	0	-	70	30	3
Total			18	0	8	540	260	22

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Surveying-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 460

COURSE OBJECTIVES:

1. To choose proper method of surveying for any surveying assignment.
2. To set out simple curve on surface and in underground.
3. To determine the distance and elevation of any point on the surface & in underground.
4. To find out magnitude of error in Plan & section.

UNIT-I LEVELLING

Fundamental, lines of a dumpy level and their relationship., Permanent adjustment of fundamental axes of a dumpy level., Types of theodolites, Vernier, and digital theodolite, Component parts of a theodolite, Size of theodolite., Definitions and term related to theodolite survey., Fundamental axes of a theodolite, Temporary adjustments, Face left and face right observations, Measurement of Horizontal angle, measurement of vertical angle, checking verticality of a line, Miscellaneous operations with theodolite, measuring direct angles, measuring deflection angles, prolonging a straight line, fixing intermediate points. Sources of errors and their rectification

UNIT-II TACHEOMETRIC SURVEY

Principles of tacheometry, Purpose of fixed and movable stadia hairs, Computation of constants of given instrument in field, Movable and fixed hair method of a tacheometer with staff held vertical, Computation of RL and horizontal distances of staff station for different Positions, Tangential method
Trigonometrical Levelling, Method to determine the selective altitudes in various cases, Computation of R.L using all methods.

UNIT-III MINOR INSTRUMENT

Construction and use of optical square, hand level, Abney level, box sextant, pentagraph and Ceylon ghat tracer. Use of planimeter and to calculate the area of irregular figure.

UNIT-IV SETTING OF CURVES

Horizontal curves, designation of curve, types of curves, elements of simple curve, offsets from long chord, offsets from chord produced and deflection angle method, calculation for setting out curves, setting out curves on field.

UNIT-V MODERN METHODS OF SURVEYING

Study and use of digital instruments like digital theodolite, electronic distance measuring instruments and introduction to photographic survey.



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COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on stratigraphy of India and important geological formation of India.
- The students are expected to possess ability to identify, formulate and solve the problems of economic minerals.
- The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for geophysical and geochemical prospecting.
- Work effectively as an individual and as a member of a multidisciplinary team.

TEXT BOOKS:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni

REFERENCE BOOKS:

1. Engineering Surveying Technology: Kennie, T.J.M. and Petrie G. (Blackie & Sons Pvt. Ltd., London, 1990)
2. Surveying (Vol. II & III): Agor, R (Khanna publications, Delhi, 1995)
3. Surveying (Vol. II & III): Arora, K.R. (Standard Book House, Delhi, 1993)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Geology-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 461

COURSE OBJECTIVES:

- Discuss the principles of stratigraphy, units of stratigraphy, classification and correlation of stratigraphy.
- Discuss the important geological formations: Archeans, Cuddapahs, Vindhyan, Gondwanas and Tertiary.
- Discuss the mode of occurrence, origin, distribution and industrial use of important metallic and non-metallic minerals
- Explain the geophysical and geochemical prospecting.

UNIT-I STRATIGRAPHY

Definition: objectives of Stratigraphy, Geological time scale. Physical divisions of India. major Stratigraphical divisions of India. Archeans, Dharwar, Cuddapah, Vindhyan, Gondwana systems, Fossil: Definition, mode of occurrence, uses of fossils.

UNIT-II ECONOMIC GEOLOGY

Definition of forms of Ore, Gangue, Tenor, associated mineral resources, proved, probable, possible reserves, different process of Mineralization, important Economic minerals; Metallic and Non-Metallic Minerals.

UNIT-III PROSPECTING TECHNIQUES

Objectives: Guide lines for location of mineral deposits, prospecting methods principles, Applicability's of pitting, trenching, Drill cutting, Boring, Geophysical methods, Electrical, gravity, Seismic, Radiometric, G I S and Remote Sensing

UNIT-IV KNOW ABOUT THE COAL GEOLOGY

Objectives: State the Periods of coal Formation, Mention the different Stages of Coal formation, Explain the Origin of Coal Seams-Explain the In situ Theory, Explain the Drift Theory, Describe the Structural Features of Coal Seams-Give the Classification of Coal- Name the world coal fields-Describe the coalfields of India

UNIT-V KNOW ABOUT THE PETROLEUM GEOLOGY

Know the importance of Petroleum as Fuel- State the Origin of Petroleum-State the Migration and Accumulation of Petroleum-State the distribution of Oil fields in the world- State the distribution of Oil fields in India.



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COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on stratigraphy of India and important geological formation of India.
- The students are expected to possess ability to identify, formulate and solve the problems of economic minerals.
- The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for geophysical and geochemical prospecting.
- Work effectively as an individual and as a member of a multidisciplinary team.

TEXT BOOKS:

1. Human Values and Professional Ethics by R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010
2. Engineering And General Geology by : K.M. Banger

REFERENCE BOOKS:

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Surface Mining
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 462

COURSE OBJECTIVES:

- To choose proper surface mining methods to different mineral deposits depending on their geo-mining conditions.
- To design and analyze basic elements of surface mine.
- To learn various methods of surface mining.
- To choose various methods of transportation in any opencast mine.
- To learn the construction & working of various machineries used in open cast mine.

UNIT-I INTRODUCTION

Different basic concepts about surface mining: Define the term surface mining - basic concepts, applicability, advantages and disadvantages; systems—classification, applicability, advantages and disadvantages. List the different norms of surface mining, Define the following terms related to surface mining with comprehensive sketches - Outcrop, overburden, face. Bench, floor of bench, depth of hole, spacing, burden. Toe, crest, back break. angle of repose, stripping ratio, economic cut Off value, quarriable limit, Opening up of deposits: Box cut - Production benches, layout of benches formation, parameters and factors affecting their selection.

UNIT-II SURFACE DRILLING & BLASTING

Drilling and blasting techniques in surface mines - Classification of the drill holes. Applications of vertical and inclined drilling. Merits and demerits of vertical and inclined drilling. Different parameters connected to drilling of blast holes. Patterns of drill holes employed. Theory of surface mine blasting, Explosives, Blast design. Bench blasting pattern, Delay blasting - blasting tools - Charging of explosives - Problems in blasting, environmental problems due to blasting, - Safety in blasting - Controlled blasting techniques - Secondary Blasting.

UNIT-III HEMM IN SURFACE MINING

Different type of HEMM used in OCM Selection & Application. (Shovel, hydraulic excavator, wheel loader, dumper, ripper, dozer, road grader Drag line, BWE, spreader Surface Miner, Highwall mining). Study of layout of Shovel-dumper combination and dragline system. In Pit Crushing & Conveying (IPCC), hydraulic rock breaker, splitter

UNIT-IV SLOPE STABILITY

Slope stability (bench & dump), dump design, back filling Different types of slope failures', measures to be taken against slope failures, Instrument used in slope stability, Pumping & drainage system,



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UNIT-V ENVIRONMENT MANAGEMENT PLAN

Mine Illumination (lighting standard, measurement plan), Acid Mine Drainage - Necessity of EIA & Environment Management Plan - Essential features of EIA & EMP, and environmental impact of surface mining.

COURSE OUTCOMES:

- Apply knowledge of surface mining for understanding, formulating and solving problems related with the opencast mine.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of opencast mine
- Work effectively with other engineering and science teams.

