DETAILED CONTENT (YEAR WISE FOR EACH SUBJECT)

PROGRAM STRUCTURE OF DIPLOMA IN MINING ENGINEERING

STATE BOARD OF TECHNICAL EDUCATION, JHARKHAND									
COURSE NAME: **DIPLOMA IN MINING ENGINEERING**									
YEAR/SEMESTER: **FIRST YEAR (A)**				**WITH EFFECT FROM** 2011-12 BATCH					
Sr. No	**TEACHING SCHEME**			**EXAMINATION SCHEME & MAXIMUM MARKS**					
	SUBJECT TITLE WITH CODE NO.	**TH**	**PR**	**PAPER HRS**	**TH**	**PR**	**OR**	**TW**	**SW**
1.1	Communication Skills (901)	2	1	3	100	--	--	@50	50
1.2	Engineering Mathematics (902)	2	1	3	100	--	--	@50	50
1.3	Applied Physics (903)	2	2	3	100	@50	--	--	50
1.4	Chemistry of Engineering Materials (904)	2	2	3	100	@50	--	--	50
1.5	Engineering Drawing (905)	2	2	4	100	--	#50	--	50
1.6	Elements of Mining Geology	3	2	3	100	#50	--	--	50
1.7	Mining Technology	3	2	3	100	--	#50	--	50
1.8	Workshop Practice	--	2	--	--	--	--	#50	--
1.9	Information Technology Application – I	--	2	--	--	#50	--	--	--
1.10	Development of Generic Skills I	2	2	--	--	--	#100	--	--
	TOTAL	**18**	**18**	**--**	**700**	**200**	**200**	**150**	**100**

Institutional Hours per Week: 36 Hrs.
Student Contact Hours per Week (Formal Teaching) : 40 Hrs.
Student Centered Activities (Library Studies, Guidance & Counseling, Seminar, Self Learning, Etc.) Hrs per week: 4 Hrs.
Total Marks: 1350.
Abbreviations: TH – Theory, PR- Practical, OR-Oral, TW-Term work and SW-Sessional Work.

(1) Theory and Practical period of 60 minutes each.
(2) Two class tests to be conducted for sessional & total of sessional marks is to be converted to the base of 100 marks.
(3) # Practical, Oral, & term work assessment is to be done by external examiner as per the curriculum implementation & assessment norms..
(4) @ Practical, Oral, Term work assessment is to be done by subject teacher as per the curriculum implementation & assessment norms..
(5) Practical Training of 12 weeks shall be started after completion of summer examination (Mandatory training for the partial fulfillment of Diploma).
(6) Expert lectures shall be conducted for mining subjects wherever feasible.

*** Eligible students will go for practical Training that will commence after completion of summer examination.**

1.1 COMMUNICATION SKILLS (901)

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
2	1	100/3 Hrs	--	--	@50	50

@ Internal assessment as per curriculum implementation and assessment norms.

Subject Objective

To introduce students with the process of communication so that they can identify conditions favorable to effective communication and to teach them basic and applied language skills useful for the study of technical subjects as well as communication, with a particular emphasis on writing and oral presentation skills, which are top-ranking capabilities needed for professional careers as middle level manager

Detailed Contents:

Theory Contents	Practical Contents
UNIT – I: BASIC CONCEPTS AND PRINCIPLES OF COMMUNICATION (Marks 16 ,Periods 08) **Chapter 1: The Communication Event** 1.1 The communication event: definition 1.2 The elements of communication: the sender, receiver, message, channel, feedback and context. **Chapter 2: The Concept of Communication Process** 2.1 The communication process: definition 2.2 Stages in the process: defining the context, knowing the audience, designing the message, encoding, selecting proper channels, transmitting, receiving, decoding and giving feedback	1.0 Identifying Communication Events 2.0 Analyzing Communication Events
Chapter 3: Principles of Effective Communication 3.1 Effective communication: definition 3.2 Communication Barriers and how to overcome them at each stage of communication process. 3.3 Developing effective messages: thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers and facilitating feedback. **UNIT – II : LANGUAGE GRAMMAR (Marks 20, Periods 14)** **Chapter 4:** : Principles of Language Grammar and Usage 4.1 The sentence elements: words, phrases, and clauses. 4.2 Phrase structure and clause structure; transformation of sentences 4.3 Constructing correct and effective sentences 4.4 Punctuation 4.5 Mechanics of writing **UNIT III: WRITTEN COMMUNICATION**	3.0 Identifying Units of Grammar 4.0 Constructing Effective Sentences

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Theory Contents	Practical Contents
(marks 32, Periods 20) **Chapter 5** : Preparation for Writing 5.1 Understanding the writing assignment: topic, purpose, audience, scope and constraints 5.2 Analyzing the context 5.3 Determining the scope of topic 5.4 Audience Analysis for entry behavior 5.5 Collecting information for the assignment **Chapter 6 :** Designing Message Outline 6.1 Organizing ideas: structural components of the text and supporting elements, determining the general and specific purpose, organizing principles of the text 6.2 Outlining: keyword and topic sentence outlines, writing target statements; **Chapter 7 :** Writing and Reviewing 7.1 Principles of presentation of text: progressive differentiation, integrative reconciliation, sequential organization and consolidation. 7.2 Procedures for writing texts with specific purposes: Writing topic sentences, Writing introductions, definitions, describing objects, events and procedures; classifying, comparison and contrast, cause and effect, concluding; explaining concepts, principles and procedures 7.3 Reviewing for relevance, structure, unity, coherence, clarity, consistency, length and accuracy **UNIT IV : NON-VERBAL AND GRAPHIC COMMUNICATION (Marks 10, Periods 08,)** **Chapter 8 :** Non-verbal Codes 8.1 Nonverbal codes: body language, chronemics and artifacts 8.2 Body language: Kinesics (eye-contact, gestures, postures, body movements and facial expressions), Proxemics (using space), Haptics (touch), Vocalics (aspects of speech like, tone, emphasis, volume, pauses etc.) and Physical Appearance; Chronemics (manipulating time); Artefacts (environment and objects) 8.3 Using non-verbal codes in oral communication	5.0 Using a Dictionary 6.0 Drawing Information Structure of Texts 7.0 Summarizing Techniques 5.0 Designing the message 9.0 Writing Topic Sentences 8.0 Writing Paragraphs 9.0 Writing Function Paragraphs 11.0 Understanding Body Language Expressions 12.0 Understanding Graphics
Chapter 9 : Using Visuals **9.1 Interpreting visuals and illustrating with visuals like tables, charts and graphs** **UNIT V : USING THE COMMUNICATION SKILLS**	

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Theory Contents	Practical Contents
(Marks 22, Period 14) **Chapter 10 :** Communicating Oral Messages 10.1 Designing oral messages: preparation, practice and presentation with written and graphic material 10.2 International Phonetic Script **Chapter 11** : TOPICS IN THE CLASSROOM CONTEXT 11.1 Writing answers by defining, describing, explaining and illustrating **Chapter 12** : TOPICS FOR OUT OF CLASSROOM CONTEXT 12.1 Letter, memorandum and short reports: types, parts and `formats; developing messages	13.0 Formal Written Communication 14.0 Communicating Orally

REFERENCE:

Author	Title	Year Of Publication	Place Of Publication& Publisher
BURGOON MICHAEL	Human communication	1994	London:Sage Publications
GEOFREY LEECH AND JAN SVARTVIK	A Communicative Grammer of English	1994	Essex Longman Group Ltd. ELBS
RANDOLEF QUIRK AND SIDNEY GREENBAUM	University Grammer of English	1993	Essex Longman Group Ltd. ELBS
JOHN SINCLAIR (ed.)	Collins Cobuild English Grammer	1990	Essex Longman Group Ltd. ELBS
THOMAS HUCKIN AND LESLIE OLSON	Technical Writing and Professional Communication	1991	London William Collins & Sons co.
LYN CLARK AND ZIMMER	Business English and Communication	1988	New York : Mcgraw Hill
JOHN THILL AND COURTLAND BOVEE	Excellence in Business Communication	1991	New York : Mcgraw Hill
R. K. BANSAL AND J. B. HARRISON	Spoken English for India	1972	New York : Mcgraw Hill
J. D. O'CONNOR	Better English pronunciation	1970	New Delhi : Orient Longman.
KRISHNA MOHAN AND MEERA BANNERJI	Developing Communication Skills	1994	London : Cambridge University Press ELBS, Macmillan

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1.2 ENGINEERING MATHEMATICS (902)

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Tutorial Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
2	1	100 / 3 Hrs	--	--	@50	50

@ Internal assessment as per curriculum implementation and assessment norms..

Subject Objective:

This subject is classified under basic science. This subject intends to teach students basic facts, concepts, principles, procedure and techniques of mathematics as a tool to analyze engineering problems and as such it lays down foundations for the understanding of Engineering Science and Core Technology subjects.

Detailed Content:

Theory Contents				Practical Contents
UNIT - I : Algebra (Marks : 24 Period : 16)				
Chapter 1 :	**Logarithms**	**Marks**	**Period**	To learn basic concept & rules of Logarithm.
1.1	Definition of logarithm.	4	4	
1.2	Types of logarithm.			
1.3	Laws of logarithm.			
1.4	Applications of logarithm to solve Engineering Problems.			
Chapter 2 :	**Determinants.**	**Marks**	**Period**	
2.1	Definition of determinant.	6	4	
2.1.1	Order of determinant.			To learn the definition of a determinant & its properties.
2.1.2	Expansion of determinants of order 2& 3			
2.2	Properties of determinant.			
2.3	Cramer's rule (solution of simultaneous equations in two & three unknowns)			
2.4	Applications of determinant to co-ordinate geometry & to solve Engineering Problems.			
Chapter 3 :	**Partial Fractions.**	**Marks**	**Period**	
3.1	Rational Fraction	8	4	To classify given Example in to partial fraction and to learn the Rules.
3.2	To resolve given rational fractions into partial fractions.			
3.2.1	Denominator containing non-repeated linear factors.			
3.2.2	Denominator containing repeated linear factors.			
3.2.3	Denominator containing irreducible non- repeated quadratic factors.			
3.3	Applications in Engineering Problems.			
Chapter 4 :	**Binomial theorem.**	**Marks** 6	**Period** 4	To understand basic concept of Bionomial Expansion.
4.1	Factorial Notation.			
Statement of Binomial theorem for positive integral index.				

Theory Contents	Practical Contents
4.2 General term in Binomial theorem. 4.2.1 Middle term. 4.2.2 Co-efficient of x & term independent of x in Binomial theorem. 4.3 Binomial theorem for any rational index. Applications of binomial theorem for approximate values.	
UNIT- II : Trigonometry. Marks : 26 Period : 16 **Chapter 5 : Trigonometric Ratios. Marks Period** 5.1 Trigonometric Ratios of any angle. 4 3 5.2 Trigonometric Ratios of positive & negative angles of any size & single. 5.3 Fundamental identities. 5.4 Procedure for use of fundamental identities. 5.5 Examples using fundamental identities & table of acute angles.	To indicate relationship between sin 0, cos 0 and tan 0.
Chapter 6 : Trigonometric ratio of allied, Compound & multiple angles. Marks Period 6 3 6.1 Trigonometric ratios of allied angles. 6.2 Trigonometric ratios of compound angles. 6.3 Trigonometric ratios of multiple & sub multiple angles. 6.4 Product, sum, difference formulae.	To understand concepts of allied angles, compound angles, multiple and sub multiple angles
Chapter 7 : Inverse Circular Functions. Marks Period 7.1 Definition. 8 3 7.2 Principal value of inverse circular functions. 7.3 Relation between inverse trigonometric functions. 7.4 Simple problems.	Understanding the principal of inverse circular function.
Chapter 8 : Properties & Solution of a triangle. Marks Period 8.1 Sine rule. 8 4 8.2 Cosine rule. 8.3 Tangent rule. 8.4 Half angle formulae. 8.5 Problems.	Understanding the concept of Sine rule, Cosine rule, Tangent rule and Solution of a triangle.

