

1	Name of Course	Certificate Course in Draughtsman Mechanical									
2	Course Code	303401									
3	Max no. of Students	25									
4	Duration	2 Year									
5	Course Type	Full Time									
6	No. of Days per week	6 days									
7	No. of hours per day	7 Hrs									
8	Space require	Theory Class Room – 240 sqft Three Practical Lab – 540 sqft each									
9	Entry qualification	SSC Pass									
10	Objective of syllabus	To prepare working drawing of machine parts and components. complete project drawing. To reproduce the drawing by making tracing and taking prints. To record and preserve the drawing. To make simple design of machine parts and simple jigs and fixtures. To calculate the weight and cost of simple machine components. To Prepare Drawing by using CAD.									
11	Employment opportunities	The student can get jobs in industries or with working experience will be in a position to start his own independent Business.									
12	Teachers Qualification	1) For Vocational subject - B.E.Mech. 2) For Non Vocational Subject - Master Degree in Concern subject									
13	Teaching Scheme –										
	Sr.	Subject	Subject Code	Clock Hours / Week		Total					
				Theory	Practical						
	1	English (Communication Skill)	90000001	2 Hrs	1 Hrs	3 Hrs					
	2	Elective – I		2 Hrs	1 Hrs	3 Hrs					
	3	Elective – II		2 Hrs	1 Hrs	3 Hrs					
	4	Mechanical Technology and Material Science	30340001	3 Hrs	8 Hrs	11 Hrs					
	5	Engineering Drawing and CAD	30340002	3 Hrs	8 Hrs	11 Hrs					
	6	Mechanical Drafting	30340010	3 Hrs	8 Hrs	11 Hrs					
	Total						42 Hrs				
14	Internship	Two Months Summer Internship from 1 st May to 30 th June is Compulsory.									
15	Examination Scheme – Final Examination will be based on syllabus of both years.										
	Paper	Subject	Subject Code	Theory			Practical		Total		
				Duration	Max	Min	Duration	Max	Min	Max	Min
	1	English (Communication Skill)	90000001	3 Hrs	70	25	3 Hrs	30	15	100	40
	2	Elective – I		3 Hrs	70	25	3 Hrs	30	15	100	40
	3	Elective – II		3 Hrs	70	25	3 Hrs	30	15	100	40
	4	Mechanical Technology and Material Science	30340001	3 Hrs	100	35	3 Hrs	100	50	200	85
	5	Engineering Drawing and CAD	30340002	3 Hrs	100	35	3 Hrs	100	50	200	85
	6	Mechanical Drafting	30340010	3 Hrs	100	35	3 Hrs	100	50	200	85
	..										
16	Teachers – Three Teachers per batch for vocational component. For English, Elective-I & II guest faculty on clock hour basis.										
17	a) For Elective I – Student can choose any one subject					b) For Elective II – Student can choose any one subject					
	Code	Subject Name			Code	Subject Name					
	90000011	Applied Mathematics			90000021	Applied Sciences (Physics & Chemistry)					
	90000012	Business Economics			90000022	Computer Application					
	90000013	Physical Biology (Botany & Zoology)			90000023	Business Mathematics					
	90000014	Entrepreneurship									

Subject Name : English (Communication Skill) - 1st Year

(Subject code : 90000001)

1) PROSE

	TOPIC	AUTHOR	
1	SPOKEN ENGLISH AND BROKEN ENGLISH	GEORGE BERNARD SHAW	
2	THE HOMECOMING	RABINDRANATH TAGORE	
3	WHAT WE MUST LEARN FROM THE WEST	N.R. NARAYAN MURTHY	
4	AFTER 20 YEARS	O .HENRY	
5	THE HAPPY PRINCE	OSCAR WILDE	

2) POETRY

1	IF	RUDYAR KIPLING	
2	BABY'S WORLD	RABINDRANATH TAGORE	
3	POISON TREE	WILLIAM BLAKE	
4	PSALM OF LIFE	H.W.LONGFELLOW	
5	HOPE	SIDDHARTH ANAND	