TEXT BOOKS:

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin
3. SME handbook: Hartman

REFERENCE BOOK:

1. A Handbook on Surface Mining Technology: Dr. Samir K Das, Sagardeep Prakashan, Kharagpur.
2. Surface Mining: TN Singh, Lovely Prakashan, Dhanbad
3. Elements of Mining Technology, Vol. I. D. J Deshmukh Denett & Co., Nagpur
4. B. V. Gokhale, Blasthole chilling technology. Multi Fields, Botnbay
5. Dr G. K. Pradhan. Explosives & Blasting Techniques. 4th Edition, 2020, an AKS University Initiative, Mintech Publications. Bhubaneswar, p. 572. 7. K. A. Pant
6. विस्फोटक - एक परिचाय, Anamika Publishers, (in Hindi) 8. DGMS Circular



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Mine environment Engineering-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 463

COURSE OBJECTIVES:

- To learn the sampling of dust and physiological effect of the dust to the miner.
- To learn about the various miner occupational diseases and its preventive measures
- To prepare the enquiry report of a mine accident.
- To know the major accident occurred in Indian mines and their causes.

UNIT-I MINE FIRE

Classification, Causes, Preventive measure, Spontaneous heating-causes and preventive measures. Different methods of dealing with fire Permanent sealing of Fire. Collection of samples behind fire seals – Interpretation of samples – Coward's diagram, calculation of CO/O₂ deficiency ratio, reopening of sealed off areas Firefighting equipment and organization.

UNIT-II VENTILATION PLAN & CONTINUOUS MONITORING OF VENTILATION SYSTEM

Determination of the ventilation efficiency quotient, ventilation survey, ventilation plan, crossing point temperature, Continuous recording and monitoring of Air velocity and Quantity Tele monitoring systems – Advantages – disadvantages of it. Important regulation related to mine ventilation.

UNIT-III HEAT AND HUMIDITY

Heat and humidity in mine atmosphere and their effects; cooling power of mine air Dust-Generation/Sources - Control - Dust monitoring - Dust Survey.

UNIT-IV MINE ILLUMINATION/LIGHTING

Mine Illumination/Lighting sources in mines, cap lamps, constructional feature of lamps; Underground lighting Flameproof and intrinsically safe lighting; Lamp room layout, lamp room organization, care and maintenance of cap lamps; Lighting in opencast as well as underground mines exactly as per statutory norms

UNIT-V MINERS DISEASES

Different types of notified miner's diseases, diseases due to inhalation of dust in mines causes and preventive measures of pneumoconiosis silicosis, siderosis, manganese poisoning, lead poisoning, Chromium poisoning. Harmful effects of radioactive minerals- causes and preventive measures of nystagmus and Ankylostomiasis



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COURSE OUTCOMES:

- Apply knowledge of Health, Safety and Environmental Engineering. to the miners for keeping them safe and improving their efficiency and productivity.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mining engineering in particular.
- Make awareness among the miner to avoid any accident and health hazard.

TEXT BOOKS:

1. Mine fires, Rescue, Recovery and Inundation M A. Ramulu
2. Mine ventilation S. Ghatak
3. Mines Rescue rules

REFERENCE BOOKS:

1. Mine ventilation Hartmen
2. Mine ventilation G.B. Mishra
3. UMS Volumes
4. Statham series
5. Mine management, Legislation and General safety S.Ghatak



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Surveying-II Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 464

LIST OF EXPERIMENTS

1. To fixed station point and to measure lengths of the line by direct ranging with the help of chain and tape and plot it.
2. To perform a chain survey of closed traverse fixing the angle between two chain lines by time lines and to plot them and adjusting the closing error by graphical method.
3. Study the parts of prismatic compass and surveyor's compass and to measure the bearings of lines joining different station point
4. To take the fore bearing and back bearing of sides of a regular polygon and to calculate included angle and check them.
5. To perform a chain and compass survey of an area by open traverse and prepare a map.
6. To learn temporary adjustment of leveling instrument and to find the R.L. of the given point.
7. To find the difference of R.L. of two given point by shifting of instrument on change points and applying arithmetical checks.
8. To take the longitudinal and cross-section levels of an existing road.
9. To study the accessories of plane table surveying and to plot the objects by radial method.
10. To perform the plan table survey of small area by intersection method.
11. To take the block leveling of undulated site and to draw the contours using method of interpolation.
12. Preparing a contour map of a small area by direct method of contouring.
13. To draw contour map of a small panel and to calculate its capacity.
14. To study a Topo sheet of certain area and to mark on it watershed line and find out catchments area of a stream at a place.



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Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Mine Environment Engineering-II Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 465

LIST OF EXPERIMENTS

1. Identifies the parts of flame safety lamp - Tests for the presence of inflammable gas accumulation - different types of flame safety lamps
2. Determination the percentage of methane using methanometer-Determines the percentage of CO using Co Detectors (chemicals)- Determination the percentage of other gases using multi-gas detectors
3. Draws the performance/characteristic curves of mine fans from the observations made by conducting appropriate experiments
4. Measurement of air velocity with the help of anemometer, velometer
5. Determination of the ventilation efficiency quotient (VEQ)
6. To prepare a mine ventilation plan & determine the cooling power of mine air
7. Study and sketch firefighting equipment for class A, B, C, D, E Fires.
8. Collection of mine air sample from different parts of the mine by using water displacement methods, pipette and aspirator and vacuum bottles
9. Analysis of the air samples for the presence of various noxious gases- Graphs from results of the analysis of mine air samples from behind the sealed off areas of CO wards diagram.
10. Measurement of relative humidity with the help of various types of hygrometers



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Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Geology Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 466

LIST OF EXPERIMENTS

1. Megascopic Study and Physical Identification of Non-Metallic Minerals by their physical properties.
2. Megascopic Study and Physical Identification of Metallic Minerals by their physical properties.
3. Microscopic Study and Identification of Non-Metallic Minerals by their Optical properties
4. Microscopic Study and Identification of Metallic Minerals by their Optical properties
5. Megascopic Study and Physical Identification of different kinds of Coals by their physical properties.
6. Microscopic Study and Identification of different kinds of Coals by their Optical properties
7. Estimation of Ore Reserve.
8. Estimation of Coal Reserve.
9. Estimation of Oil Reserve.
10. Locate and distribute the various Economic Minerals in India On Indian Map



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Semester	:	IV
Branch	:	Diploma in Mining Engineering
Subject	:	Surface Mining Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 467

LIST OF EXPERIMENTS

1. Determination of Opening up of deposits: Box cut
2. Determine parameters connected to drilling of blast holes
3. Determine Controlled blasting techniques - Secondary Blasting
4. Determine Blast design.
5. Study of layout of Shovel-dumper combination and dragline system.
6. Determine slope failures', measures to be taken against slope failures
7. Determine Environmental impact of surface mining
8. Study the working of
9. Highwall mining
10. Mine Illumination
11. Pumping & drainage system



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Scheme of Teaching & Examination

V - Semester

S.No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP560	Metal Mining	3	-	0	70	30	3
2.	DP561	Mine machinery-I	3	-	0	70	30	3
3.	DP562	Methods of Work (Coal)	3	-	0	70	30	3
4.	DP563	Mine machinery-I Laboratory	-	-	2	30	20	1
5.	DP564	Methods of Work (Coal) Laboratory	-	-	2	30	20	1
6.	DP565	Vocational Training Evaluation	-	-	2	30	20	1
7.	DP566	Project-I	-	-	6	70	30	3
8.	DPP6XX	Professional Elective II	3	0	-	70	30	3
9.	DPOXX	Open Elective II	3	0	-	70	30	3
Total			15	0	12	510	240	21

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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Semester	:	V
Branch	:	Diploma in Mining Engineering
Subject	:	Metal Mining
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 560

COURSE OBJECTIVE:

- To choose proper extraction methods to different mineral deposits depending on their geo-mining conditions.
- To learn how to develop a metal mine.
- To choose proper support system for the metal mines.
- To learn the various metal mining methods.