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Theory Contents				Practical Contents
UNIT- III : Co-ordinate Geometry. Marks : 24 Period : 16				
Chapter 9 :	**Point & Distance.**	**Marks**	**Period**	To solve problems based on distance formula and section formula.
9.1	Points, Cartesian co-ordinate system.	6	6	
9.2	Relation between Cartesian & polar co-ordinates.			
9.3	Distance formula.			
9.3.1	Types of triangle, quadrilaterals.			
9.4	Section formula.			
9.4.1	Mid point formula.			
9.4.2	Centroid of a triangle.			
9.5	Area of a triangle.			
9.5.1	Co-linearity of three points.			
Chapter 10 :	**Straight lines.**	**Marks**	**Period**	
10.1	Slope & intercepts of a line.	8	4	Equations of a straight line.
10.2	Different forms of Straight line.			
10.2.1	Slope intercept form.			
10.2.2	Slope point form.			
10.2.3	Two points form.			To find equation of a straight line and angle between two lines.
10.2.4	Two intercepts form.			
10.2.5	Normal form.			
10.2.6	General form and its slope & intercept.			
10.3	Acute angle between two lines			
10.3.1	Conditions for two straight lines to be Parallel & perpendicular to each other.			
10.4	Perpendicular distance of a point from the lines.			
10.4.1	Distance between two parallel lines.			
Chapter 11 :	**Circle.**	**Marks**	**Period**	
11.1	Definition of a circle	10	6	To understand Definition of a circle and its standard form.
11.2	Different forms of a circle.			
11.2.1	Standard equation of a circle.			
11.2.2	Centre radius form of a circle.			
11.2.3	Diameter form of a circle.			
11.2.4	General form and its Centre & radius.			
11.3	Equations of tangent & normal to the circle.			To find general equation of thecircle and Tangent and Normal to the circle.

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Theory Contents	Practical Contents
UNIT : IV Functions & Limits. Marks : 26 Period : 16 **Chapter 12: Functions & limits.** **Marks** 12 **Period** 6 12.1 Functions. 12.1.1 Concept of constant & variable. 12.1.2 Definition of function. 12.1.3 Value of a function at a point. 12.1.4 Types of function. 12.2 Limits. 12.2.1 Concept of limit & limit of a function. 12.2.2 Algebra of limits. 12.2.3 Standard limits. Limits of algebraic, trigonometric, exponential & logarithmic functions.	To Explain the concept of functions and limits of a functions by Example.
UNIT V : Differential Calculus. **Marks** **14** **Period** **10** **Chapter 13 : Differential calculus.** 13.1 Definiition of derivative of a function. 13.1.1 Derivative by the method of first principle 13.2 Laws of derivatives. 13.3 Standard formulae. 13.4 Derivatives of different types of functions. 13.4.1 Derivatives of Composite functions. 13.4.2 Derivatives of Explicit functions. 13.4.3 Derivatives of Inverse circular functions. 13.4.4 Derivatives of Implicit functions.	To learn the concept of Derivatives and methods of differentiating various types of functions. Second order derivatives.
13.4.5 Derivatives of Parametric functions. 13.4.6 Applications of derivatives of Parametric functions. 13.4.7 Derivatives of Logarithmic functions. 13.5 Second order derivatives.	

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REFERENCE:

Author	Title	Year Of Publication	Place Of Publication and Publisher
Deshpande S. P.	Mathematics For Polytechnic Students II	1994	Pune : Pune Vidyarthi Griha Prakashan
Grewal B. S.	Engineering Mathematics	1989	N. Delhi : Khanna Publishers
Deshpande S. P.	Calculus	1992	Pune : Pune Vidyarthi Griha Pakashan
Chatwal R. K. and Others	Mathematics	1990	Delhi : GBS Publishers & Distributors

1.3 APPLIED PHYSICS (903)

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
2	2	100/3 Hrs	@50	--	--	50

@ Internal assessment as per curriculum implementation and assessment norms..

Subject objective:

This subject is classified under basic science. It describes basic facts, concepts, principles and techniques of scientific investigation of physical quantities and physical processes which are used in Core Technology & Technology subjects.

Detailed content:

Theory Contents	Practical Contents
Unit 1 : Introduction **Marks** 02 **Period** 02 **Chapter 1 : Revision** 1.1 Revision of basic terms, related laws and principles studied in school. (Mass,time, area, vol., density, force, current, charge, Newton's laws of motion, Laws of kinematics, etc.) 1.2 Graph 1.2.1 X, Y axes, origin. 1.2.2 Dependent and Independent variable scale, slope. 1.3 Plotting graph & Interpretation. 1.3.1 Straight line passing through origin. 1.3.2 Straight line with positive or negative intercept. Find slope, state nature of relationship, find value of one of the variable if other is given, significance of intercept etc.	➢ Study of vernier calipers ➢ Study of micrometer screw gauge
Chapter 2 : Physical Measurements. **05** **03** 2.1 Introduction: Properties of matter & their measurement. 2.2 Physical quantities & their measurements. 2.2.1 Fundamental physical quantities definition Examples. 2.2.2 Derived physical quantities definition, examples. 2.2.3 Measurement of a physical quantity & need for measurement. 2.3 Units for measurement. 2.3.1 Need for unit. 2.3.2 Definition of unit. 2.3.3 Requirement of ideal unit. 2.3.4 Fundamental & derived units. 2.4 Systems of units. 2.4.1 C.G.S., M.K.S., SI Systems. 2.4.2 Definition of fundamental units in SI. 2.4.3 Multiples and sub multiples of units. tera , giga , mega , kilo , hecto, deca, deci, centi, milli, micro, nano, pico T G M K h da d c m μ n P Powers of ten, prefix & symbols. 10^{12} to 10^{-12} 2.5 Errors and accuracy. 2.5.1 Types of errors – systematic, Instrumental, Random. Definition, explanation, examples. 2.5.2 Estimation of errors. Absolute, avg. absolute and % error definition explanation example. 2.5.3 Accuracy – Definition, explanation, example, significant figure. 2.6 Measuring Instruments. 2.6.1 Measurement of length using vernier calipers. 2.6.2 Measurement of length using micrometer screw gauge.	

Theory Contents	Practical Contents
Unit II : Understanding principles of electricity for use in Engineering **Science & core** Technological Subjects. **Chapter 3 : Electrostatics.** **03 02** 3.1 Introduction Structure of matter, n, p, e, loss or gain of "e" of charged bodies, Electric charges. 3.2 Force between two charges. 3.2.1 Attractive – dissimilar charges. 3.2.2 Repulsive – similar charges. 3.2.3 Coulomb's Law – Statement, mathematical equation. 3.2.4 Definition of 1 coulomb. 3.3 Electric Field 3.3.1 Definition of Electric field. 3.3.2 Definition & unit of Intensity of electric (E) field 3.4 Lines of force. 3.4.1 Definition & properties of Lines of force. 3.4.2 Definition of flux and flux density.(D) 3.5 Derivation of relation between E & D	
Chapter 4 : Electric potential. **Marks periods** 03 02 4.1 Introduction. Electric field charges. 4.2 Electric potential. 4.2.1 Definition & explanation of Electric potential. 4.2.2 Definition & explanation of Absolute potential. 4.3 Expression for P. D. between two points. 4.4 Potential of spherical conductor. Potential of earth. **Chapter 5 : Capacitance.** 05 03 5.1 Introduction Charges, Potential 5.2 Storage of charge at lowers potential – Principal of capacitor. 5.3 Capacitance – unit & Definition of 1 Farad 5.4 Combination of capacitance. 5.4.1 Series combination & expression for effective capacity. 5.4.2 Parallel combination & expression for effective capacity. 5.5 Parallel plate capacitor. 5.5.1 Construction. 5.5.2 Expression for capacity of a parallel plate capacitor. **Chapter 6 : Principle of electrical circuits.** 08 05 6.1 Introduction Current, voltage, electric cell 6.2 Ohm's Law 6.2.1 Statement of Ohm's Law 6.6.2 Mathematical expression of Ohm's Law and R as constant of proportionality, Unit of R, definition of 1 Ω. 6.3 Dependence of resistance on various factors (length, Area, & Temperature) 6.3.1 Dependence of R on l, A R α l R α 1 A Constant of proportionality – Resistively (ρ) (sp.Resistance) Unit & definition of ρ 6.3.2 Dependence of R on temp.R = R_0 (1 + α t) Definition of Temp. coefficient of resistance. 6.4 Platinum resistance thermometer 6.4.1 Principle and construction 6.4.2 Experiment to determine α (Lab Work)	

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Theory Contents	Practical Contents
6.5 Combination of resistances 6.5.1 Series combination and expression for effective resistance. 6.5.2 Parallel combination & expression for effective resistance. 6.6 Shunt 6.6.1 Shunt – definition. 6.6.2 Calculation of shunt resistance 6.7 Internal resistance 6.7.1 Explanation & concept 6.8 General equation of Ohm's Law 6.8.1 Derivation using internal resistance 6.9 Principle of potentiometer 6.9.1 Equation for fall of potential along a uniform wire (derivation $V \alpha l$) 6.10 Potentiometer 6.10.1 Construction 6.10.2 Lab Experiment to verify principle of potentiometer 6.10.3 Lab Experiment to determine internal resistance. 6.11 Application of potentiometer to compare e.m.f. or to determine Internal resistance. 6.12 Wheatstone's Network 6.12.1 Circuit diagram 6.12.2 Balancing condition (derivation) 6.13 Metre Bridge 6.13.1 Construction – Correlation with network. 6.13.2 Experiment on Wheatstone's Bridge 6.14 Application of Wheatstone's Bridge – P.O. Box.	➢ Ohm's law by V. A. method ➢ Law of resistance in series & parallel using meter bridge ➢ Principal of Potentiometer. ➢ Internal resistance by potentiometer ➢ Temperature coefficient of resistance by meter bridge
Chapter 7 : Heating effect of electric current **Marks** 03 **Periods** 02 7.1 Introduction stating facts. Resistance, current, Time. 7.2 Joule's Law 7.2.1 Statement 7.2.2 Mathematical expression 7.2.3 Definition & unit of 'J' 7.2.4 Various forms of Joule's Law 7.3 Lab Experiment to determine J by electric method 7.4 Electric Energy. 7.4.1 Definition & unit of electric power 7.4.2 Definition & unit of electric energy (J) 7.4.3. Calculation of Electric Energy in KWH 7.4.4. Calculation of electricity Bills.	"J" by electric method
Chapter 8 : Thermoelectricity. 03 02 8.1 Introduction. Thermal energy – Electric Energy. 8.2 Seebeck Effect. 8.2.1 Statement & Explanation of Seebeck effect. 8.2.2 Definition & units of Thermo e.m.f. 8.2.3 Definition of thermoelectric current. 8.3 Variation of thermo e.m.f. with temperature.Graph showing Neutral, Inversion temperature with definition. 8.4 Thermoelectric Series. 8.5 Thermocouple. 8.5.1 Construction & use for temperature Measurement.	