3) GRAMMER

		EXCERCISES
PARTS OF SPEECH NOUNS : KINDS OF NOUNS AND USAGES PRONOUNS PREPOSITIONS ADJECTIVES CONJUNCTION VERB ADVERB INTERJECTION	INTRODUCTION AND EXPLANATION	SENTENCE CORRECTIONS

ARTICLES / APOSTROPHES		
DIRECT /INDIRECT SPEECH		
HOMONYMS/HOMOPHONES		
FIGURES OF SPEECH		
LETTER WRITING – FORMAL AND INFORMAL		
COMPREHENSIONS		
EMAIL AND BUSINESS LETTERS (FORMAT TO BE TAUGHT WHICH IS USED IN WORKPLACE)		
COMPOSITIONS		

4) NON DETAIL

My experiments with truth – M.K.GANDHI

(an autobiography)

5) PRACTICAL

PRACTICALS – 30 MARKS

(BASED ON PERSONAL ENHANCEMENT)(THROUGH SKITS/CHARTS/FLASH CARDS/SKITS/PRACTICAL PROJECT)

OBJECTIVE : GROOMING THE STUDENT TOWARDS HIS CAREER.

AT THE END OF EACH TOPIC, THE STUDENT HAS TO HAVE BENEFITTED FROM IT.

KNOW THYSELF

GOAL SETTING HELP STUDENTS IDENTIFY THEIR OWN GOALS AND THUS LINK TO THEIR CAREERS AS PART OF CURRICULUM

TIME MANAGEMENT

TEAM WORK

INTERPERSONAL COMMUNICATION

GENERAL KNOWLEDGE/ QUIZ BASED ON THEIR SUBJECT

SPOKEN ENGLISH

English (Communication Skill) – 2nd year.

1) PROSE

	TOPIC	AUTHOR	
1	SPEECH AT CHICAGO	SWAMI VIVEKANANDA	
2	THE CASE FOR THE DEFENCE	GRAHAM GREENE	
3	WAITING FOR THE BUDDHA		
4	WATER – THE ELIXIR OF LIFE	C.V.RAMAN	
5	A HORSE AND TWO GOATS	R.K.NARAYAN	

2) POETRY

1	ROAD NOT TAKEN	ROBERT FROST	
2	Even this shall pass		
3	TO INDIA	SAROJINI NAIDU	
4	ALL THE WORLDS A STAGE	WILLIAM SHAKESPEARE	
5	A PRAYER FOR MY MOTHERS BIRTHDAY	HENRY VAN DYKE	

3) GRAMMER

		EXCERCISES
PARTS OF SPEECH NOUNS : KINDS OF NOUNS AND USAGES PRONOUNS PREPOSITIONS ADJECTIVES CONJUNCTION VERB ADVERB INTERJECTION	Different usages on the lines of competitive exams	SENTENCE CORRECTIONS

ARTICLES / APOSTROPHES		
DIRECT /INDIRECT SPEECH		
HOMONYMS/HOMOPHONES		
FIGURES OF SPEECH		
LETTER WRITING – FORMAL AND INFORMAL		
COMPREHENSIONS		
EMAIL AND BUSINESS LETTERS (FORMAT TO BE TAUGHT WHICH IS USED IN WORKPLACE)		
COMPOSITIONS		

4) NON DETAIL

MY EXPERIMENTS WITH TRUTH – M.K.GANDHI

5) PRACTICALS

CAREER CHART.(DEPENDING ON THE STREAM CHOSEN BY THE STUDENT)

ETIQUETTE FOR INTERVIEWS

BODY LANGUAGE

BUSINESS LETTERS

PRESENTATIONS

MARKING SCHEME :

PROSE : 20

POETRY : 15

GRAMMAR : 25

NON DETAIL : 10

PRACTICALS : 30

Elective 1 : Applied Mathematics - 1st Year

(Subject code : 90000011)

