

AKS University, Satna (M.P.)
FACULTY OF ENGINEERING AND TECHNOLOGY
DIPLOMA (Engg.)
SEMESTER- I
(For Civil, Electrical & Mining Engg.)
2015-18

Sr. No.	Sub. Code	SUBJECT	L	T	P	Credit
1.	14MS101	APPLIED MATHEMATICS-I	3	2	-	4
2.	14PH103	APPLIED PHYSICS	3	1	-	4
3.	14ME104	APPLIED MECHANICS	3	1	-	4
4.	14EV106	ENVIRONMENTAL SCIENCE & ENGINEERING	3	-	-	3
5.	14CA107	COMPUTER FUNDAMENTAL & PC PACKAGE	3	-	-	3
6.	14SD109	SSD-FUNCTIONAL ENGLISH-I	3	-	-	3
7.	14PH152	APPLIED PHYSICS Lab	-	-	2	1
8.	14ME154	APPLIED MECHANICS Lab	-	-	2	1
9.	14CA155	COMPUTER FUNDAMENTAL & PC PACKAGE- Lab	-	-	2	1
Total			18	4	6	24

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Sr. No.	Sub. Code	SUBJECT	L	T	P	Credit
1	14MS201	APPLIED MATHEMATICS-II	3	2	-	4
2	14CH203	APPLIED CHEMISTRY	3	2	-	4
3	14ME204	ENGINEERING DRAWING	3	-	2	4
4	14SS205 (H/I)	SPIRITUAL STUDIES (H/I)	3	-	-	3
5	14SD206	SSD-FUNCTIONAL ENGLISH-II	3	-	-	3
6	14MI210	BASIC MINING ENGINEERING (Only for Mining Engineering)	3	-	-	3
7	14CH252	APPLIED CHEMISTRY Lab	-	-	2	1
8	14ME253	WORKSHOP PRACTICE Lab	-	-	2	1
Total			15/18	4	6	20/23

Diploma (Engg.)
(Civil, Electrical & Mining Engg.)
Semester-I
APPLIED MATHEMATICS – I

UNIT-1 ALGEBRA

Introduction of Permutations and Combinations.

Theory of Quadratic Equation : Function, Number and Nature of Roots, Simultaneous quadratic equations. General form of a quadratic equation with real coefficients, relation between roots and coefficient of a quadratic equation.

Binomial Theorem: Statement of theorems for positive integer, general term, middle term, constant term.

UNIT-2 Function, Limit and Continuity

Function : Definition, Range and Domain and Co-Domain of Function, Types of Function, Absolute Value Function, Exponential value Function, Identity Function, Reciprocal Function, Rational and Irrational Function, Increasing and decreasing Function.

Limits: Concept of Limit, Left Hand Limit, Right Hand Limit, Limit of Standard Functions.

Continuity: Definition of Continuity, Elementary test for Continuity and discontinuity.

UNIT-3 DETERMINANTS AND MATRICES

Determinants: Definition and Properties of determinants, Solution of equations by Cramer's rule.

Matrix: Definition of matrix, representation of matrix, addition, subtraction and multiplication of matrices. Types of matrices, Minors and co-factors of matrices, Adjoint of a matrix, Inverse of a matrix, Solution of simultaneous linear equations by Matrix method .

Partial Fractions: Proper and Improper fractions, Break a fraction into partial fraction, whose denominator contains: linear factors, repeated linear factors, non repeated quadratic factors.

UNIT-4 COMPLEX NUMBERS AND VECTOR ALGEBRA

Definition of complex number, operation on complex number (addition, subtraction , multiplication, division), conjugate complex number, Modulus and Amplitude of a complex number, polar form of a complex number, Uses of De Moivre's theorem(without proof) for n integer.

Vectors and Scalars: Concept of vector and scalar quantities (Elementary), Types of vectors, Addition and subtraction of vectors, Multiplication of two vectors, Scalar product (2d & 3d), vector product.(2d & 3d)

UNIT-5 TRIGONOMETRY

- Allied angles [$\sin (180 \pm A)$, $\sin (90 \pm A)$ etc.].
Addition and subtraction formulae for trigonometric functions.
Product formulae for trigonometric functions, C-D formula for trigonometric functions.
T-ratio of multiple and sub-multiple angles, Conditional identities, solution of trigonometric equations.
Relation between sides and angles of a triangle.

TEXT BOOK :

1. Gupta, D , "Engineering Mathematics" 5th edition, S.Chand, 2009

REFERENCE BOOKS :

1. Sabharwal, SS , "Applied Mathematics Vol. I" Eagle Prakashan, Jalandhar, 2nd edition,
2. Kohli, S, "Engineering Mathematics Vol. I", IPH, Jalandhar, 3rd edition, 2008.
3. Mathur, AB, Jagi, VP, "Advanced Engineering Mathematics" Khanna Publishers, Delhi, 8th edition, 2010.
4. Grewal, BS, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 13th edition, 2010.

Diploma (Engg.)
(Civil, Electrical & Mining Engg.)
Semester-I
APPLIED PHYSICS

Objective- Engineering physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Unit- 1 : Units , Measurement and Motion

Physical quantities , fundamental and derived units, symbols & abbreviation. scalar and vector quantities- example , basic requirement to represent vector addition and multiplication of vectors. Linear measurement by vernier calipers, screw gauge and spherometer

Motion:- Newton's laws of motion and their applications, linear momentum, impulse and impulsive forces, Circular motion, concept of centripetal and centrifugal forces, Rotational motion, moment of torque, moment of inertia and radius of gyration

Unit-II

Ray Optics & Optical Instruments

Reflection – Definition and laws, types of reflecting surface (mirror), image formation by spherical mirrors, Relation between focal length and radius of curvature, mirror formula.

Refraction – laws of refraction , refractive index , total internal reflection, critical angle, image formation by spherical lens lens formula .

Dispersion – refraction in prism , dispersion of light by a prism , application of light in nature.

Optical instruments- Microscopes and telescopes, simple & compound microscopes astronomical telescope, terrestrial telescope and their uses.

Unit-III

Solid State Physics & Laser

Formation of energy bands in solids, differentiate between conductor , semi conductor and insulator on the basis of energy band theory, Semiconductors and its classification, doping, intrinsic (pure) and extrinsic(impure) semiconductors, P and N type semiconductors, Formation of P-N junction , zener diode, , Applications of P-N junction

LASER- Introduction , spontaneous and stimulated emission, pumping and population inversion, construction and working of He-Ne Laser, applications of laser.