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Theory Contents	Practical Contents
8.6 Use of thermocouple in high temperature measurement. 8.7 Laws related to thermo e.m.f. 8.7.1 Law of Intermediate temp. 8.7.2 Law of Intermediate metals. 8.8 Peltier Effect. Explanation - Opposition of Seeback effect. Comparison with Joule's heating effect. **Chapter 9 : Electromagnetism** **Marks 09** **Periods 06** 9.1 Introduction. Current, conductor, Magnetism resistances in series, parallel 9.2 Oersted's Experiment. 9.2.1 Explanation. 9.2.2 Lab experiment. 9.3 Magnetic effect of electric current. 9.3.1 Explanation using Oersteds experiment. 9.3.2 Definition & unit of Intensity of magnetic field. 9.3.3 Definition & unit of Magnetic Induction. 9.4 Ampere's Rule. 9.4.1 Statement, Explanation and recalling Oersted's experiment 9.2. 9.5 Laplace's Law. 9.5.1 Statement & mathematical expression. 9.5.2 Expression for Intensity of magnetic field at center of current carrying circular coil. 9.5.3 Expression for Intensity of magnetic field at a distance from a current carrying straight conductor. 9.6 Flemmings Left Hand Rule. 9.6.1 Statement. 9.6.2 Expression for current carrying straight conductor kept in magnetic field. (Magnitude – Laplace's Law, direction - Flemmings Left Hand Rule) 9.7 Galvanometer. Torque acting on rectangular coil carrying current kept in magnetic field. (Principle of galvanometer) 9.8 Galvanometer.Demonstration as current increases deflections increases. 9.9 Conversion of Galvanometer → various meters. 9.10 Galvanometer to Ammeter using shunt. Galvanometer to Voltmeter using R in series. 9.9.3 Galvanometer to Ohmmeter using cell.	➢ Calibration of thermocouple ➢ Verification of ampere's rule using Oersted's expt.
Unit III : Understanding properties of matter for use in Engineering Science & core Technology Subjects. **Chapter 10: Elasticity** **Marks 03** **Periods 02**	

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Theory Contents	Practical Contents
10.1 Introduction : Force, matter. 10.2 Definition & explanation of elasticity, plasticity, rigidity. 10.3 Concepts related to elasticity. 10.3.1 Molecular theory of elasticity 10.3.2 Definition of strain, restoring force, stress, units. 10.3.3 Definition of elastic limit. 10.3.3 types of stresses & strain. 10.4 Hook's law 10.4.1 Statement 10.4.2 Modules as constant of proportionality. 10.5 Types of Modula. 10.6 Behaviour of wire under continuously increasing load. 10.6.1 Diagram, Definition of Yield point , Breaking stress. 10.6.2 Verification of behaviour of wire within elastic limit in lab. 10.6.3 Definition of factor of safety.Use in design of structures etc.	➢ Young's Modulus of elasticity by Searls method.
Chapter 11 : Surface Tension. 05 03 11.1 Introduction : Adhesive, cohesive forces. 11.2 Surface Tension. 11.2.1 Molecular Theory of Surface Tension. 11.2.2 Surface energy Definition. 11.3 Relation between Surface energy & Surface Tension. 11.4 Effect of temperature & impurity on Surface Tension. 11.5 Capillarity. 11.5.1 Shape of Meniscus, drops. 11.5.2 Angle of contact - Definition. 11.5.3 Capillarity – hr = constant. 11.6 Relation between Surface Tension & capillary rise 11.7 Lab experiment to verify hr = constant.	➢ Study the capillarity action due to surface tension
Chapter 12 : Viscosity **marks periods** 05 03 12.1 Introduction : Friction, gravitational force , up thrust. Flow through pipes 12.2 Viscosity. 12.2.1 Explanation & Definition, unit of velocity gradient, viscous drag, viscosity. 12.3 Newton's Law of viscosity. 12.3.1 Statement. 12.3.2 Coefficient of viscosity as constant of proportionality It's Definition & unit 12.4 Terminal Velocity. 12.4.1 Explanation using viscosity , up thrust , gravitational force. 12.4.2 Definition of terminal velocity. 12.5 Stoke's Law 12.5.1. Statement & mathematical equation. 12.5.2 Derivation to find η of using free fall of a spherical body in liquid. 12.6 Lab experiment to determine η using Stoke's method 12.7 Flow of liquid. 12.7.1 Streamline flow & properties. 12.7.2 Turbulent flow & properties. 12.7.3 Critical velocity. 12.8 Reynold's number & its significance & Applications.	➢ Coefficient of Viscosity by Stoke's method.

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Theory Contents	Practical Contents
Unit IV : To understand principles of thermal energy for use in engineering science & core technology subjects. **Chapter 13 : Gas Laws & Specific Heats.** **Marks 06 periods 04** 13.1 Introduction. Volume, Temperature, Expansion of gases, Elasticity, Specific Heats, Pressure. 13.2 Gas laws: 13.2.1 Boyle's Law 13.2.2 Charle's Law 13.2.3 Gay Lussac's Law 13.3 Absolute scale & Absolute zero. 13.3.1 Graphs of Charle's, Gay Lussac's Law V against t & P against t V = 0 p = 0 13.3.2 V = 0 at t = - 273 using equations of charle's & Gay Lussac's Law P = 0 Introduction.Volume, Temperature, Expansion of gases, Elasticity, Specific Heats, Pressure. 13.3.3 Lord Kelvin's ideaAbsolute zero, definition of Absolute scale zero = - 273^0c size of degree same 13.4 Universal gas constant. 13.4.1 General gas equation derivation using 3 gas laws. 13.4.2 Universal gas equation 13.4.3 Universal gas constant. 13.5 Expression for W = pdv at count pressure 13.6 Specific heats of gases 13.6.1 Definition of Cp & Cv & their units 13.7 Relation between specific heats 13.7.1.1 Cp / Cv = γand its value for mono, dia and triatomic gases 13.7.1.2 Cp – Cv = R / MJ derivation if Cp, and Cv are in M. K. S. systemCp – Cv = R / M if Cp, and Cv are in S. I. system. 13.8 Expansion of gases 13.8.1 Adiabatic & Isothermal expansion - Definition 13.9 Elasticities of gases 13.9.1 Adiabatic & Isothermal elasticity relation between adiabatic & isothermal elasticity 13.10 Applications in Heat engines / Thermodynamics **Chapter 14 : Conduction & expansion of gases : Introduction** **Marks 05 Periods 03** 14.1 Modes of Transfer of heat, temperature and matter. 14.2 Conduction of heat. 14.2.1 Conduction – mechanism - Definition 14.2.2 Temp gradient definition & unit 14.3 Steady state 14.3.1 Explanation & Definition of steady state 14.4 Principle of Heat conduction	Verification of Boyle's Law

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Theory Contents	Practical Contents
14.5 Coefficient of thermal conductivity (k)Definition & unit 14.6 Experiment to determine k by searle's method 14.7 Thermal Expansion of solids 14.7.1 Linear ($\propto$), areal (β), Volume(γ) - Definition 14.8 Relation between $\propto$, β, γ 14.9 selection of material depending on thermal properties. **Unit V: Understanding principles of optics & use these in engineering science & core technology** **Marks Periods** **Chapter 15 : Propogation of light 06 04** 15.1 Introduction Light, prism, reflection & Concerned laws. 15.2 Refraction through prism 15.2.1 Angle of prism, angle of incidence, emergence, faces of refraction, base of prism 15.2.2 Angel of deviation – definition & dependence on angle of incidence.Angle of min deviation, $A + \delta = i + e$ 15.3 Derivation of prism formula 15.4 μ by pin method 15.5 Dispersive power 15.5.1 Dispersion – definition & explanation 15.5.2 Angular dispersion 15.5.2 Dispersive power definition – unit 15.6 Relation between dispersive power and refractive index. 15.7 Determination of ω using spectrometer 15.8 Total Internal Reflection (TIR) 15.8.1 Definition & explanation of TIR 15.8.2 Critical angle 15.9 Fiber Optics 15.9.1 T I R & construction of optical fiber. 15.10 Application in communication & Opto electronics **Chapter 16 : Photometry Marks Periods** 03 05 16.1 Introduction, visible light 16.2 Definition related to photometry 16.2.1 Definition of Luminous Body, Luminous Flux, Luminous Intensity, Illumination 16.3 Laws related to Illumination 16.3.1 Inverse square law 16.3.2 Cosine Law 16.4 Bunsen's photometer 16.4.1 Construction & principle 16.4.2 Laboratory experiment. 16.5 Indoor Lighting Unit VI : Understanding principles of wave motion & sound & use them in engineering science & core technology. **Marks Periods** **Chapter 17 : S.H.M & wave motion 08 05** 17.1 Introduction ,Circular motion, ripples in water 17.2 Simple Harmonic Motion (S. H. M.) 17.2.1 S. H. M. as projection of circular motion 17.2.2 Parameters related to SHM - definition and Unit Oscillation, Phase, Amplitude, Period, Frequency (n) -	➢ Coefficient of thermal conductivity of good conductor ➢ Refractive index on of the prism by pin method ➢ Dispersive power of the prism by pin method Study of Bunsen's Photometer

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Theory Contents	Practical Contents
17.3 Equation of S. H. M 17.3.1 $x = r \cos\theta$ or $y = r \sin\theta$ 17.3.2 General equation of S.H.M $x = r \cos(\theta + \alpha)$ Derivation 17.3.3 Velocity in S.H.M 17.3.4 Acceleration in S.H.M 17.4 Graphical representation of S.H.M 17.4.1 Graph of displacement, acceleration, velocity against time 17.4.2 Concepts lagging – leading from graphs 17.5 Waves 17.5.1 Wave Definition & explanation two types (Progressive, stationary)Definition of wave length (λ) 17.6 Types of progressive waves 17.6.1 Definition of Transverse wave & its characteristic 17.6.2 Definition of Longitudinal wave & its characteristic. 17.7 Derivation of $\mu = n\lambda$ 17.8 Equation of progressive waves 17.9 Stationary waves 17.9.1 Principle of superposition 17.9.2 Formation of stationary waves & definition 17.9.3 Nodes, Antinodes - definition Distance between two successive Nodes Distance between two successive Antinodes Distance between two successive Nodes & Antinodes 17.10 Types of Oscillations. 17.10.1 Free and forced (induced) oscillations. Definition explanation 17.10.2 Free (Natural) & forced frequeney definition & explanation 17.10.3 Factors on which Natural frequency depends 17.11 Resonance – definition, explanation, examples. 17.12 Derivation of $v = 4nL$ (only) (Vibration of air column closed at one end) 17.13 Experiment to determine velocity of sound using resonance tube **Chapter 18 : Sound** **Marks 06 Periods 04** 18.1 Introduction Sense of hearing, frequency 18.2 Propagation of sound energy Absorption, Transmission, Reflection of sound, definition of their coefficient. 18.3 Relation between absorption, transmission, reflection coefficient. 18.4 Limits of audibility 18.5 Loudness & intensity of sound - Definition 18.6 Logarithmic Law of intensity. of sound 18.7 Definition of Bel & decibel 18.8 Definition & explanation Echo, reverberation, reverberation time 18.9 Acoustics 18.9.1 Requirements of goods acoustics 18.9.2 Sabines formula 18.10Sound pollution and its prevention,acoustical planning of building	➢ Wave nature of sound resonance

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Theory Contents	Practical Contents
Unit VII: Understanding principles of Modern physics & their applications. **Chapter 19 : Photoelectricity.** **Marks** 05 **Periods** 03 19.1 Introduction Conversion of one form of energy to other. 19.2 Planks Hypothesis 19.2.1 Explanation & statements of plank's Hypothesis. 19.2.3 Definition & unit of 'h' 19.3 Engineering applications.	Photo-electricity
Chapter 20 : Non destructive Testing **Marks** 05 **Periods** 03 20.1 High frequency sound, radiation 20.2 Ultrasonic 20.2.1 Ultrasonic sounds – frequency 20.2.2 Props of U.S. wave, (Penetration, reflection, low divergence) 20.2.3 Ultrasonic detection of flaw. 20.3 Radiography 20.2.4 X rays 20.2.5 γ rays 20.2.6 Properties - Reflection transmission, absorption. 20.2.7 Analysis of radiograph. 20.4 Liquid penetration 20.2.8 Properties of liquid used for testing. 20.2.9 Detection of cracks. 20.5 Application in quality control for industry.	