UNIT-I BASIC CONCEPT OF METAL MINING AND DEVELOPMENT OF MINERAL DEPOSITS

Ore Mineral – Gangue – Comparison between coal, metal Mines. Dividing mineral ore body- Hanging wall – foot wall – Ore pass – Ore bin – Ore chute, Raise – Winze — Levels – formation of blocks - Shaft Station

UNIT-II DEVELOPMENT OF MINERAL DEPOSITS

Levels into sub levels, Positions of drives – Footwall - Laying initial haulage – haulage inclines - Handling waste rock - Hand drills and air legs – drifters and Jumbos – Tunnel Boring - Arrangements for loadings and hauling of broken rock, Conventional and mechanized methods of raising, jora rise method.

UNIT-III STOPING METHODS

Classification of stoping systems, selecting stoping method- Breast stoping, under hand stoping, overhand stoping, open stope stoping. Shrinkage stoping, Sub level stoping, Vertical crater retreating method. Sublevel slicing, Ring hole drilling, Caving methods- block caving, sub- level caving.

UNIT-IV CUT & FILL METHODS

Selection of methods- horizontal cut & fill, post & pillar, selection of fill material- mill tailing & paste fill-precaution against stability of fill material Problems associated with Deep Mining- Deepening– difficulties associated remedial measures. Heat and humidity and dust in deep mines – working remedial measures- conversion of open cast to underground metal mining.

UNIT-V SAMPLING

Objectives and principles, mining situations – classification of sampling methods basing on collection. Stope sampling, channel sampling chip sampling, bulk sampling, drill sampling, Salting, Assaying and Assaying Plan



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COURSE OUTCOMES:

- Apply knowledge of metal mining for understanding metal mining problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of metal mine.
- Apply knowledge of metal mining for designing a metal mines

TEXT BOOKS:

1. Elements of Mining Tech. Vol II by D. J. Deshmukh
2. S M E Handbook
3. Rock Mechanics: B.S. Verma

REFERENCE BOOKS:

1. Elements of mining: LEWS
2. Mining Engineers Hand Book: Peele. Vol 1,2
3. Mining Geology: Arogyaswami
4. Mine Ventilation: G.B.Mishra



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Semester	:	V
Branch	:	Diploma in Mining Engineering
Subject	:	Mine machinery-I
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 561

COURSE OBJECTIVES:

- To choose proper transportation system for shaft, incline and roadways in underground mines depending on the geo-mining conditions of the mineral deposit.
- To calculate and analyze basic element of haulage system and winding system.
- To learn the construction and working of various haulage system and winding system.
- To learn the construction and working of various pumps.

UNIT –I WIRE ROPES

Usage, classification of wire ropes, Application of different ropes - causes of deterioration, precautions, selection parameters, computation of numerical problems on size - Weight and strength of wire ropes. Capping and recapping of wire ropes, classification - description of capping methods - splicing methods, description of splicing.

UNIT-II WINDING OF MEN & MATERIAL

Winding in shafts – purpose, equipment, Types of had gear frames –Shaft fittings – guides in the shafts – pit – top arrangement – keps and suspension gear – Types of drums. Head gear pulley, Cage & Skip winding-pit-top and pit-bottom arrangements.

UNIT–III TYPES OF WINDING SYSTEM

Drum winding and skip winding, multi-deck winding and friction winding – Drum and friction winding – Winding engine – safety devices on winder– Methods of speed control – Braking in winding – Types of brakes.

UNIT– IV TRANSPORTATION IN MINES -ROPE HAULAGES

Factors of selection for rope haulage. comprehensive classification of transportation - ROPE HAULAGE - direct Rope Haulage System, merits, demerits and applications - safety Devices in Direct Rope Haulage System Endless Rope Haulage System, merits, demerits - Laying and maintenance of track. Constructional details of mine tub/car, Computation problems for determination of H.P. rope size breaking strength, Tub capacity, number of tubs.

UNIT-V TRANSPORTATION IN MINES

Conveyor Type- belt conveyor – pipe conveyor- belt constructions, safety devices, merits & demerits - Numerical problems. Scraper chain conveyor system. Locomotives & types of locomotive systems, merits, demerits, Aerial Rope Ways. Shuttle car, Man riding system.



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COURSE OUTCOMES:

- Apply knowledge of mine machinery for understanding, formulating and solving transportation problems in underground mine.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of transportation systems.
- Work effectively with other engineering and science teams.

TEXT BOOKS:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery By S. C. Walker

REFERENCE BOOKS:

1. Handbook of Metalliferous Mining Methods by Y.P. Chacharkar, Lovely Prakashan, Dhanbad
2. Mine Transport by Kerlin



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Semester	:	V
Branch	:	Diploma in Mining Engineering
Subject	:	Method of Work (Coal)
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 562

COURSE OBJECTIVES:

- The basic objective of the course is to provide knowledge of different theories of coal formation, coal classification, methods of coal mining.
- The course will also deal with Bord & Pillar and Longwall method of extraction.
- Thick seam mining and various specialized coal mining methods namely, Room & pillar mining, Shortwall mining, Hydraulic mining and underground gasification of coal.

UNIT-I BORD AND PILLAR METHOD DEVELOPMENT

Bord & pillar system ,Application , Merits , Demerits ,Different terms ,stages of development , depillaring stages , Application of panel system , types of panels , factors influencing the size of panel system , General Considerations , factors influencing the no. of openings of panel , merits and demerits of panel system , Factors governing the selection of development method , factors governed while opening of a district , Panel development with three headings and , Different methods of development systems along dip, strike, crosscuts, steeply dipping seams, loaders, belt conveyer load haul dumpers, belt conveyers chain conveyors. Arrangements for ventilation of Road header.

UNIT-II BORD AND PILLAR METHOD- DEPILLARING

Important terms , classification ,planning preparation arrangements , sequence of operations , Pillar extraction under weak roof condition , mechanized method of Pillar extraction by LHDS, SDL, scraper chain, conveyor systems , size, shape of pillars, ribs , local fall main fall, air blast, dangers, precautions , method of stowing conditions required for adopting stowing , preparation arrangement for stowing , lay out of panel with stowing , used of fly ash as stowing material ,danger and precautions while working below goaf areas , contiguous seams extraction , precautions against fire during and after depillaring. Depillaring with continuous mine

UNIT-III LONGWALL MINING METHOD

Long wall methods (advancing, retreating, punch longwall), Terminology, Application, merits, demerits, limitations. Long wall advancing indicating its application, comparison between long wall advancing and long wall retreating. Development of gate roads, machinery employed on a mechanized long wall face continuous mining methods, different factors governing the length of long wall face, lay outs of mechanized long wall face advancing with caving, layout of mechanized long wall face advancing with stowing



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UNIT-IV LONGWALL RETREATING METHOD

Long wall retreatting and its application & selection. Layout of mechanized long wall face retreatting- with stowing & caving. Layout of long wall face equipped with shearer (SERD&DERD), Cutting methods of the Shearer in longwall mining, methods of sumping in long wall face extraction, method of push, sumping in longwall face extraction, salvaging operation

UNIT-V THICK SEAM WORKING

Definition-selection & application. Methods- inclined slicing with caving/stowing, Horizontal slicing with caving / stowing, Blasting gallery method sub, level caving with mechanized long wall, Horizon mining, Selection & Application. Use of plough, hydraulic mining- Underground gasification of coal, method of extraction of contiguous seam. CBM-CMM-Definition, status in India, selection, methods of extraction, safety precaution as per CMR2017.