Unit- IV : Waves and Sound Mechanics

Wave motion :- Wave motion with examples, Types of wave motion, transverse and Longitudinal wave motion with example, depression of beam and Derivation of determination of time period of a depression of beam.

Sound:- Introduction, definition of pitch, loudness, quality and intensity of sound Waves, reflection, refraction and absorption of sound waves by surfaces, echo, noise and reverberation defects and method to control these defects.

Unit- V : Heat & Temperature & Transfer of heat

Heat & Temperature:- Heat & Temperature, concept of heat capacity, specific heat, and latent heat, Calorimeter and its uses.

Transfer of heat:- Modes of transfer of heat (conduction, convection and radiation with examples), study state and variable state, Co-efficient of thermal conductivity, Determination of thermal conductivity good conductor (Searle's method) and bad conductor (rubber tube method), properties of heat radiation, Stefan's law, Kirchhoff's law, Wien's law, Planck's black body radiation law, Prevost theory of heat exchange.

List Of Experiments

1. To find internal radius of hollow tube by vernier calipers.
2. To find volume of a given cylinder by screw gauge.
3. To determine the thickness of a glass strip and radius of curvature of a convex surface by using a spherometer.
4. To determine the focal length of a convex lens by u-v method.
5. To determine the focal length of a convex lens by displacement method.
6. To determine the refractive index of the material of prism by incident angle-deviation curve.
7. To determine the refractive index of the prism in mercury light with the help of a spectrometer.
8. To study of a travelling telescope and find the internal & external radius of a hollow tube.
9. To study of a Telescope and calculate it's resolving power.
10. To study the of characteristics curve of P-N junction diode & Zener diode.
11. To find value of acceleration due to gravity 'g' by using a simple pendulum.
12. To find the frequency of the given tuning fork using a sonometer.
13. To find the velocity of sound by using Resonance air column apparatus.
14. To study the depression of a beam and hence to determine Young's modulus of the material of beam by using a spherometer.

TEXT BOOKS

1. 'BASIC APPLIED PHYSICS' BY - GAUR R.K. , Dhanpat Rai Publications.
2. APPLIED PHYSICS' BY – R.P.GOYAL , Shivalal Prakashan, Agra

REFERENCE BOOKS

1. Verma H.C. "CONCEPT IN PHYSICS" , Bharti Bhawan Ltd. ,New Delhi
2. APPLIED PHYSICS' BY – A.K. JHA
3. Gomber and Gogia , " Fundamental Physics" Vol-I and Vol-II, Pradeep ublications, Jalandhar
4. "A text book of nano science" S.K. Kataria and Sons, New Delhi
5. Optics by- Ghatak

**Diploma (Engg.)
(Civil, Electrical & Mining Engg.)
Semester-I
APPLIED MECHANICS**

RATIONALE: In the wider sense “Applied Mechanics” may be defined as a science which deals with the problems related to objects in motion or in equilibrium. Depending on the discipline of the technicians the depth of knowledge and extent of areas of mechanics will vary.

Only those topics which form common requirement of the different courses and those to, a depth required by all have been included in this subject. Further study of this subject in respect of topic/depth is left out and could be integrated with their use in subjects like theory of structure, strength of materials, theory of mechanics and basic machine design.

UNIT-1 : COMPOSITION AND RESOLUTION OF FORCES

Definition , Effect, characteristics of force System of Forces Principle of Transmissibility of Forces Concept of Resultant Force Law of –Parallelogram of Forces Triangle of Forces Polygon of Forces Determination of Resultant of two or more concurrent forces (analytically and graphically)

PARALLEL FORCES AND COUPLES: Classification of Parallel Forces Methods of finding resultant Force of parallel forces- analytically & graphically Position of resultant force of parallel forces Definition, Classification and characteristics of a force Couple, moment of couple

MOMENTS AND THEIR APPLICATIONS: Definition, Types and law of moment Varignon’s Principle of moment and its applications Lever and its Applications Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL)

EQUILIBRIUM OF FORCES: Equilibrium of a system of concurrent forces Conditions and types of Equilibrium Lami’s Theorem and its applications

UNIT-2 : CENTRE OF GRAVITY

Difference between Centroid and Center of Gravity (CG) Centroid of standard plane figures and CG of simple solid bodies Method of finding out Centroid of composite plane laminas and cut sections Method of finding out CG of Composite solid bodies

FRICTION: Concept and types of friction Limiting Friction, coefficient of friction, angle of friction, angle of repose Laws of friction (Static and Kinetic) Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane

UNIT-3 : SIMPLE LIFTING MECHINES

Concept of lifting Machines Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation Reversibility of Machines and condition for self locking machine Law of Machines, Maximum mechanical advantage and maximum efficiency of machine Friction in machine (In terms of Load and effort) Calculation of M.A.,

V.R. and efficiency of following machines Simple wheel and axle Differential wheel and axle Single purchase crab Double purchase crab Simple screw jack Different System of simple pulley blocks

UNIT-4 : MOTION OF A PARTICLE

Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration Motion under constant acceleration/ retardation (equations of motion) Motion under force of gravity Concept of relative velocity Definition of projectile, velocity of projection , angle of projection, time of light, maximum height, horizontal range and their determination Definition of angular velocity, angular acceleration and angular displacement Relation between linear and angular velocity of a particle moving in a circular path Motion of rotation under constant angular acceleration.