Theory	Practical
<p>Detailed Syllabus:</p> <p>1.0. Trigonometric ratios</p> <p>1.1. Angles & its measurements</p> <p>1.2. Trigonometric ratios</p> <p>1.3. Relation between degree and radian.</p> <p>1.4. Fundamental identities.</p> <p>1.5. Examples based on Fundamental Identities</p> <p>1.6. Trigonometric ratios of compound angles</p> <p>1.7. Factorization formulae</p> <p>1.8. Inverse trigonometric functions</p> <p>1.9. Properties of a Triangle</p>	<p>Detailed Syllabus:</p> <p>Solve problems on:</p> <p>1) Conversion of radian to degree</p> <p>2) Conversion of degree to radian</p>
<p>2.0. Plane co-ordinate geometry</p> <p>2.1. Locus</p> <p>2.2. Line</p>	
<p>3.0 Vectors and Linear Equalities</p> <p>3.1. Definition of vector, position vector</p> <p>3.2. Algebra of vectors (Equality, addition, subtraction and scalar multiplication)</p> <p>3.3. Dot (Scalar) product with properties.</p> <p>3.4. Vector (Cross) product with properties.</p> <p>3.5. Solutions of Linear inequalities in one variable and two variables</p>	
<p>4.0. Determinants and Matrices</p> <p>4.1. Definition and expansion of determinants of order 2 and 3.</p> <p>4.2. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns</p> <p>4.3. Definition of a matrix of order $m \times n$.</p> <p>4.4. Types of matrices.</p> <p>4.5. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication.</p> <p>4.6. Transpose of a matrix.</p> <p>4.7. Minor, cofactor of an element of a matrix, adjoint Of matrix and inverse of matrix by adjoint method.</p> <p>4.8. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.</p>	<p>Solve problems on Cramer's rule</p>
<p>5.0 Statistics and Probability</p> <p>5.1. Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data.</p> <p>5.2. Analysis of frequency distributions with equal means but different variances.</p> <p>5.3. Random experiments: outcomes, sample spaces (set representation).</p> <p>5.4. Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events</p> <p>5.5. Probability of an event, probability of 'not', 'and' & 'or' events.</p>	<p>State and prove Baye's theorem</p>

6.0. Set Relations & Functions 6.1. Types of functions 6.2. Domain, Co – domain, Range of a function 6.3. Composite and Inverse functions 6.4. Graphs of functions	Solve problems on Graphs
7.0. Logarithms 7.1. Introduction and Definition 7.2. Laws of logarithms 7.3. Numerical problems based on multiplication, division and power.	Solve problems on power law
8.0. Complex Numbers and Quadratic equations 8.1. Complex Numbers in the form of $a+ib$ 8.2. Modulus, Complex conjugate, Argument of complex numbers 8.3. Algebra of complex numbers 8.4. Square root of complex numbers 8.5. Argand diagram 8.6. Nature of roots 8.7. Sum and product of roots 8.8. Formation of quadratic equation 8.9. Symmetric functions of roots 8.10. Cube roots of unity	
9.0. Sequences and Series 9.1. Definition of a sequence 9.2. Geometric Progression and Arithmetic Progression 9.3. Arithmetic mean, Geometric mean, harmonic mean 9.4. Special Series	1) Proof of arithmetic progression and geometric progression 2) Proof of arithmetic mean and geometric mean
10.0 Permutations and Combinations 10.1. Factorial notation 10.2. Fundamental principle of counting 10.3. Permutation 10.4. Combinations	
11.0 Mathematical Induction and binomial theorem 11.1. History, statement, Proof of Binomial theorem for positive integral indices, Pascal's triangle, general and middle term in binomial expansion 11.2. Principle of mathematical induction and its application 11.3. Simple applications	Proof of Binomial theorem

Elective 1 : Applied Mathematics - 2 nd Year

(Subject code : 90000011)

Theory	Practical
Detailed Syllabus : 1.0. CALCULUS: Limits and Continuity 1.1. Definition of a limit 1.2. Algebra of limits 1.3. Standard limits 1.4. Limit at infinity and infinite limits 1.5. Continuity of a function at a point 1.6. Algebra of continuous functions 1.7. Continuity in interval 1.8. Continuity of some standard functions	Detailed Syllabus 1) Theorem on a limit of a sequence 2) Theorem on continuity in interval
2.0. Differentiation 2.1. Derivative using first principle 2.2. Rules of Differentiation 2.3. Derivatives of standard functions 2.4. Derivatives of logarithmic and exponential functions 2.5. Derivative of composite functions 2.6. Derivative of Inverse functions	Proof of derivative using the first principle with the help of an example