COURSE OUTCOME:

- The students are expected to enhance the technical knowledge on extraction of coal by board & pillar mining and longwall mining.
- The students are expected to possess ability to identify, formulate and solve the problems of extraction of coal from the underground mines.
- The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for thick seam mining and room & pillar mining.
- Work effectively as an individual and as a member of a multidisciplinary team.

TEXT BOOK:

1. Principle and practices of modern Coal Mining by R.D. Singh
2. Coal Mining in India by S.P. Mathur
3. Mining & working coal by R.T. Deshmukh

REFERENCE BOOKS:

1. Longwall Mining: Samir Kumar Das
2. Modern coal Mining Technology: Samir Kumar Das
3. Principle & Practices of Coal Mining; R.D. Singh
4. Coal Mining practice: Statham
5. Surface Mining Technology: Samir Kumar Das.
6. Surface Mining: T.N.Singh



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Semester	:	V
Branch	:	Diploma in Mining Engineering
Subject	:	Mine Machinery-I Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 563

LIST OF EXPERIMENTS

1. To study of different types of wire rope its composition & uses in mining.
2. Process of changing of winding rope and its requirement as per regulation.
3. To study of Direct rope haulage system with figure.
4. Study of Endless rope haulage system & its designing aspect with figure.
5. Study of various types of safety devices in haulage system.
6. To study the different types of winding system and their comparative application.
7. Study of different types of locomotive & its application.
8. Study of different types of conveyors with their design parameters & uses in mines.
9. To study the different method of speed control in winding system.
10. Study of different types of Aerial ropeway & its uses.



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SCHOOL OF ENGINEERING & I.T.

Semester	:	V
Branch	:	Diploma in Mining Engineering
Subject	:	Method of Work (Coal) Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 564

LIST OF EXPERIMENTS

1. Layouts of underground mine
2. Draw a pit top & pit Bottom layout of shaft,
3. Layout of Bord and pillar showing
4. Development work and ventilation network,
5. Layout of Bord and pillar
6. Showing method depillaring and ventilation network
7. Layout of longwall retreating method
8. Layout of Blasting Gallery panel.
9. Calculate the percentage of extraction for depillaring work
10. Layout of CM district



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Scheme of Teaching & Examination

VI - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1	DP610	Internship-1	-	0	-	70	30	6
2	DP611	Project-2	3	0	-	90	60	6
3	DPP6XX	Professional Elective-3 MOOCs	3	0	-	70	30	3
4	DPOXX	Open Elective-3 MOOCs	3	0	0	70	30	3
Total			9	0	0	300	150	18

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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Department of Mining Engineering List of Professional Elective for Diploma

Code	Subject
DPP601	Mine Legislation and General Safety
DPP602	Engineering Materials
DPP603	Rock Mechanics and Strata Control
DPP604	Mine Management
DPP605	Surface Mining-II
DPP606	Mineral Dressing
DPP607	Pollution Control in Mining



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Branch	:	Diploma in Mining Engineering
Subject	:	Mine Legislation & General Safety
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DPP601

COURSE OBJECTIVES:

- To know the various rules & regulations applicable in different conditions to the mine workers, managers and mine owner.
- To know the responsibility and duties of the various employee of the mine and owner of the mine accidents

UNIT-I MINES ACT 1952

Meaning of the terms, Mine Act, Regulations, Rules, Bye-laws, standing orders, and situations under which act does not apply. Provisions of Mines Act in respect of Drinking water health and hygiene conservancy, Medical Appliances, Hour and limitations of Employment - Leave with wages.

UNIT-II MINES RULES 1955

Mine Rules related to drinking water, lavatories, urinals with on surface and in underground first aid, - Ambulance, Hours, and limitations of Employment - leave with wages - with wages and over time.

UNIT-III COAL MINES AND METALLIFEROUS MINES REGULATIONS

Important definitions, regulations related to notice of accidents duties of managers, Asst/under Managers, Overman, foreman and surveyor, Mine plans and sections. Means of Access and egress ladder and Ladder ways under M.M.R

UNIT-IV TRANSPORTATION

Transport of men and material by Haulage mine working precautions against dangers from gas and water Mine ventilation, mine lighting and safety equipment and types of fences (Miscellaneous)

UNIT-V SAFETY ASPECTS IN MINES

Accidents classification and analysis-safe condition- unsafe condition- mine safety- safety objectives-major factors to be considered for safety - safety week- pit safety committee- safety organization and safety policy.

COURSE OUTCOMES:

- Apply knowledge of legislation in mines for the implementation of rules and regulations during their job.
- Work effectively with other engineering and science teams for suggesting any measures against any mine



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TEXT BOOKS:

1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I By- S. D. Prasad & Prof. Rakesh CMR-1957 & MMR-1961 L. C. Kaku.

REFERENCE BOOKS:

1. Mines Act-1952 & Mines Rules-1955 L. C. Kaku.
2. Vocational Training Rules L. C. Kaku.
3. Mine Accidents S. J. Kejeriwal



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Branch	:	Diploma in Mining Engineering
Subject	:	Engineering Materials
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DPP602

COURSE OBJECTIVES:

- Discuss the classification of engineering materials, structure of metals and alloys, and Fe-C phase diagram.
- Explain the treatment of iron & steel, hardening, annealing, normalizing, and tempering.
- Explain the various types of ropes and its construction and application.
- Explain the classification of cement, RCC, application of fly ash mining.
- Discuss the engineering behavior of materials.

UNIT I GENERAL

Introduction, Classification of engineering materials, Structure of Metals and Alloys, Iron-carbon phase diagram.

UNIT II HEAT TREATMENT OF IRON & STEEL

Different Types Of Steels, Their Properties and Uses, Different Types of Heat Treatment Techniques viz. Hardening, Annealing, Normalizing & Tempering and Their Uses in Mining Industry.

UNIT III WIRE ROPE

Types and Construction, Wire Rope Lays, Non- Stranded Ropes, Selection of Wire Ropes, Ropes Used For Different Purpose, Mass & Strength Of Wire Ropes, Wire ropes used in Mines, Application of wire ropes in Mines, Testing of wire ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Rope splicing.

UNIT IV CONSTRUCTION MATERIALS

Cements–Classification & Properties, Quick Setting Cement, R.C.C., Shot creting, Brick & Stone Masonries, and Application of Fly Ash In Mining.

UNIT V ENGINEERING BEHAVIOUR OF SOME MATERIALS

Stress- Strain curves of Typical Engineering. Materials, Elastic And Plastic Deformation, Fracture, Fatigue And Creep.

COURSE OUTCOMES:

- The students are expected to enhance the technical knowledge on classification of engineering materials, structure of metals and alloys and iron-carbon phase diagram.
- The students are expected to possess ability to identify, formulate and solve treatment of iron & steel problem.



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- The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for engineering materials.

TEXT BOOKS:

1. Introduction to Engineering Materials by B.K. Agrawal
2. Elements of Mining Technology by D.J. Deshmukh, Vol.I

REFERENCE BOOKS:

1. Engineering Materials by Surendra Singh
2. Concrete Technology by M.L.Gambhir.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Branch	:	Diploma in Mining Engineering
Subject	:	Rock Excavation and Strata Control
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DPP603

COURSE OBJECTIVES:

- To learn various physico mechanical & rheological properties of rock and the rock mass classification.
- To determine the RMR of any mine
- To measure the in-situ stress in the underground mines. Course outcomes.