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REFERENCE :

Author	Title	Year Of Publication & Publisher	Place Of Publication
H. H. LAL, B. K. SAWHNEY	Applied Physics	TATA MCGRAW HILL	
E. ZEBROWSKI	Physics For Technicians	TATA MCGRAW HILL	

1.4: CHEMISTRY OF ENGINEERING MATERIALS (904)

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
2	2	100/3 Hrs	@50	--	--	50

@ Internal assessment as per curriculum implementation and assessment norms..

Subject Objective :

This subject is classified under the category of Basic science. It is intends to teach students the chemical properties of materials, selection of materials, and applications in various engineering field. This will provide the input for better understanding of other core technology and Technology subjects.

Detailed content

Unit 1

Marks Periods
04 06

CHAPTER 1. ATOMIC STRUCTURE

1.1) Introduction of Atom

1.2) Fundamental Practicles of Atom-protons, neutrons, electrons,

1.3) Their mass, charge location

1.4) Definition of Atomic number, atomic mass, simple numerical problems based on atomic number and atomic mass number, Isotopes and Isobars definition, distinction and suitable examples

1.5) Bohr's theory of hydrogen atom.

1.6) Modern atomic structure
1.7) Orbits and orbitals, sub energy levels.
1.8) Quantum numbers and their significance.
1.9) Pauli's exclusion principle
1.10) Hunds rule
1.11) Filling of the Orbitals by Aufbau's principal
1.12) Concept of variable valency with examples of 'ous' & 'ic' compounds
1.13) Orbital electronic configuration of the atoms, having Z = 1 to 35
1.14) Nuclear stability
1.14) Mass defect and binding energy –numerical problems.

CHAPTER 2 Electronic Theory of Valency

Marks Periods
06 04

2.1) Duplet and Octet rule.
2.2) Electronic Configuration of inert and active elements.
2.3) Valance electrons and Valency of the Element.
2.4) Electro positive electro negative and inert nature of elements.
2.5) Electro valency and co-valency.
2.6) Formation of electro valent and covalent compounds such as NaCl, $CaCl_2$, MgO, $AlCl_3$, $FeCl_2$, $FeCl_3$, $CrCl_3$, CuO, CO_2, CH_4, NH_3, C_2H_4 , O_2, HC ≡ CH N ≡ N

EXPERIMENT NO. 1

Draw the electronic configuration of following atoms –

Sodium, Oxygen, Chlorine, Fluorine, Potassium, Aluminum, Calcium --

A) In K L M N ----
B) In s, p, d, f, ----

EXPERIMENT NO.2

Schematic representation of molecules in journals.

A) Electrovalent compounds – NaCl, $CaCl_2$, MgO,

B) Covalent compounds –

NH_3, CH_4, C_2H_4,

O = O HC≡CH, N ≡ N

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Chapter 3 Electro Chemistry

Marks	periods
12	**08**

3.1) Distinction between Atom and Ion.
3.2) Arrhenius theories of Ionization. Degree of Ionization, Strong and Week electrolytes.

3.3) Electrochemical series for cations and anions.
3.4) Mechanism of electrolysis.
3.5) Electrolysis of $CuSO_4$ solution using platinum electrodes, and copper electrodes.
3.6) Applications of electrolysis, such as electroplating & electro refining.
3.7) Faraday's laws of electrolysis and numerical problems based on these laws.
3.8) Conductivity of an electrolyte.
3.9) Solubility product and common ion effect
3.10) Specific conductivity

Chapter 4 Water

Marks	Period
16	08

4.1) Sources of water & Impurities in natural water.
4.2) Physical and Chemical Characteristic of water.

4.3) Purification of drinking water.
Sedimentation ,Coagulation ,Filtration,Sterilization, (chlorination , Ozonization, ultra – violet rays, Boiling & Aeration)
4.4) Hard and soft water and causes of hardness.
4.5) Types of hardness, degree of hardness in ppm of $CaCO_3$ Equivalent.
4.6) Effect of hard water in Domestic and Industrial application.
a) Effect of hard water n steam generation, boiler scales and sludges formation.
4.8) Removal of hardnessOf water by
a) Lime – soda process,
b) Permutite process
c) Ion exchange method.
b) PH & POH value of water and its application in domestic & industrial purposes.

Chapter 5 Material

Marks	**Period**
06	**08**

5.1) Occurrence of metals, efinition of metallurgy, ore and mineral.
5.2) Processing of ore –stages of extraction of metal from it's ore.
5.2.1 Concentration Methods
a) Physical Methods such as :
i) Gravity separation.,Magnetic separation.,Froth floatation
b) Chemical methods:Calcination ,Roasting
5.2.2 Reduction & it's Methods
5.2.3 Refining & it's methods
5.3) Extraction of Iron in the form of Pig iron in blast furnace. Reactions in the blast Furnace.
5.4) Types of carbon steel, based on the percentage of carbon. Heat treatment to steel such as hardening, tempering, annealing & normalizing.
5.5) Physical properties and applications of some commonly used metals such as – Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W.
5.6) Chemical properties of metals and their compounds.

EXPERIMENT NO.3
Determination of neutralization point of a weak acid and weak base using conductivity meter.
EXPERIMENT NO. 4
To determine the electrochemical equivalent of copper, by electrolysis of $CuSO_4$ solution, using Copper plates as an electrodes.
EXPERIMENT NO.5
Purification of NaCl by dissolving impure NaCl in water and then recrystalization
EXPERIMENT NO.6
Precipitation titration of $BaCl_2$ with H_2SO_4 using conductivity meter

EXPERIMENT NO. 7
Determination of Chloride content in given sample of water by Mohr's method.
EXPERIMENT NO.8
Determination of alkalinity of given sample water i.e. volumetric determination of OH^-, CO_3^{-2} , HCO_3^-
EXPERIMENT NO.9
Determination of degree of hardness, in terms of ppm of $CaCO_3$, of given sample of water, by EDTA method.
EXPERIMENT NO.10
Determination of pH value by Digital pH meter

EXPERIMENT NO.11
Flow sheet of extraction of metal from it's Ore.
EXPERIMENT NO.12
Schematic and labeled diagram of blast – furnace showing different heating zones with reactions.
EXPERIMENT NO.13
Chart showing properties & uses of common metals such as -
Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W.
EXPERIMENT NO.14
Qualitative analysis of seven solutions containing one acidic and one basic radical from following radicals.
$[Pb^{++}, Cu^{++}, AI^{+++}, Fe^{+++}, Cr^{+++}, Zn^{++}, Ni^{++}, Mn^{++}, Ca^{++}, Ba^{++}, Mg^{++}$
$NH_4^+, Na^+, K^+, CI^-, Br^-, I^-,$
$(SO_4)^{--}, (NO_3)^-, (CO_3)^{--}$

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TOPICS	TITLES OF LAB . EXERCISE
Chapter 6 Alloys **Marks** 06 **Period** 04 6.1)Definition of Alloys. 6.2)Purpose of making alloys. 6.3)Preparation of binary alloy by fusion method and compression method. 6.4)Classification of alloys such as ferrous and non- ferrous. 6.5)A. Alloy, steel and their Applications:- effect of addition of C, Mn, V,W, Ni, Cr, Co, and Si. On steel 6.5)B. Special alloy steels i) Heat resisting steel ii) Magnetic steel iii) Shock resisting Steel iv) Stainless steel v) Tool steel vi) High speed steel (HSS) 6.6) Non – ferrous alloys. 6.6.1 Copper alloys, Brasses and Bronze. 6.6.2 Aluminium alloys, Duralumin, Alnico, Solders- wood's, metal, Babit metal, Bearing Alloys.	**EXPERIMENT NO. 15** Determination of percentage of Iron in given ferrous alloy by ($KMnO_4$) (Redox titration method)
UNIT - II **Chapter 7 Corrosion** **Marks** 06 **periods** 04 7.1) Definition of corrosion. 7.2) Types of corrosion. 7.3) Atmospheric corrosion. 7.4) Mechanism of atmospheric corrosion. 7.5) Types of oxide films. 7.6) Factors affecting rate of atmospheric corrosion. 7.7) Electro – chemical corrosion. 7.8) Mechanism of electro-chemical corrosion. 7.9) Galvanic cell corrosion, concentration cell, Oxidation Concentration cell, Corrosion. 7.10) Factors affecting rate of electro – chemical corrosion. 7.11) Protection of metals from corrosion. 7.12) Processes of protection, cathodic protection, organic coating, Inorganic coating, and metallic coating. 7.13) Metallic coating – hot, Dipping – Galvanizing, Tinning, cementation, Sherardizing, metal-cladding, spraying.	**EXPERIMENT NO.16** Labeled diagram of mechanism of Chemical & Electro chemical corrosion
Chapter 8 Paints & Varnishes **Marks** 06 **periods** 04 8.1) Characteristic of good paint 8.2) Principle constituents of paint, such as pigments, Vehicle, thinner. Drier, Extender, Plasticizer. 8.3) Methods of application of paint such as brushing, spraying, dipping, roller, coating. 8.4) Failure of paint film 8.5) Causes and remedies 8.6) Varnishes, their types and uses 8.7) Characteristics of good varnishes 8.8) Introduction of Enamels	

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TOPICS	TITLES OF LAB . EXERCISE
Chapter 9 Lubricants **Marks 06** **Periods 04** 9.1) Definition of lubricant. 9.2) Function of lubricants. 9.3) Types of lubricants, solid, Semisolid, and liquid. 9.4) Types of lubrication such as fluid film, boundary, and extreme pressure lubrication. 9.5) Characteristics of lubricant, such as Viscosity, viscosity index, oiliness, volatility, flash & fire point, Cloud and pour point. 9.6) Chemical properties such as neutralization value, emulsificaion. 9.7) Selection of lubricant for a machine. Working under different conditions.	**EXPERIMENT NO.17** To determine the viscosity of oil lubricant, by using Ostwald's viscometer. **EXPERIMENT NO. 18** To determine the acid value of oil lubricant by neutralizing with standard KOH Solution
Chapter 10 Fuels **Marks 12** **Periods 08** 10.1 Definition of fuel. 10.2 Types of fuel. 10.3 Characteristics of fuel such as calorific value, ignition temp, percentage of non- combustible matter. 10.4 Characteristics of good fuel. Comparison between solid, liquid, gaseous fuels, based on their properties. 10.5 Solid fuels, coalification. 10.6 Analysis of coal. Proximate analysis and its importance 10.7 Importance of analysis of coal to decide the quality of coal. 10.8 Liquid fuel – crude petroleum and its refining by fractional distillation. Alcohol and power alcohol 10.9 Important products of petroleum and their applications. 10.10 Gaseous fuel – Introduction of bio- gas. and petro- chemical gas (LPG), water gas and producer gas. 10.11 Comparison of solid liquid and gaseous fuel	**EXPERIMENT NO. 19** Estimation of ash content in coal. **EXPERIMENT NO . 20** Estimation of moisture content in coal.
Chapter 11 Non-Matallic Materials **Marks 12** **Period 08** 10.1) Plastics. Formation of plastics (polymer) by addition such as polythene, polystyrene, PVC and Teflon and ondensation such as Nylon & Bakelite Types of plastics. Thermosoftening and Thermosetting.Compounding of plastics by fillers, plasticizers, accelerators, pigments.Properties of plastics and their engineering applications. 10.2) Rubber : a. Types of rubber. Natural & Synthetic rubber b. Limitations of natural rubber. c. Vulcanization of rubber. d. Properties and engineering applications of synthetic rubber. 10.3) Insulating Materials: a. Thermal insulating materials: b. Characteristics of good insulating materials. 10.4) Applications of glass – wool thermo Cole, asbestos. 10.5) Cement – Portland cement, chemical composition, setting & hardening.Lime – Fat lime, hydraulic lime, composition and properties	**EXPERIMENT NO.21** Laboratory preparation of Bakelite by Phenol and Formaldehyde.