LAWS OF MOTION: Newton’s Laws of motion and their applications

UNIT-5 : WORK, POWER AND ENERGY

Definition unit and graphical representation of work Definition and unit of power and types of engine power and efficiency of an engine. Definition and concept of Impulse Definition, unit and types of energies Total energy of a body falling under gravity

LIST OF EXPERIMENTS

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanical advantage, velocity ratio and efficiency of the following lifting machines
 - (i) Simple wheel and axle.
 - (ii) Differential wheel axle.
 - (iii) Single purchase crab
 - (iv) Double purchase crab
 - (v) Simple pulley block
 - (vi) Screw jack

REFERENCE BOOK

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|------------------------------------|---|
| 1. Engineering Statics (in Hindi) | - Gokhru & Soni |
| 2. Applied Mechanics | - I.B. Prasad, Khanna Publishers, New Delhi |
| 3. Applied Mechanics (Hindi) | - R.S. Jog, Anand Publishers, Gwalior |
| 4. Applied Mechanics Practical | - Soni & Chandel |

TEXT BOOKS

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|-------------------------------------|--|
| 1. Applied Mechanics (in Hindi) | - A. R. Paage Deepak Prakashan, Gwalior |
| 2. A text book of Applied Mechanics | - R.S. Khurmi , S.C. Chand & Co. , New Delhi |

**Diploma (Engg.)
(Civil, Electrical & Mining Engg.)**

Semester-I

ENVIRONMENTAL SCIENCE & ENGINEERING

OBJECTIVES : *In view of developing new attitudes and behavioral patterns to enable students make decisions which help preventing deterioration of environment, Ecosystem & Resources management & as certain concept of sustainable development.*

UNIT 1: INTRODUCTION TO ENVIRONMENTTHE BIOSPHERE

Introduction to Environment, Ecology, Eco system: Types An aquatic & Terrestrial ecosystem, Factors affecting Eco system, Biogeochemical cycles, Biodiversity, Types, values & Importance, Causes of losses, Biodiversity Index. Future of human being- Impact of human being on environment. Basic approach to improve environmental qualities Role of an environmental engineer.

UNIT 2 : Natural Resources

Types of resources, Quality of life, Population and Environment, Water resources, Sources of water, Water demand, Forest as resource, Forest and Environment, Deforestation, Afforestation, Forest conservation, its methods, Land Uses and abuses of waste and wet land, Wild life, Conservation of wild life, Important National parks, Sanctuaries, Reserves., Other resources, Oil and mineral resources.

UNIT 3 : ENVIRONMENTAL POLLUTION

Introduction, Water pollution, Characteristics of domestic waste water, Principles of treatment, Water treatment plant. Air pollution: Pollutants, Sources of pollution, Effect of pollutants, Air monitoring system, Air pollution control- Air quality standards, Soil pollution : sources, effects control, Thermal Pollution: sources, effects control . Noise pollution, Effect of noise pollution Radioactive pollution, Adverse effects of radiation & thermal pollution. Environmental & pollution control law.

UNIT 4 : INDUSTRIAL WASTES

Industrial Waste treatment – Economics of waste treatment benefits of pollution abatement (primary, secondary and intangible benefits), difficulties in achieving, pollution abatement through industrial waste treatment.

SOLID WASTE MANAGEMENT - Sources and classification of solid waste - Public health aspects - Disposal methods – open dumping , sanitary , land fill- Incineration , composting - Potential methods of disposal- Recovery and recycling of paper, glass, metal and plastic.

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

UNIT 5 : NATURAL DISASTERS

Types of natural disaster, Cyclone, Flood, Fire, Desert storms, Landslides, Snow avalanches, Cyclone Introduction, Fundamentals, Characteristics, Causes & effects, Preventive and Remedial measures, Flood Introduction, Fundamentals, Causes and effects, Preventive and Remedial measure, Fire, Fundamentals, Causes & effects, Preventive and remedial measures

SAFETY PRACTICES: Noise pollution control devices brief, discussion- Responsibility of employees and employers regarding health and safety- Fire hazards ,prevention and precautions-Industrial hazards prevention and protection - Protection from air and noise pollution

UNIT 6 : GLOBAL ENVIRONMENTAL PROBLEMS

Introduction, Major Global problems, Acid rain, Effect of Acid rain, Green house effect, Depletion of Ozon layer Effect of Ozon layer depletion, Human predictiments, Introduction of global warming, Measures against global worming

TEXT BOOKS:

1. Environmental Education, Dr. Mahendra Kumar Tiwari, University Publication New Delhi
2. A Text book of Environmental Science, Kaushik & Kaushik, New Age Publication New Delhi
3. A Text book of Environmental Science, Purohit & Agrawal Agrobios Publication Jaipur
4. A Text book of Environmental Science Erach Bharucha UGC Publication New Delhi
5. Paryavaran Chetna , MP Hindi granth akadami

REFERENCE BOOKS:

1. Air pollution by Perkins.
2. Liquid waste of industry, theories, practices and treatment by Nelson L. Vamerow.
3. Management of solid waste in developing countries by Flint off.
4. Environmental Engineering (International edition) by Peavy, Howards.
5. Air Pollution – It's origin and control by keneth work and Warmer. (W.H.O. Publication)
6. Industrial waste by Namit.
7. Environmental pollution control Engineering by C.S. Rao
8. Air pollution and control by Seth
9. Air pollution by M.N Rao
10. Industrial waste and its treatment by Seth
11. Paryavaran Yantriki Hindi granth akadami

**Diploma (Engg.)
Semester-I
(Civil, Electrical & Mining Engg.)
Computer Fundamental & PC Package**

Unit-1 :Introduction to computers

Definition of electronic Computer, Characteristics of Computers, features ,Types of computers Mini Computers, Micro Computers, Mainframe Computers ,Super Computers, Memory Types of Memory (Primary & Secondary) RAM, ROM, PROM, EPROM, Secondary, Storage Devices FD, CD, HD, Pen drive

I/O Devices :-Keyboard, Mouse, Monitor, Scanners, Plotters, LCD, Plasma Display

Additional Readings: Types of Programming language.

Unit-2

Operating System and Services in O.S.

Windows Operating Environment Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paint Brush.

Additional Readings: Study of Linux Operating System.

Unit- 3

MS Word 2007:– Word basics, formatting text and documents, working with headers, footers and footnotes, tabs, tables and sorting. Working with graphics, templates, wizards and sample documents, introduction to mail merge and macros.

Additional Readings: Create a word document in 2 columns from a newspaper with some tables and graphics.

Unit-4

MS Power Point 2007:- PowerPoint basics, creating presentation the easy way, working with graphics. Inserting various objects (Picture, Organizational Chart, Audio, Video etc) in slide. Adding Animation effects in slide.

use the features described in class, including: Clip art graphics ,Background , Bullet Lists of items, Text animation & Adding Hyperlinks, Word Art and other shapes

Additional Readings: Create a 6-slide Power Point presentation that includes the features of Your University.