UNIT I ROCK MECHANICS

Definition of rock mechanics – scope of Rock mechanics Application of Rock mechanics to mining field. Rock Properties – Physical, Mechanical, Properties of rocks – compressive strength – Tensile strength– Shear strength – strength indices of rocks – Point Load Strength Index- Protodyakanov Strength Index (PSI) – porosity & permeability Anisotropy.

UNIT II STRESS & STRAIN

Ground Forces, Stress Analysis, Stress distribution: Various forces acting on block – types of Stress – Relation between vertical and lateral stresses – Stress field – Hydrostatic and Litho static stage of rock. Induced stresses due to Mining – Stress distribution around narrow and wide openings – Instruments used for measurement of stress – Stress distribution around road way

UNIT III STRATA AND GROUND MOVEMENTS

Strata conditions before and after mining operations – Theories of mechanics of Strata behavior – Strata pressure in and around Bord and pillar and long wall workings. RQD, Rock Mass Rating of roof strata (RMR), Slope Mass Rating (SMR). Instrumentation for measuring ground movement. Classification of rock stability – theories of rock failure. Bumps – rock burst – Theories– Causes – Preventive measures.

UNIT IV SUBSIDENCE

Definition of various terms – Angle of draw positive or negative, factors influencing angle of draw – factors affecting subsidence – damages – Protective measures – Subsidence measurements –surface Movements and Deformation during depillaring& Longwall Mining.

UNIT-V STRATA CONTROL

Supports – Necessity– Classification & Application- Principle of roof bolting, stitching, cable bolting, short creating– Rigid and Yielding props – constructional details of Friction, Hydraulic props – Method



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of setting, testing & withdrawal – Fore polling, safari support- Junction Supports – Clearance of Heavy roof Collapse – Strata Monitoring Plan (SMP).

COURSE OUTCOMES:

- Apply knowledge of rock mechanics for understanding, formulating and solving strata control problem in any underground mine.
- Identify, analyze and solve rock mechanics problems.
- 3.Acquire knowledge and hands-on competence in applying the concepts in the development of rock mechanics

TEXT BOOKS:

1. Rock Mechanics By Obertabd Duvall
2. Rock Mechanics By Goodman
3. Rock Mechanics By Jager& Cook

REFERENCE BOOKS:

1. Rock Mechanics, by Richard E. Goodman.
2. Rock mechanics and strata control, by B.S.Varma
3. Elements of Mining Technology, by D.J.Deshmukh & R.T.Deshmuk Vol 1,2,3
4. Wining and working Vol 1,2



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Branch	:	Diploma in Mining Engineering
Subject	:	Mine Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DPP604

COURSE OBJECTIVE:

- To choose proper method of sampling for different ore bodies and mineral heaps. To estimate grade and reserves.
- To choose proper method of mine valuation for valuation of any mine and also able to determine the NPV of any mine.
- To perform various financial management aspects related with the mine

UNIT-I EVOLUTION OF MANAGEMENT

Theory - Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.

UNIT-II PERSONNEL MANAGEMENT

Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication

UNIT-III PRODUCTION MANAGEMENT

Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

UNIT-IV INDUSTRIAL PSYCHOLOGY

Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India

UNIT-V INDUSTRIAL ACT AND LAWS

Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labour laws. Payment of wages act, Strike & lockout, Illegal strikes & Lock out.

COURSE OUTCOMES:

- Apply knowledge of mine economics for understanding, formulating and solving problems related with the mine economics.
- Identify analyze and solve financial management problems.

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- Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine economics.

REFERENCES BOOKS:

1. Mine Management: V. N. Singh , Print Press Dhanbad
2. Management & Administration: S.K.Gupta
3. Introduction to management: O.P. Khanna , Dhanpat Rai Publication



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Branch	:	Diploma in Mining Engineering.
Subject	:	Surface Mining-II
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP605

COURSE OBJECTIVES

- To learn various layout of opencast mine and waste dump.
- To choose suitable excavators for any deposit extracted by opencast method. To be able to design an opencast mine and mine waste dump.
- To understand the pit slope stability and its impact on mining activity.

UNIT-I

Layouts of open pit mines, Methods of side casting, Side casting by Stripping Shovel and Dragline, Range Diagram, calculation of operating radius. Explosive casting, Layouts of waste dumps. Design of Haul roads.

UNIT-II

Introduction to continuous surface mining equipment, Continuous surface miner, their construction, basic operation and productivity. Bucket wheel excavators, their construction, basic operation and productivity, Face Layouts.

UNIT-III

Ultimate pit design, Factors affecting ultimate pit limits; Significance of ultimate pit limits; Manual methods of developing ultimate pit limits. Floating cone technique, Production planning, Some basic mine life and plant size concepts, Mine and Mill plant sizing.

UNIT-IV:

Introduction to rock slope engineering, Slopes in surface mines and their formation, Pitslopes and their influence on mine economics, Slope stability, Factors influencing slope stability, Various types of slope failure and their conditions.

UNIT-V:

Determination of factor of safety of a slope under plane and circular failure, Planning of slope stability investigations, Stabilization and protection methods for stability of slopes.

COURSE OUTCOMES:

- Apply knowledge of surface mining for understanding, formulating and solving slope stability problem in any opencast mine.
- Identify, analyze and solve opencast mining problems



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- Acquire knowledge and hands-on competence in applying the concepts in the development of opencast mine planning

TEXT BOOKS:

1. Surface Mining : G.B. Misra
2. Surface mining equipment : Martin

REFERENCES BOOKS:

1. Surface Mining : Pfeider
2. Rock slope engg. : Hoek& Bray
3. SME handbook : Hartman
4. Surface Mine Planning & Design : Hustralid&Kuchha



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Branch	:	Mining Engineering.
Subject	:	Mineral Dressing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP606

COURSE OBJECTIVES:

- To choose proper method of size reduction and concentration methods for particular ores
- To design and analyze basic element of machine e.g. crushers, mills jigs, tables etc.
- To design and analyze various special methods of separations like HMS, Magnetic Separator etc.
- To prepare flow sheets for the beneficiation of different ores and coal.

UNIT-I CRUSHING & GRINDING

Introduction, definition, scope and economic justification, main steps in ore dressing operations, general preliminary mineralogical investigations, comminution-crushing-principles of crushing, reduction jaw crushers, gyratory crushers, cone crushers, rolled crushers, gravity stamps their classifications and applications, grinding-principles of grinding units, application and classification of ball mills, rod mills, tube mills and pebble mills.

UNIT-II SIZING

Object of sizing, scale of sizing, laboratory sizing, screening and classification, different type of screens, their mode of operations and application and limitation, classification-principles of classification, movement of solids through fluids, Stoke's law, Reynold's Number, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT-III GRAVITY CONCENTRATION

Jigging, Flowing film concentrators like spirals and shaking tables, heavy media separation theory, applications and limitations of methods.

UNIT-IV FLOATATION

Physico-chemical principles, function of various floatation reagents, important machines, their principles, and working, floatation of sulphide, oxide and non-sulphide ores.

UNIT-V ELECTROSTATIC AND MAGNETIC SEPARATION

Principle and operation and field of application, Palletisation of low-grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing- Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese ores with special reference to Indian deposits.