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TOPICS	TITLES OF LAB . EXERCISE
Chapter 11 Pollution & its control Marks 08 Period 04 11.1) Causes of pollution. 11.2) Air pollution and types of air pollution. 11.3) Air pollution due to gases such as sulphur dioxide, sulphur trioxide, carbon monoxide, nitrogen dioxide, carbon dioxide. 11.4) Particulates: 11.5) Deforestation. 11.6) Air pollution due to IC engines. 11.7) Control of air pollution.p 11.8) Water pollution, sources of water pollution. 11.9) Effects of water pollution. 11.10) Methods of preventing water pollution.	EXPERIMENT NO. 22 To determine CO content in emission from petrol vehicle by using Auto exhaust analyzer.

REFERENCES :

Author	Title	Year Of Publication & Publisher	Place Of Publication
M. N. Uppal	A Text - book of engineering Chemistry		
V. P. Mehta	A Text - book of polytechnic Chemistry		
Banswal, Mahajan and Mehta	A Text - book of Applied Chemistry		

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1.5 ENGINEERING DRAWING (905)

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
2	2	100 / 4 Hrs	--	#50	--	50

External assessment as per curriculum implementation and assessment norms..

Subject Objective : This subject is classified as a Engineering Science. It describes scientific facts, concepts, principals & techniques of drawing in any engineering field to express the ideas, conveying the instructions which are used carrying out jobs on the working table. It is useful in understanding core technology and technology subjects.

Detailed content

Theory Contents	Practical Contents
Chapter 1 : Introduction of Drawing **Marks Periods** A) Use of different drawing instruments, equipments & Drafting techniques **04** B) Types of letters,Conventions of line.,Scales C) Introduction of SBTECAD -2D and its various Menu	At least 4 figures are to be draw in sketchbook and redraw using SBTECAD for practice.Printouts shall be attach to sketchbook
Chapter 2 : Curves & Tangential Exercises **12 08** To draw an ellipse by (1) Arcs or circle method (2) Concentric circle method (3) Rectangle / Oblong Method. To draw a parabola by (1) Directrix focus method (2) Rectangle method (2) Rectangle method. To draw hyperbola by (1) Transverse axis and focus Method. (2) Passing through a given point. To draw an involute of (1) A polygon (up to Hexagon) (2) A circle. To draw a cycloid, epicycloid and hypocycloid.)	1) One Problem on each curve using any one method are to be draw in A3 size sketch book.
Chapter 3 : Orthographic Projections **18 12** Introduction to orthographic projections, first and Third angle method of projection, conversion of Simple pictorial view into orthographic view Dimensioning technique.	Simple Orthographic projections – two objects – one for first angle and one for third angle. (2 sheets) And any one sheet is to be redraw using SBTECAD
Chapter 4 : Sectional Views **10 10** Conversion of given pictorial view into sectional orthographic views.	Orthographic projection with sections. (2 sheet) And any one sheet is to be redraw using SBTECAD

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Theory Contents			Practical Contents
Chapter 5 : Isometric Views Isometric scale and views of simple objects. Isometric views of rectangular, cylindrical objects and Representation of slots on sloping faces.	**16**	**06**	Isometric Projections with slopes, slots, curves etc two objects one by natural scale, one by isometric scale. (1 sheet)
Chapter 6 : Projections of Lines Lines inclined to one reference plane only. Limited to both ends in one quadrant.	**04**	**04**	Two Problems on lines are to be solved in A3 sketch book
Chapter 7 : Projection of Planes Projection of planes of circular, square, rectangular, Pentagonal and hexagonal shapes; inclined to one Reference plane only.	**10**	**06**	Two Problems on Planes are to be solved in A3 sketch book
Chapter 8 : Projections of Solids Projections of solids-prism,pyramid, cone, cylinder, Tetrahedron; axis inclined to one reference plane Only.	**10**	**06**	Two Problems on Solids are to be solved in A3 sketch book
Chapter 9 : Sections of Solids Sections of the solids-prism, pyramid, cone, Cylinder. Solids resting on their bases on the Ground. Section plane is inclined to one reference Plane and perpendicular to other.	**16**	**06**	2 problems on sections of solids are to be solved on One sheet .
Chapter 10 : Free Hand Sketches Free hand Sketching of Nuts,Bolts,Rivet,threads and split pin and key	**04**	**02**	Four free hand sketches to be draw in the sketch book.

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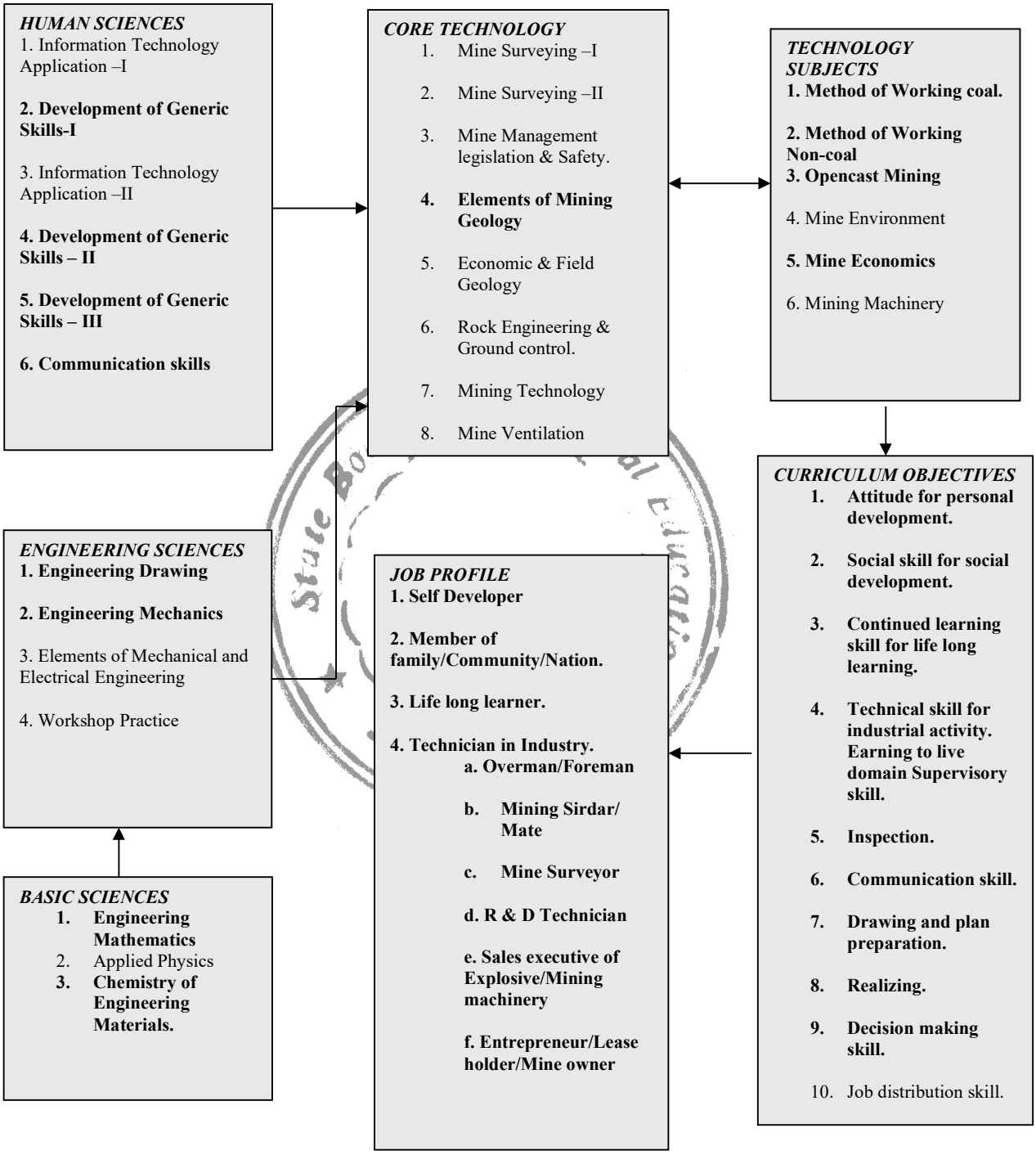
REFERENCES :

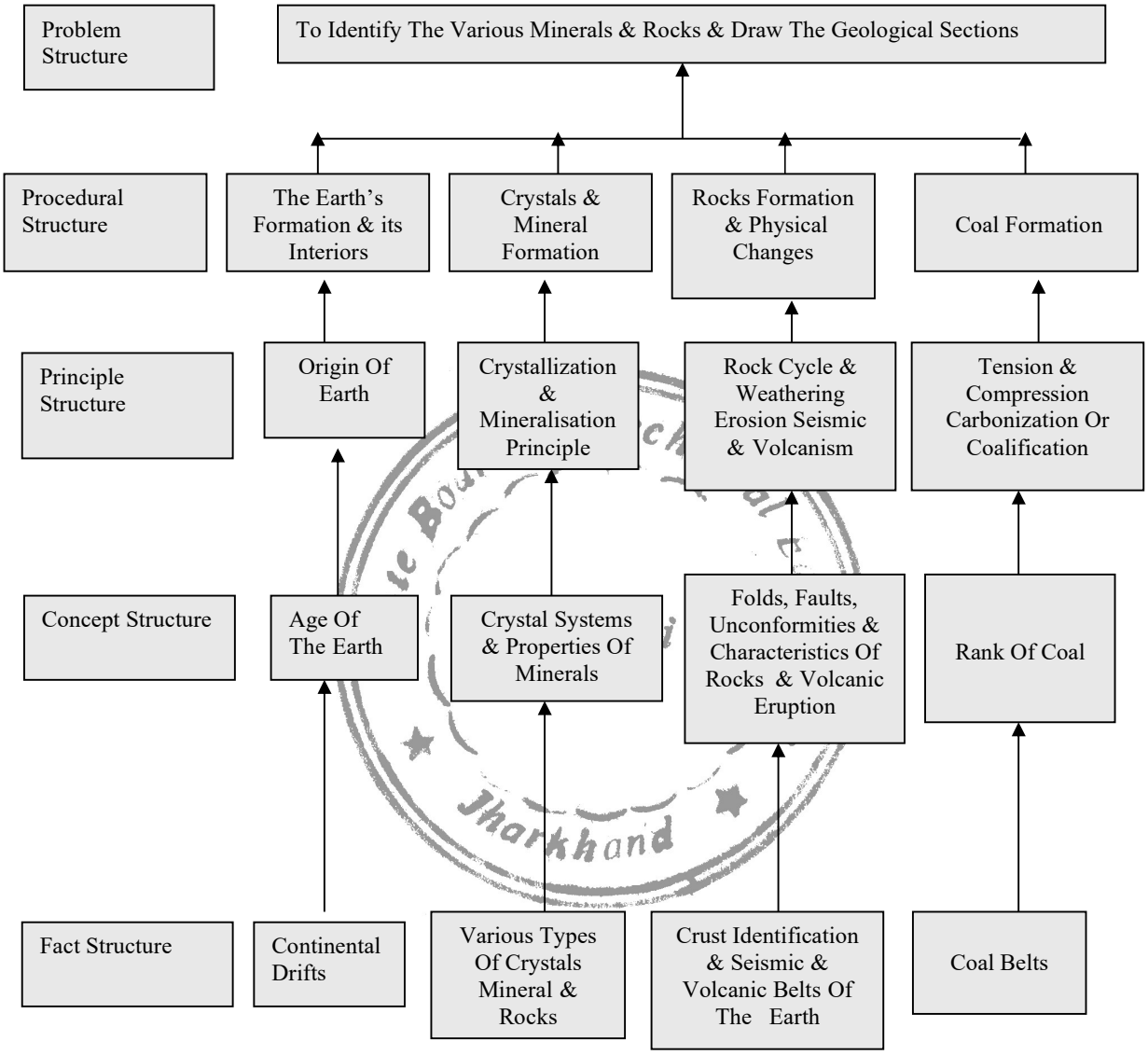
Author	Title	Year Of Publication & Publisher	Place Of Publication
N.D. Bhatt.	Elementary Engg. Drawing		
N.D. Bhatt	Machine Drawing		

CONTEXT IN THE FORM OF BLOCK DIAGRAM:

SUBJECT AREA – ELEMENTS OF MINING GEOLOGY



GRAPHICAL STRUCTURE OF THE SUBJECT AREA-ELEMENTS OF MINING GEOLOGY



1.6. SUBJECT TITLE: **ELEMENTS OF MINING GEOLOGY**

YEAR: **FIRST YEAR**

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME		EXAM SCHEME & MAXIMUM MARKS					
THEORY HRS/WEEK	PRACTICAL HRS/WEEK	PAPER HRS.	TH	PR	OR	TW	SW
3	**2**	**3**	**100**	**#50**	**-**	**-**	**50**

External assessment as per Curriculum implementation and assessment norms..