Unit-5

MS Excel 2007:- Excel basics, rearranging worksheets, excel formatting tips and techniques. Introduction to functions, Excel chart features, working with graphics. Using worksheet as a Database.

Additional Readings: Create a table maintaining the records of marks of students of a class and display it in a graph.

Text Readings

1. E Balagurusamy **Fundamentals of Computer** Tata McGraw Hills Publication.
2. Deepak Bharihoke **Fundamentals of Information Technology** Excel books.
3. Manish Mahajan **IT Infrastructure & Management** Achme learning.

Diploma (Engg.)
Semester-I
(Civil, Electrical & Mining Engg.)
SSD - FUNCTIONAL ENGLISH-1

INTRODUCTION: Grammar is vital for the efficient use of language in academic as well as social environment. You already know that our speech is made up of sentences. A sentence is the basic unit of the written and spoken language. In this unit we will learn about various structural and functional parts of the sentence, their types ,subtypes and their usage.

Objectives:

To enable the students to use verbs in appropriate contexts.

To improve students' command of spoken English by practicing the functional language needed in different situations

To familiarize the students with the concept of Functional English as a multi-focal discipline.

To enable the students to use English correctly and confidently

UNIT-1

- a. Articles: Definite, Indefinite and Zero, Noun: numbers (singular and plural) and Personal Pronouns
- b. Introduction to verb :Ordinary and Auxiliary verbs, Regular and Irregular verbs
- c. **The Present Tense:** Present Continuous, Simple Present (Form and Use)

UNIT-2

The Past and Perfect Tenses: Simple Past, The Past Continuous, The Present Perfect, The Present Perfect Continuous, The Past Perfect and The Past Perfect Continuous. (Form and Use)

UNIT-3

The Future Tense: Future Simple, The future Continuous (Form and Use),Causative Verbs,The Sequence of Tenses.

UNIT-4

Introduction to Modal Auxiliaries (Form and Use)

May and can for Permission and Possibility.

Could for permission in the Past

May ,Might for Possibility.

Can and be able for Ability.

Ought, Should, Must, have to,had to, Need for Obligation.

UNIT-5

The Conditional Sentences, The Passive Voice; Active Tenses and their Passive Equivalents including Modals, Use of Passive Structure.

NOTE: Coverage of 1220 Regular (600) and Irregular Verbs (620) with their meaning and uses. 1. (

Teachers are required to Introduce 25 verbs from the given verb list in every lec

Diploma (Engg.)
Semester-II
(Civil, Electrical & Mining Engg.)
APPLIED MATHEMATICS-II

UNIT-1:-Co-ordinate Geometry –I

Co-ordinates of points, Cartesian and Polar form of co-ordinates, distance between two points, section formula: internally and externally (2D and 3D).

Triangle: Area of a triangle, centroid and in centre of a triangle (given the vertices of a triangle), Simple problems on locus.

Circle: General equation of a circle and its characteristics, The center and radius of a circle, Three points on it. Area of a circle, The Co-ordinates of the ends of the diameter.

UNIT-2:-Co-ordinate Geometry –II

The Plane: Concept of a plane, Intercept form of the equation of a plane, general equation of a plane as a linear equation in three variables. Distance of a point of a plane. The condition for a line to lie on a plane.

- Straight Line (2D-3D): General definition of Straight Lines, Equation of a line joining two points, Angles between two lines, parallel Straight Lines , perpendicular Straight Lines. Slope, Tangent line, Normal Line, points of intersection of Straight Lines.

Sphere : Equation of a sphere, centre and radius of a sphere. Points on it.

UNIT-3 Differential Calculus

Differentiability of a function: Concept of constant function and Variable function.

Differentiation of x^n , $\log_e x$, $\sin x$, $\cos x$, $\tan x$, e^x by first principal.

Differentiation of a function of a function and implicit functions.

Differentiation of sum, product and quotient of different functions.

Logarithmic differentiation.

UNIT-4:-Integral Calculus

Definite Integrals: Definition and general properties of definite integrals.

Indefinite Integrals: Definition, Methods of integration; integration by substitution, integration by parts, integration by partial fractions.

Integration of trigonometric function.

UNIT-5:-Methods of Measurement

Introduction, Definition of a statistics, measures of central tendency: Arithmetic Mean median, mode.

Dispersion of central tendency; mean Deviation, Variance, Standard Deviation, Coefficient of standard deviation with examples.

RECOMMENDED BOOKS

1. Higher Engineering Mathematics by BS Grewal
2. Engineering Mathematics by BS Grewal
3. Engineering Mathematics vol. II by S Kohli and Others, IPH, Jalandhar
4. Engineering Mathematics by Ishan Publication
5. Applied Mathematics Vol. II by SS Sabharwal and Others; Eagle

Diploma (Engg.)
Semester-II
(Civil, Electrical & Mining Engg.)
Applied Chemistry

Objective- The role of chemistry and chemical production in every branch of engineering is expanding greatly now a day's various chemical products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials the composition of substances, their behaviors when subjected to different treatment and environment and the laws of heat and dynamic energy have entered in almost every activity of modern life.

UNIT-I

Atomic Structure and chemical bonding

Atomic Structure:- Introduction to electron, proton and neutron. Atom, Atomic number, orbit and orbitals, shapes of s, p and d orbitals. Quantum number and its type.

Rule for filling electrons in orbital's: Aufbau's principle, Pauli's principle and Hund's rule. Brief history of development of periodic table.

Chemical bonding:- Definition of bond, Ionic, covalent and co-ordinate bond.

UNIT-II

Water Chemistry and solution:-

Introduction, sources and water quality parameter (hardness and its type),

Softning of water by various method:- Soda-line process, zeolite and Ion exchange process. Treatment of drinking water.

Soultion:- Definition of solution, solute and solvent. Types of solution. Molarity, Normality and Molality of the solution.

UNIT-III

Electrochemistry:-

Electrolyte, Types of electrolyte, ostwal law of dilution, Arrhenius theory of electrolytic dissociation, P^H and its measurement, Buffer solution, Redox reaction, common ion effect, electrochemical series.

Acid and Base concept:- Arrhenius theory, Bronsted-lorry and Lewis acid-base concept.

UNIT-IV

Metals, catalysis and corrosion:-

Metals:- Physical and chemical properties of metals and non-metals, electronic configuration and oxidation state of 3d-transition metals.