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COURSE OUTCOMES:

- Apply knowledge of mineral dressing for understanding, formulating and solving problems related with mineral dressing.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of machines for separating the low grade ore economically.
- Work effectively with engineering and science teams as well as with multidisciplinary designs

TEXT BOOKS

1. Ore Dressing by Gaudin
2. Ore Dressing by B. A. Wills



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Branch	:	Mining Engineering.
Subject	:	Pollution Control in Mining
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP607

COURSE OBJECTIVES

- To learn various kind of pollutants and their causes and preventive measures. To know the salient features of environmental laws in India.
- To know the various types of occupational diseases in the mine.
- To measure the level of pollution i.e. Noise level, air pollution level etc.

UNIT-I ENVIRONMENTAL POLLUTION

Introduction and classification of environmental pollution, ecological conservation. Salient features of the environmental laws in India and Occupational disease.

UNIT-II AIR POLLUTION

Air pollution due to various gases and suspended particulate materials, causes, consequences, preventive measures, dust sampling equipment's.

UNIT-III WATER POLLUTION

Water pollution, its causes and preventive measures, acid-mine drainage, water pollution in mines and mineral beneficiation plants, water purification schemes in brief.

UNIT-IV LAND POLLUTION

Land scape pollution and land reclamation, methods of land reclamation.

UNIT-V NOISE POLLUTION

Pollution due to noise and its consequences, noise produced by different machinery, control and safety, measurement of noise levels.

COURSE OUTCOMES:

- Apply knowledge of pollution control for understanding and solving different types of environmental pollution problem in any mine.
- Identify, analyze, control and solve environmental pollution problems

TEXTBOOKS:

1. Legislation in Indian Mines – A Critical appraisal by Rakesh and Prasad
2. Environmental Impact of Mining By Down and Stokes



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REFERENCE BOOKS:

1. Air & Water Acts
2. Forest Conservation acts
3. Legislation in Indian Mines – A Critical appraisal by Rakesh and Prasad
4. Environmental Impact of Mining By Down and Stokes



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Syllabus
(Open Electives)
Diploma
All Streams of Diploma in
Engineering

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LIST OF OPEN ELECTIVE SUBJECTS

S.No.	Code	Professional Elective
1	DPO01	Alternative Sources of Energy
2	DPO02	Advance Numerical Methods
3	DPO03	Web Design Fundamentals
4	DPO04	Pumps & Pumping System
5	DPO05	Introduction to Robotics
6	DPO06	Organization Development
7	DPO07	Entrepreneurship Development
8	DPO08	Finite Element Method
9	DPO09	Disaster Management
10	DPO10	Environmental Pollution & Legislation

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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Alternative Sources Of Energy
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO01

COURSE OBJECTIVES:

- Identify renewable energy sources and their utilization.

UNIT-I

INTRODUCTION TO RENEWABLE ENERGY TECHNOLOGIES

Energy Storage: Introduction; Necessity of Energy Storage; Energy Storage Methods

Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Measurement of solar radiation data

UNIT-II

SOLAR THERMAL SYSTEMS

Introduction; Basics of thermodynamics and heat transfer; Flat plate collector; Evacuated Tubular Collector; Solar air collector; Solar concentrator; Solar distillation; Solar cooker; Solar refrigeration and air conditioning; Thermal energy storage systems
Solar Photovoltaic systems: Introduction; Solar cell Fundamentals; Characteristics and classification; Solar cell: Module, panel and Array construction; Photovoltaic thermal systems.

UNIT-III

WIND ENERGY

Introduction; Origin and nature of winds; Wind turbine siting; Basics of fluid mechanics; Wind turbine aerodynamics; wind turbine types and their construction; Wind energy conversion systems

UNIT-IV

FUEL CELLS

Overview; Classification of fuel cells; operating principles; Fuel cell thermodynamics Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies; Urban waste to energy conversion; Biomass gasification.

UNIT-V

OTHER FORMS OF ENERGY

Introduction: Nuclear, ocean and geothermal energy applications; Origin and their types; Working principles

COURSE OUTCOMES:

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

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TEXT BOOKS

1. Non-conventional Energy Resources, B.H.Khan, Tata McGraw Hill, New Delhi, 2017, 3rd edition
2. Solar Energy-Principles of Thermal Collection and Storage, S.P.Sukhatme and J.K.Nayak, TMH, 2008, 3rd edition

REFERENCE BOOKS

1. Solar Energy Thermal Processes, J.A.Duffie and W.A.Beckman, John Wiley, 2010, 2nd edition
2. Energy Technology: Non-Conventional, Renewable and Conventional, S.Rao and B.B.Parulekar, Khanna Publishers, 2010, 1st Edition.
Online Resources:
3. Non-conventional Energy Resources by Prof. Prathap Haridoss (IIT Madras), NPTEL Course (Link: <https://nptel.ac.in/courses/121/106/121106014>)



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Advance Numerical Methods
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO02

COURSE OBJECTIVES

- Student will learn various types of Numerical Solution.
- Student will learn how to obtain Numerical Solution of Algebraic and Transcendental Equations.
- Student will understand Numerical Differentiation and Integration.
- Student should understand the curve fitting method.

UNIT I

NUMERICAL SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection Method, Regula-Falsi Method, Newton-Raphson Method, Secant Method, Birge-Vieta Method, Bairstow's Method.

UNIT II

NUMERICAL SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Direct Methods: Gauss Elimination, Gauss-Jordan & Crout's Triangularisation Method. Iterative Methods: Jacobi's, Gauss-Siedal & Successive Over Relaxation Method.

UNIT III

NUMERICAL DIFFERENTIATION AND INTEGRATION

Finite Differences, Derivatives using Forward, Backward and Central Difference Formulae, Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's rules, Weddle's rule.

UNIT IV

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Picards Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Range-Kutta Methods, Predictor-corrector Methods, Milne's Method, Adams-Bashforth Method.

UNIT V

CURVE FITTING AND METHOD OF LEAST SQUARES

Method of Least Squares, Fitting of a Straight Line, Parabola, Curves of the form $y = abx$ and $y = axb$.

COURSE OUTCOMES

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.

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TEXT BOOKS

1. Numerical Methods in Engineering and Science by Dr. B.S. Grewal, Khanna Publishers.
2. Numerical Methods for Scientific and Engineering Computation by M .K. Jain, S. R. K. Iyengar & R. K. Jain, Wiley.

REFERENCE BOOKS

1. Numerical Methods and Applications, E. Ward Cheney , David R Kincaid, Cengage Learning India Edition.
2. Numerical Methods, by Noble ben, New York, International Publications New York 1964.
3. Numerical Methods for Scientists and Engineers by K. Shankar Rao, Prentice Hall of India.
4. Numerical Methods with C++ Programming, by Somasundaram & Chandrasekaran, Prentice Hall of India.
5. Numerical Methods, by S. S. Shastry, Prentice Hall Inc. India 1998.

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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Web Design Fundamentals
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO03

COURSE OBJECTIVE

- Design and develop static and dynamic web pages.
- Familiarize with Client-Side Programming,
- Learn web page validations.
- To design and implement web page.

UNIT I

WEB PROGRAMMING INTRODUCTION

WWW: Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites. Planning for designing Web pages, Model and structure for a Website, Developing Websites.

Architecture of a website. Different technologies used to develop websites.

UNIT II

INTRODUCTION TO HTML

About HTML, History of HTML, Steps need to do to get going and make HTML page, HTML tags and attributes. HTML Tags Vs Elements. HTML Attributes. Creating HTML document, Markup Tags, Heading -paragraphs, line breaking tag, HR tag.