DETAILED CONTENTS:

UNIT	CONTENTS	MARKS	HOURS	PRACTICAL CONTENT
1.	**GENERAL GEOLOGY** 1.1 Branches 1.2 Sub branches 1.2.1 Essential 1.2.2 Allied 1.3 Scope of geology 1.4 Origin of Earth 1.5 Age of earth 1.6 Interior of Earth 1.7 Continental drift 1.8 Isostacy	16	10	
2.	**MINERALOGY** 2.1 Elements of crystallography 2.2 Characteristic symmetry elements 2.3 Elements of crystal system 2.4 Definition of Mineral 2.5 Classification of Minerals. 2.6 Physical and chemical properties of Minerals.	18	18	1. Identification of Minerals in sets. Colour Form Cleavage Fracture Luster Streak Moh's scale of hardness. 2. Identification of Minerals on the basis of physical properties in hand specimens. Quartz group Feldspar group Mica group Amphibole group Pyroxene group Feldspathoid group Miscellaneous silicate group Non-silicates.

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UNIT	CONTENTS	MARKS	HOURS	PRACTICAL CONTENT
3.	**PETROLOGY** 3.1 Rock cycle and characteristics of various Rock types 3.2 Igneous Rocks 3.2.1 Origin & classification 3.2.2 Structure Classification, occurrence & uses. 3.3 Sedimentary Rocks 3.3.1 Origin & classification 3.3.2 Structure 3.3.3 Occurrence & uses 3.4 Metamorphic Rocks 3.4.1 Origin & Classification 3.4.2 Structure **3.4.3** Occurrence & Uses	18	16	3. Identification of Igneous Rocks in Hand specimen. 4. Identification of sedimentary rocks in Hand specimen. 5. Identification of Metamorphic rocks in Hand specimen.
4.	**PHYSICAL GEOLOGY** 4.1 Erosion & weathering 4.2 River & wind erosion 4.3 Earth quake 4.4 Volcano	12	10	
5.	**STRUCTURAL GEOLOGY** 5.1 Strike & Dip 5.1.1 Apparent Dip 5.1.2 True Dip 5.2 Dip-strike Problems 5.3 Folds-classification & Recognition in field 5.4 Faults- classification & Recognition in field 5.5 Unconformity- classification & Recognition in field 5.6 Joints and cleavages 5.7 Outlier and Inlier	12	20	
6.	**COAL GEOLOGY** 6.1 Physical & chemical properties 6.2 Origin, occurrence and distribution 6.3 Ranks of coal 6.4 Banded constituents of coal. 6.5 Structural features of coal seam. 6.6 Commercial classification of coal.	12	18	
7.	**GEOLOGICAL MAPS** 7.1 Drawing of Geological section of maps. 7.2 Description of Geological maps. 7.3 characteristics of contour line.	12	16	6. Drawing of Geological section Maps (any ten)

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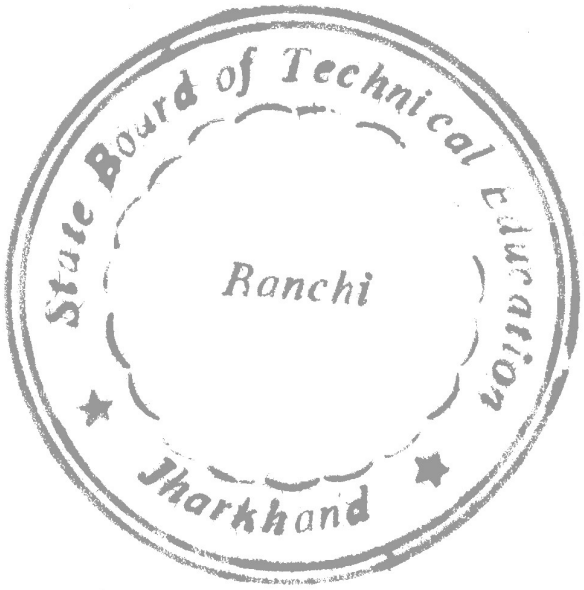
STRATEGY OF IMPLEMENTATION:

Conducting theory classes, practical, Industrial visits seminars group discussion, and assignment on different topics shall complete the curriculum for the subject.

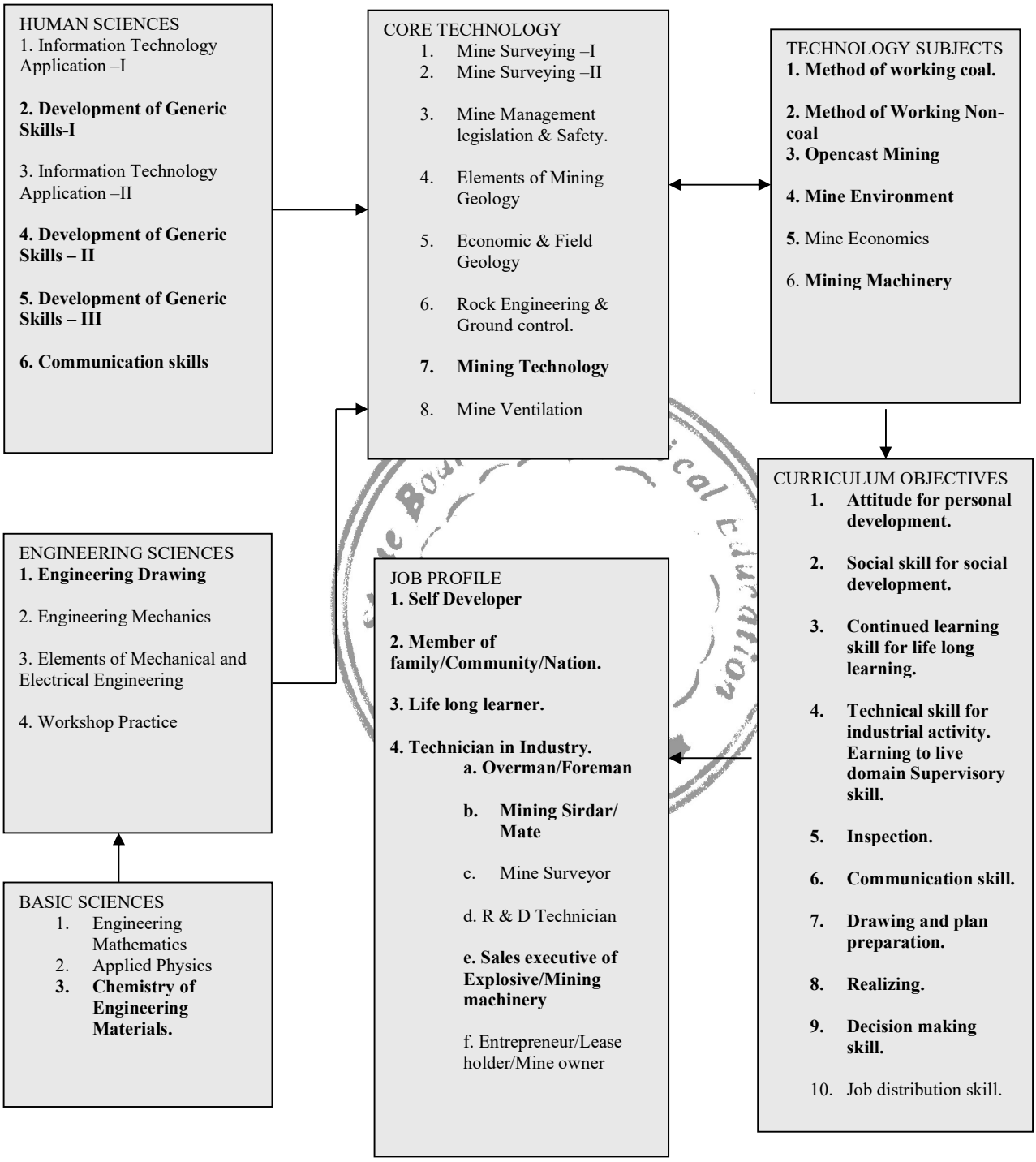
REFERENCE:

AUTHOR	TITLE	YEAR OF PUBLICATION	PLACE OF PUBLICATION & PUBLISHER
P.K. Mukherjee	A text book of Geology	1986	The world press pvt. Ltd. Calcutta.
A.K. Dutta	Physical Geology	1962	A. K. Bose Ranchi.
S.W. Chiplonkar	Structural Geology		

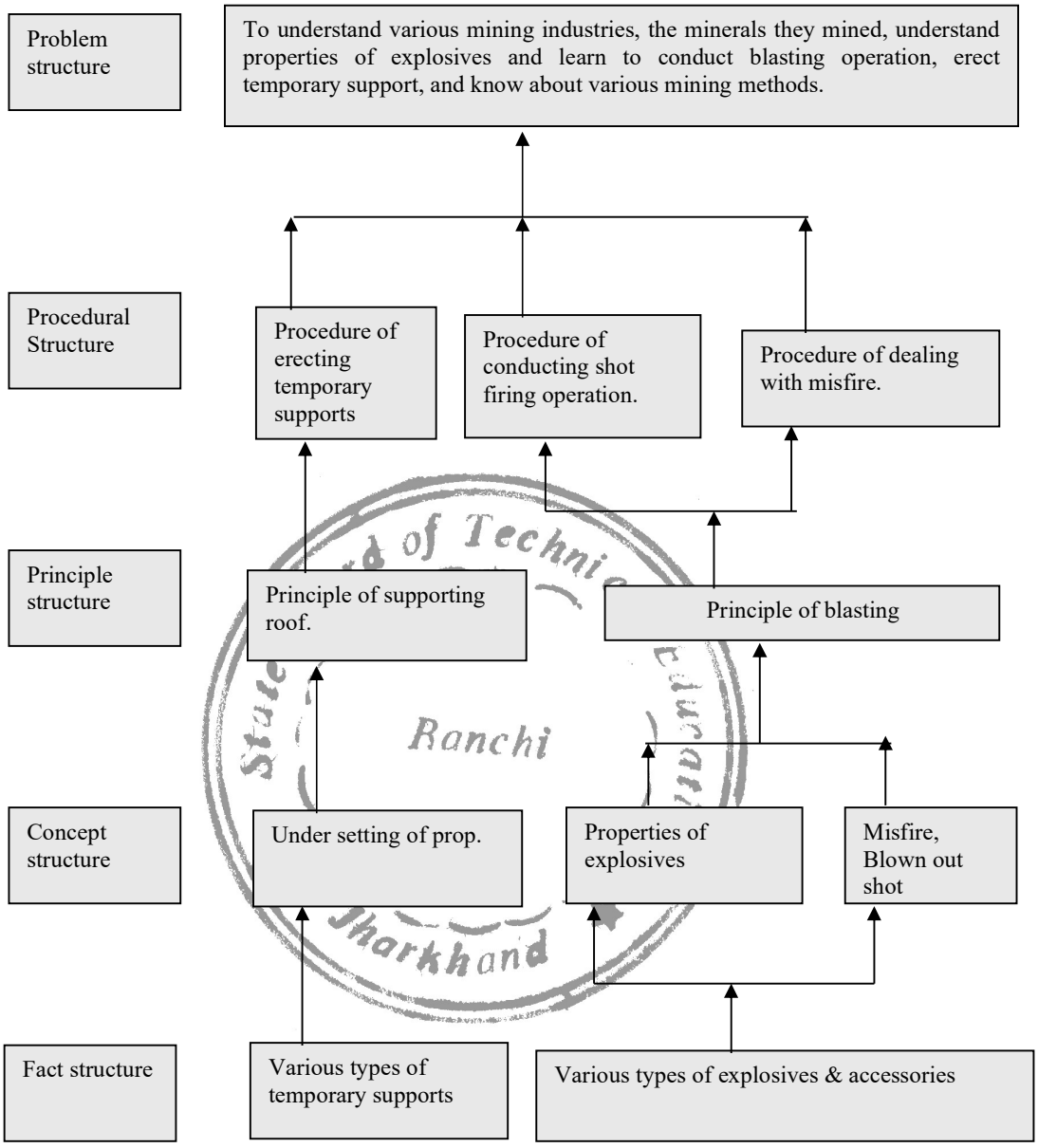


CONTEXT IN THE FORM OF BLOCK DIAGRAM:

SUBJECT AREA – MINING TECHNOLOGY



GRAPHICAL STRUCTURE OF SUBJECT AREA- MINING TECHNOLOGY



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1.7 SUBJECT TITLE: MINING TECHNOLOGY

YEAR: FIRST YEAR

External assessment as per Curriculum assessment & implementation norms..