Catalysis:- Definition, Types and theory of catalysis, industrial application of catalyst.

Corrosion:- Definition, mechanism of corrosion, type and factors affecting rate of corrosion, corrosion control.

UNIT-V

Fuels, explosive and cement-

Fuels:- Definition, classification of fuel, calorific value of fuel, determination of calorific value of fuel by bomb calorimeter.

Analysis of coal:- proximate and ultimate analysis.

Cement:- Introduction of cement, composition of Portland cement and its manufacture, setting and hardening of cement.

Explosives:- Introduction, definition, types and application of explosives.

Text Book:-

Author	Name of the book	Publisher
Jain&Jain	Engineering Chemistry	Dhanpat Rai&sons
Jain&Jain	Engineering Chemistry	WileyIndiaEdition
B.K. Sharma	Industrial Chemistry	Goel Publication
B.K. Sharma	Engineering Chemistry	Krishna Publication
S.S.Dara	Engineering Chemistry	S.ChandPublication
Shashi Chawla	Engineering Chemistry	Dhanpat Rai&sons

Reference Books:-

Ghosh	Polymer Science	Tata McGraw Hill
S.S. Kumar	Applied Chemistry	Tata
McGrawHill2 nd Edition2009		
O.P.Viramani, A.K.Narula	Appl. Che. (Theory Practice)	NEWAGE Publication
J.Rajaraman	Chemistry in Engineering	Tata McGraw Hill
F.W. Billmeyer	Polymer Science	John Wiley&sons

**Diploma (Engg.)
Semester-II
(Civil, Electrical & Mining Engg.)
Engineering Drawing**

Objective: Engineering Technician irrespective of his field of operation in an industry is expected to possess a thorough understanding of drawing which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of engineering drawings. Besides this he is also expected to possess a certain degree of drafting skill, depending upon his job functions in his day to day activities. This course of engineering drawing for diploma courses in Engineering branches is aimed at developing basic knowledge and skill, of engineering drawing.

UNIT-I

1-INTRODUCTION TO DRAWING INSTRUMENTS

Drawing material their uses Application of Minidrafter, compass, divider, French curves, pencils grades and their uses. Planning of drawing sheet as per I.S.696-1972 Margin, title block, zoning, revision panel, folding marks, and numbering of sheet.

2-CONVENTIONAL REPRESENTATION

Common Engg. Materials, Mechanical components – Internal and external threads slotted head, square head, radial arms, ribs, etc.

3-LINES AND LETTERING AND DIMENSIONING

Introduction of type of lines and their application Single Stroke vertical, inclined letter[capital] Dimensioning system– Aligned and unidirectional and their technique

4-ENGINEERING CURVES

Construction of Ellipse by Eccentricity and Concentric circle methods Construction of Hyperbola by Eccentricity Method Construction of Cycloid Construction of Involute of circle and polygon Construction of Archimedean Spiral of any number of convolutions

5-SCALES

Introduction of scales and their applications Concept of reducing, enlarging and full size scale Classification of scales-plain, diagonal, vernier Scale of chord Definition of R.F. Construction of Plain, diagonal scale and , vernier

UNIT-II

ORY OF PROJECTION AND PROJECTION OF POINT, LINES AND PLANES

Definition of various term associated with theory of projection. Planes of projection, Quadrants, first and third angle projection method .Projection of points in all the four quadrants.

Projection of lines-

1.parallel to HP and VP both 2.perpendicular to one plane and parallel to other 3.Inclined to one plane and parallel to other 4.knowledge of projection of line inclined to both the planes[No Practice required]

UNIT-III

Projection of Plane- 1.Prependicular to HP and VP both 2.Perpendicular to one plane and parallel to other 3.Inclined to one plan and perpendicular to other 4.Knowledge of projection of plane inclined to both the planes.

PROJECTION OF SOLIDS:

Projection of cylinder, cone, prism and pyramid Under the following conditions:

1. Axis parallel to HP and VP
2. Axis perpendicular to HP and parallel to VP
3. Axis perpendicular to VP and parallel to HP
4. Axis inclined to HP and parallel to VP
5. Axis inclined to VP and parallel to HP
6. Axis inclined to both HP and VP

UNIT-IV

2-SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES:

Section of cone, cylinder, prism and pyramid [Solid resting on its base in The HP i.e. the Axis perpendicular to H.P. and parallel to VP] in the following cases:

1. Section plane parallel to HP and perpendicular to VP
2. Section plane parallel to VP and perpendicular to HP
3. Section plane inclined to HP and perpendicular to VP
4. Section plane inclined to VP and

INTRODUCTION TO DEVELOPMENT OF LATERAL SURFACE OF SOLIDS

Cone, cylinder, prism and Pyramids [Simple and truncated] under the condition-solid resting on its base in the HP and axis Perpendicular to HP and parallel to VP perpendicular to HP Drawing True shape of section

UNIT-V

1-ORTHOGRAPHIC PROJECTION

Principal of orthographic projections Identification of necessary views and superfluous view Selection of front view Preparation of necessary orthographic views of simple objects From given pictorial views

2-ISOMETRIC VIEWS

Concept of isometric projection and isometric view[Isometric Drawing] Construction of isometric scale Construction of isometric view of polygon and circle Construction of isometric view of cone, cylinder ,prism and pyramids Construction of isometric view of simple objects from given orthographic views

REFERANCE BOOKS :-

Engineering Drawing	P. S. Gill
Engineering Drawing	A. C. Parkinson
Engineering Drawing	R. K. Dhawan

TEX. BOOKS :-

Engineering Drawing	N. D. Bhat
Abhyantriaki Aarekhan	Shivdatt Upadhyay Deepak Prakashan, Gwalior

Diploma (Engg.)
Semester-II
(Civil, Electrical & Mining Engg.)
WORKSHOP PRACTICE

RATIONALE: Work shop practice is the fundamental exposure to basic skill required for all students pursuing their studies in various diploma-engineering disciplines. The practice experience would help students to understand the intricacies of industrial Working in relatively shorter period of time more over the contents of this Curricula forms a basic link for higher studies of engineering programs. The students are advised to undergo each skill experience with know-how approach giving special emphasis to know-why for the various instructions imparted to them in each shop.