UNIT III

HTML BASIC FORMATTING TAGS

HTML Basic Tags, HTML Formatting Tags, HTML Color coding, HTML Grouping : using DIV and Span Tags, HTML Lists: Unordered List, Ordered List, Definition List, HTML Image: img tag and image mapping, HTML Hyperlink: Anchor Tag, Internal Link, Link with other Web pages. URL: Uniform Resource Locator, URL Coding.

UNIT I

HTML TABLES AND FORMS, FRAMES TAGS

Working with Table, Form and Frame tag of HTML, Table Tag: <table>,< th >,< tr >,< td >,< caption > with example.

HTML -form: < input >, < textarea >,< button >,< select >,< label> tags. Define frameset tag in HTML, frameset elements of HTML, use of rows and cols attribute of frameset tag in HTML.Frame's name and target attributes.

UNIT V

INTRODUCTION OF CSS AND JAVA SCRIPT

Concept of CSS(Cascading style sheets), Creating Style Sheet: External Style Sheets, Internal Style Sheets, Inline Style,CSS2-Selectors:ID Selectors, Class Selectors, CSS Styling(Background, Text Format, Controlling Fonts)

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JAVA SCRIPT: Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements Conditional statements, Arrays, Functions, JavaScript and HTML, Data entry and Validation.

COURSE OUTCOMES

- To design web sites utilizing multiple tools and techniques.
- To demonstrate the ability to create dynamic pages that are easy to navigate and easy to update.
- To utilize entry - level system analysis and design principles to solve business problems.
- Apply the validation and verification of data at client end.

TEXT BOOKS

1. Fundamentals of Computer, V. Rajaraman, Prentice-Hall of India
2. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar& others, Cengage Learning

REFERENCE BOOKS

1. Web Technology and Design by Xavier, C, New Age International
2. HTML, DHTML, Java Script, Perl & CGI by Ivan Bayross, BPB Publication.
3. Internet and Web Design by Ramesh Bangia, New Age International Element of Discrete Mathematics, C. L. Liu.



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Pumps & Pumping System
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO04

COURSE OBJECTIVES

- Obtaining a solid understanding of the fundamentals of Fluid Mechanics
- The ability to formulate basic equations for Fluid Engineering in the field of pumps.
- The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid engineering applications.
- The ability to perform checks, maintenance for various pumps.

UNIT I

INTRODUCTION

Fluid, ideal and real fluid, properties of fluid, Bernoulli's equation and its practical application, Impulse momentum equation, Momentum of Momentum equation. Pumps, types of pumps.

UNIT II

CENTRIFUGAL PUMPS

Classification of Pumps, Centrifugal pump, Construction, working, workdone, heads, efficiencies, multistage centrifugal pump, pump in series and parallel, specific speed, characteristic, net positive suction head, cavitation.

UNIT III

RECIPROCATING PUMPS

Classification of Pumps, Reciprocating pump, Positive Displacement and other Pumps, Reciprocating pump theory, Slip, Indicator diagram, Effect of acceleration, air vessels, Comparison of centrifugal and reciprocating pumps, Performance characteristics. Construction, working, work done.

UNIT IV

OTHER PUMPS

Submersible pumps, deep well pumps, ejector pump, mud pump, chemical pumps. Problems and testing of submersible pump as per BIS.

UNIT V

PUMPING SYSTEM BASICS

Pumping System Components, Pumping System Principles, Common Pumping System Problems, Indications of Oversized Pumps, Piping Configurations to Improve Pumping System Efficiency, Basic Pump Maintenance, Impeller Trimming, Controlling Pumps with Adjustable Speed Drives.

COURSE OUTCOMES

- Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
- Acquire knowledge of pumps and its classification for the design and development of mechanical systems.
- Identify, analysis, and solve mechanical engineering problems useful to the society.

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- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.

TEXT BOOKS

1. Mechanics of Fluids by Massey BS; Van Nostrand Reinhold Co
2. Fluid Mechanics by Douglas JF, Gasiorek JM, Swaffield JP; Poitman
3. Fluid Mechanics by Streetes VL and Wylie EB; Mcgraw Hill Book Co

REFERENCE BOOKS

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som & G. Biswas – TMH
2. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd.



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Introduction to Robotics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO05

COURSE OBJECTIVES

- Analyze Robotic Sensors and Vision.
- Analyze alternative systems such as Understand Coordinate Frames, Mapping and Transforms.
- Select/ design equipment for Robotic Sensors and Vision systems.
- Carry out calculations of Robot Applications.

UNIT I

INTRODUCTION TO ROBOTICS

Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.

UNIT II

COORDINATE FRAMES, MAPPING AND TRANSFORMS

Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices

UNIT III

SYMBOLIC MODELING OF ROBOTS – DIRECT KINEMATIC MODEL

Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator, Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transformation Matrix. Introduction to Inverse Kinematic model.

UNIT IV

ROBOTIC SENSORS AND VISION

The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.

UNIT V

ROBOT APPLICATIONS

Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.

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COURSE OUTCOMES

- Acquire knowledge and hands-on competence in the design and development of Transformation of 2. Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices .
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Demonstrate an understanding of Robotic application for sustainable Development.
- Demonstrate a basic understanding of Symbolic Modeling of Robots.

TEXT BOOKS

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers - Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss, R.N.Nagel, N.G.Odrey.

REFERENCE BOOKS

1. Robotics Control Sensing, Vision and Intelligence - K.S.Fu, R.C.Gonzalex, C.S.G.Lee- McGrew hill Book co.
2. Kinematics and Synthesis of linkages - Hartenberg and Denavit - McGrew Hill Book Co
3. Kinematics and Dynamics of Machinery - J.Hirchhorn - McGrew HillBook.
4. Kinematics and Linkage Design - A.S. Hall - Prentice Hall



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Organization Development
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO06

COURSE OBJECTIVES

- To Learn OD process that applies a broad range of behavioral science knowledge and practices to help organizations
- To build their capacity to change and to achieve greater effectiveness, including increased financial performance, customer satisfaction, and organization member engagement”.

UNIT I

GENERAL INTRODUCTION TO ORGANIZATION DEVELOPMENT

Organization Development Defined, Growth and Relevance of Organization Development Short History of Organization Development, Evolution in Organization Development

UNIT II

THE NATURE OF PLANNED CHANGE

Theories of Planned Change, General Model of Planned Change, Different Types of Planned Change Critique of Planned Change

UNIT III

THE OD PRACTITIONER

Who is the OD practitioner, Competencies of an Effective OD Practitioner, The Professional OD Practitioner, Professional Values, Professional Ethics.

UNIT IV

STRATEGIC CHANGE INTERVENTIONS

Continuous Change Self-Designing Organizations, Learning Organizations Built-to-Change Organizations

UNIT V

EVALUATING AND INSTITUTIONALIZING ORGANIZATION DEVELOPMENT INTERVENTIONS

Evaluating Organization Development Interventions
Institutionalizing Organizational Changes

COURSE OUTCOMES

- In this course, the students know the theoretical models and the process of OD.
- Students will also learn how to improve individual, group/team and organizational performance through the use of OD techniques or interventions like group dynamics, training, culture change, and work-life balance.