TEACHING SCHEME		EXAM SCHEME & MAXIMUM MARKS					
THEORY HRS/WEEK	PRACTICAL HRS/WEEK	PAPER HRS.	TH	PR	OR	TW	SW
3	**2**	**3**	**100**	**--**	**#50**	**-**	**50**

TEACHING AND EXAMINATION SCHEME:

RATIONALE:

The student of first year of Mining & Mine surveying must be aware of the Mineral Industry in the country and the Departments, which deal with mineral exploration, exploitation, safety, conservation and control of the mining industry. All technical definitions and terminologies connected with above are included here, as the students at this stage must be acquainted with these to cope up with the contents at later stage. Blasting is an important operation in all the mining operations. Knowledge of all the types of explosive, their properties and selection for different conditions/situation types of detonator/fuses etc is a must for them. Also it is essential for a mining engineer to understand systems of support of the mine workings. These all aspects have been included in the subject.

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OBJECTIVES:

After undergoing the course of study the student shall be able to

1. State the various organizations engaged in coal and noncoal mining, their role and functions.
2. Understand various technical terms, operations involved in coal & noncoal mining.
3. Understand properties of explosives, procedure of conducting shot firing operation in underground coalmines with due regards to safety.
4. Understand the procedure of erection of temporary supports in underground coalmines.
5. State the major method of extraction of coal used in underground coal mines, their conditions of applicability.

DETAILED CONTENTS:

UNIT	CONTENTS	Marks	Hrs	PRACTICAL CONTENT
1.	**Introduction to Mining & Mineral.** 1.1 Uses of important minerals mined e.g. Coal, lignite, iron ore, limestone copper, zinc, bauxite, gold, manganese, mica etc. 1.2 Important Organizations involved like DGMS, CIL, MECL, CMRI, IBM etc. their role and functions.	12	08	
2.	**Mining Terminology & Definition.** 2.1 Common terminologies used in coal mining. 2.2 Common terminologies used in metal mining. 2.3 Common terminologies used in mine ventilation and environment. 2.4 Common terminologies used in mine supports. Simple definition, explanation, purposes and sketches.	16	20	1.Errection of prop support At the face and incline road Ways. 2. Settings of cog support at junctions. 3. Setting of Cross Bar in the gallery. 4. Withdrawal of supports by Using Sylvester machine.
3.	**Explosives & Accessories** 3.1 Common explosive bases, Properties of Explosives, High Explosive & Low explosive, their comparison. 3.2 Permitted explosives their types, composition, properties, uses, advantages & disadvantages. Brand names of some commonly used explosive of each type. 3.3 A detonator, common types of detonators, plain detonators, instantaneous and delay action detonators their construction, uses, comparison etc. low tension & high-tension detonators. 3.4 Safety fuses, detonating cords, detonating relays. Shot firing tools, exploders.	20	25	5. Demonstration of different Types of permitted Explosive Cartridges. 6. Demonstration of Instantaneo Electric Detonator 7. Demonstration of delay Detor used for Shot firing in underg Mines. 8. Demonstration of shot Firing tools. 9. Demonstration of single Shot and multi shot exploder.

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UNIT	CONTENTS	Marks	Hrs	PRACTICAL CONTENT
4.	**Shot Firing** 4.1 Drilling patterns for shot firing on machine cut face, in stone drift etc. 4.2 Face preparation for shot firing, Preparation of priming charge, charging of hole in coal and rock in under ground working only, Direct and inverse initiation, shot firing circuits, procedure of shot firing of holes in gassy mine, precautions. Simultaneous & delay firing. 4.3 Solid blasting, conditions to be satisfied before doing solid blasting, advantages of solid blasting, drilling patterns used with solid blasting	20	25	10.. Study of different Drill hole patterns used For blasting in stone drifts 11. Demonstration of Preparation of Priming Cartridge. 12. Demonstration of methods o Charging of holes (Direct & Inverse initiation) for Blasting in underground Mines. 13. Demonstration of various Shot firing circuits.
5.	**Safety in Shot firing operation.** 5.1 charge of explosive required for blasting in coal, rock. Powder factor, detonator factor. Precaution to improve blasting results. 5.2 Misfires, causes, remedy and method of relieving dealing with misfires, blown out shots, blown through shots causes and precautions. 5.3 Purpose of stemming, Stemming materials used for shot firing, water ampoules for stemming. 5.4 Storage of explosives, Magazines 5.5 Disposal of outdated explosives.	16	20	14. Detection of misfire Shot and dealing with The misfire. 15. Sketch and Specifications Of explosive magazine
6.	**Introductory Lesson in Working coal.** 6.1 Main classifications of method of working coal a) Board & Pillar b) Open cast method. c) Long wall. 6.2 Applicability condition for selection of each methods of working. Advantages, disadvantages & simple layout of each method.	16	10	

Note: All practicals shall be completed by showing them audiovisual aids/ models etc. Industrial visit may be conducted wherever possible.

STRATEGY OF IMPLEMENTATION

Conducting theory classes, practical, Industrial visits seminars group discussion, and assignment on different topics shall complete the curriculum for the subject.

REFERENCE:

Author	Title	Year of Publication	Publisher
G.K. Pradhan	Explosive and Blasting Techniques	1996	Mintech publication Bhubaneshwar.
S.K. Das	Explosives and Blasting Techniques	1993	Lovely prakashan Dhanbad.
D.J. Deshmukh	Mining Technology Vol.- I	1995	Central techno publication, Nagpur

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1.8 WORKSHOP PRACTICE

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
-	2	-	-	-	#50	-

External assessment as per Curriculum assessment & implementation norms..

Subject Objective

This subject is classified as a Core Technology. It is intended to teach students to understand facts, concepts and techniques of manufacturing of various items used in technology areas. This will help the students to discharge the function of supervisor in industry.

General Instructions

Before the start of practical every instructor will give: -

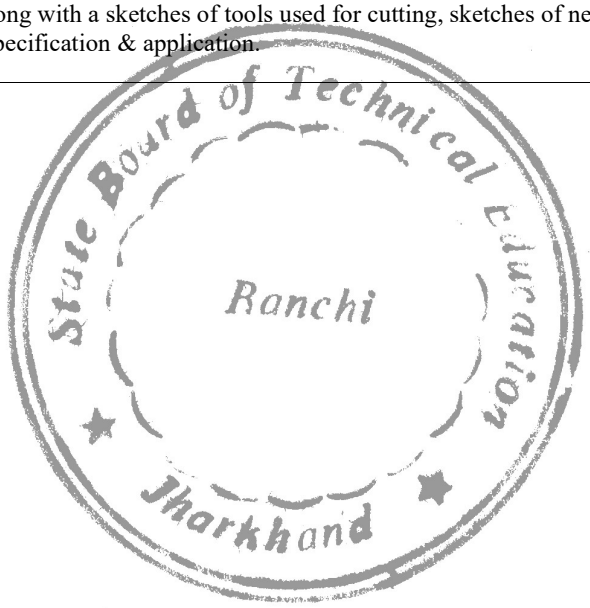
- Demonstration of basic tools, machinery equipment marking & measuring instruments etc.
- Demonstration of various operations to be performed sequentially.
- Explanation of the method of selection of materials (types, quality, quantity, size etc.)
- Demonstration of marking and measuring instruments and their specific use.
- Sufficient practice in handling various tools / equipment.
- Sufficient practice of various operations.
- Procedure to develop safety awareness on shop floor.

Note: - Job mentioned below are only for guideline any other suitable job can be taken up.

Detailed Content

Theory And Practical Content
1. Wood Working Shop Any one composite job from the following involving different joints, turning and planing, surface finishing by emery paper, varnishing etc. e.g. square stool, teapoy centre table, choupang, table lamp, bed sofaset, bookrack, cabinet, notice board, show cases, tables, chairs etc. Note: - One job to be allotted to a group of 2 to 4 student depending on volume of work to be carried out.
2. Fabrication Shop Including ARC gas, welding gas cutting, remetalling of worn-out parts or rebuilding of broken parts with gas welding. - One job, which is having marketability to be selected and performed in a group of 2 to 4 student depending on volume of works e.g. Waste paper basket, grill, door and window panel, tree guard, door and window frame, table frame (square pipe 25mm) cooler frame (folding type) etc. - A fitting job need not be a separate activity. It should be practical oriented supporting to other manufacturing activities. Some separate fitting job to be performed like e.g. Taper sunkey

Theory And Practical Content
- Preparation of right angle, acute angle, absolute angle, surfaces using filling. - Drilling & tapping on such job.
3.0 Heat Treatment Shop One job [Hook & Peg] (using round and square base) Equipment such as Style on any other useful & marketable job or any other Hardware items
4.0 Plumbing And Sheet Metal Works One job – nipple, coupling for a standard pipe, pipe threading using standard die set. One job – Letterbox, trunk, grain container, water heater container, bucket, wastepaper basket, Cooler tray, water draining channel, funnel etc. (Including soldering and pivoting). **Note :-** Work book to be submitted comprising, job drawing, narration of process adopted in each shop for a given job along with a sketches of tools used for cutting, sketches of necessity tools & Equipments with the specification & application.



1.9 INFORMATION TECHNOLOGY APPLICATION - I

Teaching Scheme		Examination Scheme				
Theory Hrs per week	Practical Hrs per week	Theory Marks/ paper duration	Practical marks	Oral marks	Term-work marks	Sessional marks
--	2	--	#50	--	--	--

External assessment as per Curriculum assessment & implementation norms..

Subject Objective: This subject is classified as core Technology subject**.** The students will study the various tools like word processing, spreadsheet, presentation tools and Internet for using them in technology subjects appropriately.