UNIT-I INTRODUCTION TO WORK SHOP

General Safety rules of workshop, State the General Safety Measures to be observed in Workshop. State the General housekeeping activities, Prepare a list of general safety Rules to be followed in Workshop

Fitting shop

Layout of Shop, Sketch & Label Details of shop Layout

Type of jobs produced in fitting shop, Understand the functions of fitting shop, Understand different Metals, Alloys & their Sections, List the Commonly used Metals, Alloys., State at least Five Sections, Shape & Size of Metals, Alloys.

Use relevant IS Code for commonly used materials with their samples of different Cross sections.

Fitting tools.

Know use of fitting tools, sketch various tools & label their parts. Classify fitting tools as marking tools, Clamping devices, striking tools, cutting tools etc. Know the marking out & inspection instruments such as surface plate, marking block, scribe, tri square, bevel protractor etc. Fitting operation: - Use of Various fitting tools, inspection & measuring Instruments. To produce given jobs. Choose correct Shape & Size of Blank for a given drawing.

Marking as per drawing using correct method, tools & sequence. Choose correct sequence of operations for the job viz. Sawing, filing, scraping, drilling & Tapping etc. Select appropriate Tools, inspection and measuring instruments.

Clamping the job in correct position in an appropriate clamping device. Perform the operation with appropriate body posture, method & precision, exercising personal judgment of need of the force. Inspect the job as and when necessary.

Introduction to screw threads.

UNIT-II

Carpentry Shop: -

Carpentry shop lay out. Sketch & Label Details of shop Layout. Type of jobs produced in carpentry shop. Understand the functions of carpentry shop. Introduce type of jobs produced by carpenter. Commonly used raw materials: Know commonly used raw materials & their commercially available size. Name various type of raw materials used such as Timber: - logs, planks, battens etc. Ply, Teak ply, block board, sun mica, Formica etc. Carpentry tools: - Know various carpentry tools with their specifications and uses e.g. Different saws, chisels, gauges, scales, hammers, tri squares planners, vice etc.

Carpentry Joints:-

Introduction of various joints like T, corner, mortise & tennon joints, dovetail, pin, cross half lap joint, etc.

Choose correct shape & size of timber blank for a given job drawing.

Do marking as per drawing using correct method, tools & sequence.

Identify correct operations e.g. sawing, chiseling, planning, grooving etc. Select appropriate Tool, inspection & measuring Instruments. Clamping the jobs in correct position in an appropriate clamping device. Perform the operation with appropriate body posture, method & precision, exercising personal judgment of need of the force. Inspect for size & quality of finish as and when necessary. Assemble the components produced. Inspect for proper joint quality & take remedial steps.

UNIT-III

BLACK SMITHY SHOP:-

Understand the function of black smithy & forging shop. Layout of Shop. Sketch & Label Details of shop lay out.

Know the different jobs produced in smithy shop e.g. round to hexagonal shapes or vice versa J hook, S- hook, circle, chain etc. Commonly used raw materials: - M.S. Bars of different shapes and size. Smithy Tools: - Know various smithy tools with their specifications e.g. different type of hammers, hot / cold chisel, flatters, tongs, leg vice, swage block, anvils, open hearth and furnaces etc. Preparation of job (any three) J-hook, S-hook, chain, circle, tong, chisel etc.

Safety measures: - Know the safety regulation in black smithy shop.

Machine Shop:-

Lathe:- Description and function of various parts of a lathe Classification and specification of various types of lathe Work holding devices Lathe operations: - Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling. Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time. Lathe accessories:- Centers, dogs, chucks, collets, face plate, angle plate, mandrel, steady rest, taper turning attachment, tool post grinder

Standard Shaper Machine:- Specifications and working principle of Shaper machine Classification of Shaper machines and their brief description and their applications

Drilling Machine: Specifications and working principle of Drilling machine Classification of Drilling machines and their brief description and their applications

Milling Machine :- Specifications and working principle of milling machine Classification of milling machines and their brief description and their applications. Details of column and knee type milling machine Milling machine accessories and attachment -Arbors, adaptors, collets, vices,circular table, indexing head and tail stock, vertical milling attachment, spiral milling attachment, slotting attachment and rack milling attachment

UNIT-IV

WELDING SHOP

Layout of Shop:- Sketch & Label Details of shop lay out. Know the different jobs produced in Welding shop e.g. Lap joint, single butt, double butt, corner, T joint, etc. Tools & equipments used:-Specifications & use of various tools and equipments used in Welding shop e.g. . A.C. welding transformer, Gas welding set, electrode used, chipping hammer, wire brush, shield, gloves, apron etc.

Preparation of job: - (any two) Lap joint, single butt, double butt, corner, T joint, etc. Safety measures:- Know the safety regulation in Welding shop.

WORK SHOP PRACTICALS

Carpentry Shop: (Any Two)

1. Preparation of Cross-Half Lap Joint.
2. Preparation of Dovetail Joint
3. Preparation of Mortise and Tenon Joint

Welding Shop: (Any Two)

1. Preparation of a Butt Joint by Gas Welding.
2. Preparation of Lap Joint by Electric arc Welding.
3. Preparation of T-Joint by Electric arc We
4. Demonstration on Brazing by the Instructor.
5. Demonstration on Gas Cutting

Fitting shop: (Any One)

1. Marking Filing & Hack Sawing Practice.
2. Production of Utility Job involving, Marking, Filing and Hack Sawing.
3. Production of Utility Job involving Marking, Filing and Hack Sawing Drilling and Tapping.

Machine Shop:-

- 1.demonstration of various metal cutting operation viz Plain turning Facing, chamfering , etc.

2. demonstration Slots / Plain Surface Generation on Shaper
3. demonstration of Milling Machine and its operation (slotting/keyway) using multipoint Cutting tool.
4. Study of Lathe machine and its components.
5. Study of Standard Shaper and its components
6. Study of Drilling Machine and its components.
7. Study of various checking & measuring instruments viz VC,MM.VHG Threading gauge /OC/IC etc.