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TEXT BOOKS

1. The Fifth Discipline: The Art & Practice of The Learning Organization by Peter M. Senge
2. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler, Stephen R. Covey

REFERENCE BOOKS

1. Cummings, T. G. & Worley, C. G. (2009). Organization development and change (9th edition).



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Entrepreneurship Development
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO07

COURSE OBJECTIVES

- To promoting self-employment/entrepreneurship as career option thereby creating more job providers
- To focuses on inputs required for students to undertake entrepreneurial activities as career option

UNIT I

GENERAL

Definition of entrepreneurship, Characteristics of entrepreneurs, Entrepreneurship environment, Characteristics of entrepreneurs, Environmental analysis, Government policies for setting up new small enterprises, Opportunities in service industries.

UNIT II

FORMS OF BUSINESS ORGANIZATION

Forms of ownership, Sole Proprietorship, Partnership, Cooperative society. Joint stock company, Private Limited Companies, Public Limited Companies.

UNIT III

INSTITUTIONAL SUPPORT TO SSI

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

UNIT IV

PLANNING ASSI

Introduction of planning, Types of planning, Importance of planning, Steps in planning Steps in planning a SSI, Technical dimensions for setting up an enterprise.

UNIT V

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.

COURSE OUTCOMES

- Students are expected to understand and learn the subject well and use it in practicality
- Students are able to understand how to Manage Small Business Firm & Resource management.

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TEXT BOOKS

1. Starting your own Business, A step-by-step Blue print for the First-time Entrepreneur - Stephen C. Harper, Mc Craw-Hill
2. Harvard Business Review on Entrepreneurship - Harvard Business School Press

REFERENCES BOOKS

1. Entrepreneurship : Strategies & Resources - Abrams Grant Pass, Oregon: Oasis Press
2. The Business Planning Guide - David H. Bangs Upstart Publishing Company, In Chicago



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Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Finite Element Method
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO08

COURSE OBJECTIVES

- To learn basic principles of finite element analysis procedure .
- To learn the theory and characteristics of finite elements that represent engineering structures.
- To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses.

UNIT I

FORMULATION OF FINITE ELEMENT EQUATION

Formulation of Finite Element Equation starting from governing differential equation, Domain residual and minimization, Weighted residual method, Weak form of weighted residual method.

UNIT II

ONE DIMENSIONAL FINITE ELEMENT ANALYSIS

One dimensional finite element analysis, generic form of total potential for one dimensional case, determination of shape functions for linear bar finite element and quadratic bar finite element, stiffness matrix, one dimensional problems of structure mechanics and heat conduction.

UNIT III

SHAPE FUNCTIONS AND ELEMENT MATRICES

Stiffness matrix formulation for beam and frame element, Determination of shape functions and element matrices, Application problems

UNIT IV

TWO DIMENSIONAL FINITE ELEMENT ANALYSIS

Two dimensional finite element analysis, simple three node triangular elements, four node rectangular element, six node triangular element, natural coordinates, simple two dimensional problems.

UNIT V

APPLICATION OF FINITE ELEMENT ANALYSIS

Finite element analysis for plane stress and plane strain problem, Strain displacement matrix for 2-D elements, two-dimensional integrals. Application problems, Scalar field problems including heat conduction and flow problems.

COURSE OUTCOMES

- Understand the concepts behind formulation methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
- Develop element characteristic equation and generation of global equation.

TEXT BOOKS

1. Textbook of Finite Element Analysis – Seshu P – Prentice Hall of India.



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2. Fundamentals of Finite Element Analysis - David Hutton – TMH, Delhi

REFERENCE BOOKS

1. Finite Element Method: Basic concepts & Applications- Alavala – PHI, Delhi
2. Finite Element in Engineering - T.R. Chandrupatla and Belegundu, Pearson, Singapore
3. Concepts and Applications of Finite element analysis - Cook, Robert – John Wiley
4. The Finite Element Method, A Practical Course - Liu and Quek. – McGraw Hill
5. The Finite Element Method in Engineering - S.S. Rao.
6. An Introduction to the Finite Element Method – J.N. Reddy – TMH, Delhi
7. Finite Element Method – Zienkiewicz. O C - TMH, Delhi
8. Finite Element Analysis: Theory And Programming – Krishnamoorthy C.S.- TMH, Delhi



MATS UNIVERSITY

Aarang, Raipur (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Disaster Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO09

COURSE OBJECTIVES

- To improve knowledge about nature of disaster, Environmental impact assessment, construction of technology for mitigation of damage of structures.

UNIT I

NATURE OF DISASTER

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters

UNIT II

BEHAVIOR OF STRUCTURES

Behavior of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental Impact Assessment

UNIT III

Methods of mitigating damage during disasters, disaster preparedness.

UNIT IV

Management systems during disasters, Construction Technology for mitigation of damage of structures

UNIT V

Short-term and long-term relief measures.

TEXT BOOKS

Design of Earthquake Resistant Buildings–Minoru Wakabayashi (McGraw Hill Publication)
Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition)– Anil K Chopra (Pearson Education Publication)

REFERENCE BOOKS

1. Fundamentals of Vibrations – Anderson, R.A. (McMillan)
IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993
2. Earth quake engineering damage assessment and structural design – S.F. Borg Disasters and development –
Cuny F (Oxford University Press Publication)

COURSE OUTCOMES

- It promotes a multi-stakeholder and inter-sectoral angle to risk management.
- It highlights the root causes of risks by identifying underlying risk factors.

MATS School of Engineering &I.T



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Aarang, Raipur (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Course	:	Diploma
Branch	:	Common for All Branches
Subject	:	Environmental Pollution And Legislation.
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO10

COURSE OBJECTIVE

- To promoting self-employment/entrepreneurship as career option thereby creating more job providers
- To focuses on inputs required for students to undertake entrepreneurial activities as career option

UNIT I

INTRODUCTION

Environmental Pollution, Fundamentals of air pollution: Composition and physics of atmosphere, Stationary and mobile sources; combustion process, fugitive emission; primary and secondary pollutants; POPs, Effects of air pollution on human being, animals, plants; Air pollution episodes – causes and consequences; indoor air quality.

UNIT II

INDUSTRIAL POLLUTION

Industrial Air Pollution Control: Dust control and abatement measures in mines; role of green belts. Thermal power plants: Control principle to improve overall thermal efficiency, Fuel and flue gas desulphurization, FBC, control of NO_x, control of mercury, concept of Integrated Gasification Combined Cycle (IGCC) and Carbon Capture and Storage (CCS). Control of motor vehicle emissions.

UNIT II

NOISE POLLUTION

Fundamentals of Noise: Sound power, Sound intensity and Sound pressure levels. Effects of noise - Presbycusis, Acoustic Trauma. Characterization of Noise from Construction, Mining, Transportation and Industrial Activities. Permissible noise levels in different zones.

UNIT IV

MONITORING AND QUALITY CONTROL

Air quality monitoring: Air quality sampling network design; analysis and interpretation of data. Air pollution standards and indices, emission factor, emission inventory and emission standards, Prediction of effective stack height- plume rise concept and algorithm, e.g., Holland's equation, Briggs equation, etc.

UNIT V

ENVIRONMENTAL LEGISLATION & POLICY

Evolution of environmental legislation in India, Legal provisions for environmental protection; various Acts, Rules and Regulations. Notifications issued under various Acts and Rules.

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COURSE OUTCOMES

- To Understand the dispersion of air pollutant and prediction through various pollutants
- Students will have fundamental knowledge of past-present-future course of legal system for environment protection and conservation of natural resources

TEXTBOOKS

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. De Nevers, N., Air Pollution Control Engineering, 3rd edition
2. Handbook of Environmental laws, Acts, Guidelines, Compliances & Standards Policy, Trivedy, BS Publishers