Detailed Content

Theory And Practical Content
3. Computer Fundamentals (04 HRS) Overview to Computer System Types of Computer Hardware and Software Types of Software Operating System : DOS and Windows 98/2000 Application Software Representation of Data Components of a Computer-CPU, Memory Input and Output Devices-Keyboard, Mouse, Monitors, Printers Storage Devices-Types of Storage Devices, Magnetic Storage Devices, Optical Storage Devices (Students are expected to identify the components of computer and peripheral devices)
2. Operating system WINDOWS 98/2000 (8 HRS) Starting WINDOWS Exploring the Desktop The Start Button Moving and Sizing Windows Arranging Windows Shortcuts Shutting Down Windows Windows Tools My Computer Windows Explorer Copying Files Using Send To

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Theory And Practical Content
Creating, Renaming and Deleting Folders Copying, Deleting, Moving and Renaming Files Find Files and Folders Word Pad Opening and Saving File Editing Document and Formatting Text Previewing and Printing Document Recycle Bin Help
3.0 MS WORD (14 HRS) Introduction to Office Tools: Introduction to Word Processing: Introduction to Microsoft Word Creating and Formatting a Document Auto Text, Auto Complete and AutoCorrect Grammar and Spell Check Changing font and Type Sizes Inserting and Sizing a Document Opening and Saving a Document Printing and Previewing a Document Finding and Replacing Text Creating and Removing the Hyper Link Creating Reports and Tables. Template (Letter, Fax, Memo, Report) (The student should complete atleast 4 assignments which covers various features of word processing)
4.0 Microsoft Excel (14 HRS) Introduction to Electronic Spread Sheet Introduction to Microsoft Excel Creating and Formatting a Worksheet Inserting Data into Worksheet Entering Formulas and Functions Types of Charts Creating Charts Moving and Sizing Charts Copying a Chart Using Auto Fill Splitting Windows and Freezing Panes Using Goal Seek (The student should complete atleast 4 assignments which covers various features of excel including insertion of excel workbook in MSWord))

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Theory And Practical Content
5.0 Microsoft Power Point 97 (14 HRS) Introduction to Presentation Program Introduction to Microsoft Power Point 97 Creating a Presentation Features of Power Point Auto Content Wizard Viewing and Editing a Presentation Inserting, Moving, Hiding and Deleting Slides Inserting Pictures and Clip Art. Opening, Saving and Printing a Presentation Creating and Enhancing a Table Slide Layouts Modifying the Slide and Title master Adding Transition and Build Effects (The student should complete at least 4 presentations which covers various features of PowerPoint)
6.0 Internet And E-mail Applications (10 HRS) What is Internet History and Uses of Internet Connecting to Internet Dial Up Access and Direct Access Domains and Addresses DNS and IP Addresses Using the World Wide Web Internet Browser and Browsing the Web Services on Internet E-mail Services Search Engines Chat Services. (Every student will surf the internet for at least 4 hours. He should have ability to create Email Account, sending Email and ability to search the required information using internet.)

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REFERENCES:

Author	Title	Year Of Publication & Publisher	Place Of Publication
	Internet	Tata McGrawHill Inc 2001	

1.10 DEVELOPMENT OF GENERIC SKILLS - I

Teaching Scheme		Examination Scheme	
Theory per Weeks	Practical per Weeks	Theory Examination	Oral Examination
2 Hrs	2Hrs	NIL	#100

External assessment as per Curriculum assessment & implementation norms..

- **RATIONALE:**

Over a period of time, it has been observed that effectivity of polytechnic student; their utility at work place can be enhanced by imparting generic skills right from entry to the polytechnic. The generic skills are life skills; they are life long skills, whose edge needs to be sharpened every moment.

The content is divided into four logical units

(I) Information & learning
(II) Communication skills
(III) Self development
(IV) Task – Management

It is designed by keeping self in focus with a clear objective of developing Generic Skills, to enhance the capabilities in the fields of searching, assimilating and using information on job. Developing self and managing given tasks, finally to present him as a technomanager.

It is an effort to develop student that enables him to be successful in finding a practical and reaction solution to any problem he comes across. It covers more or less all aspects of life skills. The development of subject is progressively ascending parallel to development of study in polytechnic.

DETAILED CONTINENTS

UNIT – 1 INFORMATION & LEARNING		Marks	Units
CHAPTER-1	**INFORMATION SOURCE** **1.1 Introduction** 1.2 Types of information Sources 1.2.1 Print Media 1.2.2 Documentary sources 1.2.3 Non-documentary sources 1.2.4 Non-print media 1.2.5 Electronic Media 1.3 Conclusion		
CHAPTER-2	**INFORMATION CENTRE** 2.1 **Introduction** 2.2 Classification 2.3 Services **2.4 Conclusion**		
CHAPTER-3	**PROCEDURE FOR INFORMATION SEARCH** 3.1 **Introduction** 3.2 Need of approach 3.3 Types of approach 3.4 Steps for information search 3.5 Preparation of bibliographic card 3.6 Preparation of index card **3.7 Conclusion**		

CHAPTER-4	**LEARNING** 4.1 **Introduction** 4.2 Concept of learning 4.3 Basic model of Learning 4.4 Principles of learning **4.5 Conclusion**		
CHAPTER-5	**MEMORY & COGNITION** 5.1 **Introduction** 5.2 Basic Concepts 5.3 Dual store model of memory 5.4 Sensory register Characteristics 5.5 Attention i) Factors affecting attention ii) Figure ground rule 5.6 Working memory (WM) i) Characteristics of WM ii) Control processes in WM 5.7 Long Term Memory (L.T.M.) i) Characteristics of LTM ii) Control processes in LTM 5.8 Organization of Knowledge 5.9 Conclusion		
CHAPTER-6	**METACOGNITION & STUDY STRATEGIES**. 6.1 Introduction 6.2 Metacognitive knowledge & skills 6.3 Self regulated learning 6.4 Effective learning & study strategies (covert) i) Selective attention ii) Maintain Rehearsal iii) Meaningful learning reflection iv) Internal organization v) Elaborative rehearsal vi) Visualization 6.5 Effective overt learning strategies i) Effective reading ii) Effective listening iii) Notes taking 6.6 Conclusion		
CHAPTER-7	**LEARNING ON JOB** **7.1 Introduction** 7.2 Definition 7.3 Identifying general and specific skills 7.4 Workplace as a system 7.5 Types of system 7.6 Conclusion		
CHPTER-8	**LEARNING PRACTICAL SKILLS** **8.1 Introduction** 8.2 Process of performing the job 8.3 Domains of Learning job 8.4 Conclusion		
CHAPTER-9	**TESTING OF ACQUIRED SKILLS** **9.1 Introduction** 9.2 Objectives 9.3 Process for skill analysis **9.4** Conclusion		

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Unit-II	**COMMUNICATION SKILLS**		
CHAPTER-10	**BASIC OF COMMUNICATION** 10.1 Definition 10.2 Concept of communication 10.3 Communication cycle 10.4 Barriers in communication **10.5 Conclusion**		
CHAPTER-11	**TECHNIQUES OF COMMUNICATIONS** 11.1 Introduction 11.2 Oral communication 11.3 Written communication 11.4 Body language 11.5 Conclusion		
Unit-III	**SELF DEVELOPMENT**		
CHAPTER-12	**AREAS OF SELF DEVELOPMENT** 12.1 Introduction 12.2 Areas of self development 12.3 Self Analysis 12.4 Conclusion		
CHAPTER-13	**SELF DEVELOPMENT** - TIME 13.1 Introduction 13.2 The Process of Time Planning 13.3 How to plan your time 13.4 Time Management 13.5 Ways to get the most out of time Management 13.6 Case Study/Exercise 13.7 Conclusion		
CHAPTER-14	**SELF DEVELOPMENT - STRESS** 16.1 Introduction 14.2 Stress Physiology & Health 14.3 Coping styles or strategies 14.4 Counteracting Stress 14.5 Stress & Yoga 14.6 Conclusion		

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CHAPTER-15	**SELF DEVELOPMENT- EMOTION** 15.1 Introduction 15.2 Emotional Stability & Self Control 15.3 People Skills-influence & Collaboration 15.4 Emotional Intelligence & Training 15.5 A short story **15.6** Conclusion		
CHAPTER-16	**SELF DEVELOPMENT- HEALTH** 16.1 Introduction 16.2 Health-Food, Exercise, Rest 16.3 Body-Observation, Protection 16.4 Dietary Guidelines 16.5 Addictions 16.6 Conclusion		
CHAPTER-17	**SELF DEVELOPMENT- ETHICS** **17.1** Introduction 17.2 Basic of Ethics 17.3 Individual and Ethics-Issues 17.4 Code of Ethics 17.5 Conclusion		
CHAPTER-18	**SELF DEVELOPMENT - MOTIVATION** 18.1 Introduction 18.2 Theories of Motivation 18.3 Self Motivation-Contributing 18.4 Attitudes and Attitude Replacement 18.5 Conclusion		
Unit-IV	**TASK MANAGEMENT**		
CHAPTER-19	**INTRODUCTION TO TASK MANAGEMENT** 19.1 Introduction 19.2 Activity 19.3 Event 19.4 Task 19.5 system 19.6 Management 19.7 Task Management 19.8 Conclusion		

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CHPTER-20	**TASK IDENTIFICATION** 20.1 Introduction 20.2 Task characteristics 20.3 Task sponsor 20.4 Task stakeholder - Definition - Identification and management of stakeholder 20.5 The task dynamic action cycle **20.6 Conclusion**		
CHAPTER-21	**TASK CUSTOMER** 21.1 Introduction 21.2 Customer 21.3 customer need and requirement 21.4 Customer satisfaction 21.5 Documentation 21.6 Conclusion		
CHAPTER-22	**TASK PLANNING** 22.1 Introduction 22.2 Preparation of task plan 22.2.1 Task Mission - statement 22.2.2 Task goal and goal Hitachi 22.2.3 Task objectives 22.3 Task Plan 22.3.1 Work break down structure 22.3.2 Resource identification 22.3.3 Resource scheduling 22.4 Conclusion		
CHAPTER-23	**TASK EXECUTION AND CONTROL** 23.1 Introduction 23.2 Task Baseline 23.3 Methodology to perform task & Monitoring Tools 23.4 Task control 23.5 Task status against baseline could 25.6 Conclusion		
CHAPTER-24	**CLOSING THE TASK** 24.1 Introduction 24.2 Task summery & conclusions 24.3 Task Evaluation & Feedback 24.4 Conclusion		

Note: Assignment is in Learning material. Students must do all assignment to get practice on life situations so that they use generic skills in the life.

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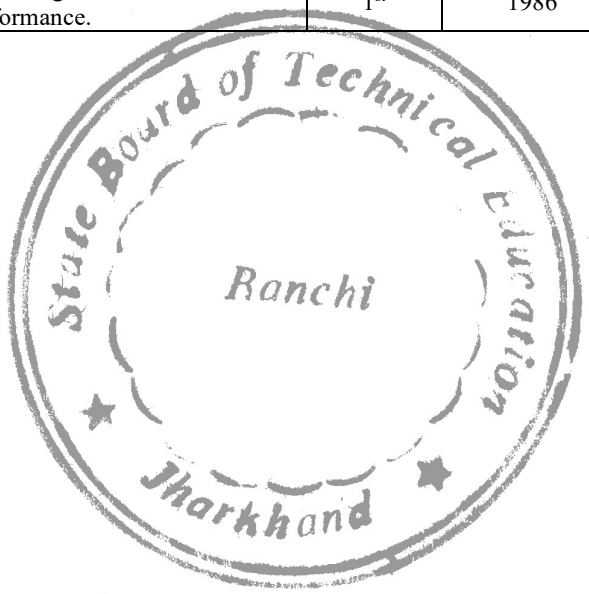
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Jeanne. E.O	Human learning	Third	1999	Prentice Hall, New jersey
Kenneth a kiewra Nelson F. Dubois	Learning to learn	-	1998	Allyn and Bacon
E.H. Megrath	Basic managerial skills for all	Third	1989	Prentice hall of India Ltd.
P.D. Kulkarni & B.B. Sharama	Independent study techniques	-	1986	T.T.T.I. Chandigarh
Trevor L. Young	The handbook of project management	First	1999	Kogan page
Michael Davies	Trainer's Guide Project management	"	1999	Kogan page
Elizabeth Hierney	101 ways to better communication	1st Edition	2001	Kogan Page
Dean R. Spitzer	Improving individual performance.	1st	1986	Educational technology Pub., New Jersy.