REFERENCE BOOKS

- | | |
|---------------------------------|------------------------|
| 1. Production technology vol. I | R.C. Patel &C.G. Gupta |
| 2. Production technology vol. I | Dalela |
| 3. Work shop technology vol. I | Raghuwanshi |
| 4. Work shop technology vol. I | Chapman |
| 5. Workshop Technology (Hindi) | Tahil Maghnani |
| 6. Workshop Technology (Hindi) | Vinay Kumar |

TEXT BOOKS

- | | |
|----------------------------------|-----------------------------------|
| 1. Workshop Technology vol. I&II | Hajra, Chaudhary |
| 2. Workshop | P. N. Vijayvargiya (Hindi medium) |

Diploma (Engg.)
Semester-II
(Civil, Electrical & Mining Engg.)
SSD- CSEP(COMMUNICATION SKILLS ENHANCEMENT PROGRAM)
FUNCTIONAL ENGLISH-II

Unit-1

Subject verb Agreement, Adjectives and Comparison of Adjectives, Determiners

Unit-2

Introduction to Prepositions (Use and omission), Preposition of travel and movement, Preposition of Date and Time, Relations expressed by Preposition, Words followed by preposition, Finite and Non Finite Clauses& Uses of Let.

Unit-3

Conjunction: Co-ordinating and Subordinating,Sentences :Simple, Compound and Complex

Unit-4

Statement : Direct & Indirect, Phrasal Verb, Antonyms, Synonyms, Letter Writing: Formal (Parts& Layout)

Unit-5

Communication: Definition & Meaning of Communication, Importance &Process,Types: Verbal & Non-Verbal, Barriers, and how to overcome these barriers.

Reference:

Thomson, A.J and A.V. Martinet.*A Practical English Grammar*. Oxford University Press: New York.

Wren and Martin.*High School English Grammar and Composition*.S.Chand& Company Pvt. Ltd. : New Delhi

Greenbaum, Sidney. *Oxford English Grammar*. Oxford University Press: New York.

Rudzka-Ostyn, Brygida.(2003) *Word Power: Phrasal Verbs and Compounds*.Mouton de Gruyter, Berlin: New York

Chambers Dictionary of Antonyms & Synonyms

Hudson, Richard. *English Grammar*. Routledge: New York.

Rodrigues, M.V. *Effective Business Communication*. Concept Publishing Company: New Delhi. Raman,Meenakshi&Sangeeta Sharma.Communication Skills. Oxford University Press

SPIRITUAL STUDIES (HINDUISM)

SRIMADBHAGWADGITA

Compulsory for All Programme/ Courses

श्रीमद्भगवद्गीता

UNIT-I

अध्याय—एक अर्जुन की मोहग्रस्तता,

अध्याय—दो

अर्जुन का नैराश्य, शरीर और आत्मा का विश्लेषण, कर्तव्यपालन, निष्काम कर्मयोग, स्थितप्रज्ञ एवं तापत्रय

अध्याय—तीन कर्मयोग, षट्ठिकार

UNIT-II अध्याय—चार

गीता का इतिहास, भगवान के प्राकट्य का कारण एवं उनकी सर्वज्ञता

अध्याय—पांच ईश्वरभावनाभावित , कर्म

अध्याय—छः

ध्यान योग या सांख्य योग, सिद्धि या समाधियोग

अध्याय—सात

परा और अपरा शक्ति, पुण्यात्मा मनुष्य के लक्षण

UNIT-III अध्याय—आठ

ब्रह्मा, आत्मा, अधिभूत, अधिदैव, अधियक्ष, मुक्तिलाभ की विधि

अध्याय—नौ परमगुहाज्ञान

अध्याय—दस

श्रीभगवान का ऐश्वर्य

UNIT-IV अध्याय—ग्यारह

श्रीभगवान का विराटस्वरूप

अध्याय—बारह

भक्तियोग का वर्णन, अव्यक्त की उपासना में क्लेश, शुद्ध भक्त के लक्षण

अध्याय—तेरह

क्षेत्र, क्षेत्रज्ञ एवं कर्मक्षेत्र की परिभाषा, ज्ञान, ज्ञेय, प्रकृति एवं परमात्मा, चेतना

अध्याय—चौदह त्रिगुण स्वरूप

अध्याय—पंद्रह

परम पुरुष का स्वरूप, जीव का स्वरूप

UNIT-V अध्याय—सोलह

दैवीय स्वभाव, आसुरी स्वभाव

अध्याय—सत्रह

श्रद्धा के तीन प्रकार, भोजन के प्रकार, यज्ञ के प्रकार, तप के प्रकार, दान के प्रकार, ऊँ कार का प्रतिपादन, सत्, असत् का प्रतिपादन

अध्याय—अठारह

सन्यास एवं त्याग में अंतर, त्याग के प्रकार, कर्म के कारण, कर्म के प्रेरक तत्व, कर्म के प्रकार, कर्ता के प्रकार, चार वर्णों के स्वाभाविक गुण, प्रभु के प्रति समर्पण भाव

Recommended books

संदर्भ ग्रंथ सूची

1. श्रीमद्भगवद्गीता—गीताप्रेस, गोरखपुर।
2. श्रीमद्भगवद्गीता—मधुसूदनसरस्वती, चौखम्भा संस्कृत संस्थान, वाराणसी, 1994।
3. श्रीमद्भगवद्गीता—एस.राधाकृष्णन् कृत व्याख्या का हिन्दी अनुवाद, राजपाल एण्ड सन्स, दिल्ली, 1969।
4. श्रीमद्भगवद्गीता—श्रीमद् भक्तिवेदांत स्वामी प्रभुपाद, भक्तिदांत बुक ट्रस्ट, मुंबई, 1996।
5. तपउंकईहूंकहपजं.मदहसपी बवउउमदजंतल इल श्रंलकंलंस ळवलंदकांए ळपजं च्तमेए ळवतीचनतए 1997

SULLABUS
SPIRITUAL STUDIES (ISLAM)
Compulsory for All Programme/ Courses

UNIT-I

इस्लाम धर्म:- 6वीं शताब्दी में अरब की (राजनैतिक, धार्मिक, सामाजिक, आर्थिक परिस्थितियां व कबीलाई व्यवस्था)

मोहम्मद साहब का जीवन परिचय, संघर्ष व शिक्षाएं, इस्लाम का प्रारम्भ, इस्लाम क्या है और क्या सिखाता है, ईमान-ईमाने मोजम्मल, ईमाने मोफस्सल।

UNIT-II

इस्लाम धर्म की आधारभूत बातें:-

तोहीद, कल्मा-कल्मा-ऐ-शहादत, कल्मा-ऐ-तैय्यबा, नमाज, रोजा, जकात और हज का विस्तारपूर्वक अध्ययन

UNIT-III

खोदा-तआला की किताबें (आसमानी किताबें):-

इंजील का परिचय, पवित्र कुरान का संकलन, "वही" की परिभाषा, तौरत, जुबूर, पवित्र कुरान का महत्व, कुरान की मुख्य आयतें, पवित्र कुरान और हाफिजा

UNIT-IV

पवित्र हदीसों और सुन्नतें:-

हदीस और सुन्नत क्या है, हदीस और सुन्नत का महत्व, कुछ प्रमुख सुन्नतें और हदीसों का अध्ययन, सोकर उठने की सुन्नतें, लेबास की सुन्नतें, बीमारी और अयादत की सुन्नतें, सफर की सुन्नतें

UNIT-V

इस्लाम धर्म की अन्य प्रमुख बातें:-

मलाऐका या फरिशते (देवदूत), खुदा के रसूल, खुदा के पैगम्बर, नबी और रसूल में अन्तर, कयामत, सहाबा, खलीफा, मोजिजा और करामात, एबादत, गुनाह (कुफ्र और शिर्फ), माता-पिता, रिश्तेदार व पड़ोसी के अधिकार, इस्लाम में औरत के अधिकार, इस्लाम में सब्र और शुक्र, इस्लाम में समानता और भाईचारा

ADDITIONAL KNOWLEDGE:-

IN THE LIGHT OF 'QURAN' AND 'HADEES', TEN POINTS WILL BE DELIVERED TO THE STUDENTS DAILY, IN A SECULAR COUNTRY THE STUDENTS SHOULD KNOW THE PHILOSOPHY OF OTHER RELIGION ALSO SUCH AS "JAINISM", "BUDHISM" AND "SANATAN DHARMA".

**Diploma (Engg.)
Semester-II
(only for Mining Engineering)**

Basic Mining Engineering

Unit I : Earth-Geology-Branches of Geology-origin, internal structural of earth, plate tectonics. Definitions of Geology-Definition of mineral and Rocks-Classification-Igneous-Sedimentary & Metamorphic- Examples of each Rock Type, Minerals and Ore classification of metallic and non metallic minerals. – Energy Minerals (Coal, Lignite, Petroleum Crude, Coal Bed Methane) – Ferrous Minerals(Iron, Manganese, Chromium etc), Atomic Minerals(Uranium, Illiminite, Beach Sand etc)–Non-Ferrous Minerals(Limestone, Dolomite, Bauxite, etc) – Metals & Non Metals - Classification of Coal (Peat-Lignite-Bituminous & Anthracite) - Uses of Coal & Lignite – Some important Minerals – Copper, Lead & Zinc, Chromite, Iron Ore, Limestone, Bauxite, Dolomite, Diamond, Gold etc – Their occurrence in India-CG & MP, -Uses. Prospecting-Exploration-Drilling for exploration-Ore/Coal Reserve Terms & Terminology.

Unit II : Mining administration-Mines-Safety-DGMS (Role of DGMS)-IBM-CIMFR-Exploration agencies-Coal India and its subsidiary companies-Neyveli Lignite Corporation Ltd, NMDC Ltd-Acts and Rules related to Mining in India (Mines Act, CMR, MMR, MVTR, etc)-Mine Planning

Unit III : Mining Terms – Opencast (OC) terms – Under Ground (UG) Mining terms Opencast vs UG Mining, How to select UG & OC Mining. – UG Mining – entry (Shaft & Incline – Shaft fittings-Winders-Pit Top, Pit Bottom), Different types of UG Mining of Coal & Metal;

What do we see/observe in UG Mine Pit-Top – Haulage-or Winder-Ventilation Fan-Lamp Room-First Aid Room-Unloading & Loading of men & material (into Incline or Shaft system)-Man riding system(in some Inclines) – Entrance to walking way-Conveyor or Rope haulage system(in Inclines) – Road ways, Method of Work (Bord & Pillar-Longwall etc)-Face, Roof & Floor-Support system-Track & Tubs, Locomotives-Drilling & Blasting Face-Development & Depillaring face-Ventilation Duct-Ventilating Doors-Lighting system-Transformer room-Priming station-First Aid Room/chamber-Rope Haulage system –Sump etc.

Unit IV : Opencast Mining – Stripping ratio-Box cut-Dump for OB and Coal/Ore-Main haul road-Benches-Bench dimensions-Production Face-Drilling & Blasting-Loading-Dumper transport-Ramp-Sump etc. Quarry operations-Shovel/Excavator Mining system-Dragline system – Unit Operations (Drilling-Blasting-Loading & Hauling)-Lighting-OB removal-Dumping of OB – HEMM selection and where to adopt?

Unit V : Role of Mining in economic development of India-MMDR Act 2015-National Mineral Policy-Mineral/Coal statistics etc.- Environmental impact of Mining (Land-Water-Air) etc.

References:

- 1) Elements of Mining Technology, (Vol. I) by D.J. Deshmukh
- 2) Introduction to Mining by G.K. Pradhan
- 3) Training Aid (Mining) Published by AKS University

References

- Indian Bureau of Mines, Minerals Year Book & other publications
- Dr C.M.Kole, Khuli Khan Ka Ayojan (Hindi), CMPDIL, Ranchi
- Dr. Calvin Konya; "Rock Blasting and Overbreak Control" Precision Blasting Services, Montville, Ohio
- C.P. Chugh, High Technology in Drilling and Exploration. Pub: Oxford & IBH Publishing Co. Pvt.Ltd. New Delhi.
- C.P. Chugh, Diamond Drilling. Pub: Oxford & IBH Publisher. Howard, L.Hartman, Introductory Mining Engineering, Pub: John Willey & Sons
- Web sites : mines.nic.in, GSI, CMPDI, Coal India, NMDC etc.

Reference Journals

- Journal of Institution of Engineers(India)-Mining
 - Journal of Mines, Metals & Fuels, Kolkata
 - Indian Mining & Engineering Journal, Bhubaneswar
 - Journal of Mining Engineers, MEAI, Hyderabad
 - Minetech, CMPDIL(Quarterly)
 - CMTM(Coal Mining Technology) Journal, IIMC Publication, Ranchi
- Minerals & Metals Review, Bombay