2.7. Derivative of implicit and parametric functions 2.8. Second order derivatives	
3.0. Applications of Derivatives 3.1. Geometrical applications 3.2. Derivative as a rate of change measure 3.3. Approximations 3.4. Maxima and Minima	
4.0. Integration 4.1. Definition of an integral of a function 4.2. Integrals of some standard functions 4.3. Rules of integration 4.4. Indefinite Integration 4.5. Definite Integration	Solve problems on definite integration
5.0 Application of Definite Integrals 5.1. Area under the curve 5.2. Volume of solid of revolution	
6.0. Differential equations 6.1. Definition 6.2. Formation of differential equations 6.3. Solution of first order and first degree differential equations 6.4. Applications of differential equations	Solve problems on first order and first degree differential equations
7.0 Numerical Methods 7.1. Definition of various operators and relation between the operators 7.2. Interpolation methods 7.3. Numerical integration	
8.0. Mathematical Logic 8.1. Statements and logical connectives 8.2. Statement Pattern and Logical equivalence 8.3. Application of logic	
9.0. Geometry 9.1. Pair of straight lines passing & not passing through origin 9.2. Circle: definition, Tangent and Normal 9.3. Conic: Equation of Conics 9.4. Three Dimensional Geometry: Direction Cosines and ratios, Line, Plane	
10.0. Linear Programming Problems 10.1. Linear Programming Problems 10.2. Simplex Method	Solve problems on simplex method
11.0. Boolean Algebra 11.1. Boolean Algebra as an algebraic structure Algebra 11.2. Principle of Duality 11.3. Boolean function & switching circuits 11.4. Application of Boolean Algebra to switching circuits	State and explain the principle of duality

Elective - I - Business Economics – 1st year

(Subject Code – 90000012)

Theory	Practical
<p>Detailed Syllabus :</p> <p>1. Introduction to Economics – 1.1 Meaning & Scope - 1.2 Relevance of Economics to different disciplines - Economics & Management, Economics & Law- Economics and Humanities – 1.3 Micro Economics and Macro economics</p>	<p>1) Prepare a project on usefulness of micro – economics. 2) Prepare a project on usefulness of micro – economics. 3) Conduct a GD on the importance of Micro Economics and Macro Economics</p>
<p>2. Macro Economics – 2.1 Meaning, Definition and Features. 2.2 Aggregates-Nature of Aggregates , problems of Aggregation. 2.3 National Income, Meaning, Definition of National Income Different National Income Concepts 2.4. Estimation of National Income – Methods and Difficulties</p>	<p>1) Prepare a PPT presentation on macro-economics, National Income and how it is computed and the difficulties in measuring National Income. 2) Prepare a chart on the circular flow of National Income. 3) Make a comparative study of closed economy and open economy. 4) Conduct a case study of 5 individual families and find out the Disposable income to the individuals.</p>
<p>3. Determinants of Aggregates 3.1. Aggregate Demand and their components 3.2 Aggregate Supply and their components</p>	<p>Prepare a chart on the components of aggregate demand. Conduct a GD on Keynes theory of employment and principles of effective demand. Take 2 or 3 case studies on entrepreneurship and discuss to what extent they provide employment to people.</p>
<p>4. Money and Banking 4.1 Meaning, definitions and functions of Money 4.2 Commercial Banks: Meaning and Functions. 4.3 Central Banks: Meaning and Functions.</p>	<p>Find out RBIs concept of money supply. A visit to various financial institutions. A visit to a rural bank, cooperative bank, commercial bank. A visit to the RBI Training college, NABARD OR IDBI Further For the first year the practical will consist developing familiarity with banking functions and will comprise Of what are different types of banking services, facilities, available to individuals/organizations? (to increase the financial literacy) how to open a bank account? different investments like – FD,MF facilities for financial inclusion</p>

<p>5 Public Economics</p> <p>5.1 Government Budget and the Economy Government Budget – Meaning and its components</p> <p>5.2 Types of Government Budget – Balanced, Surplus and Deficit.</p>	<p>Prepare a report on sources of revenue in the budget of local Government. Comment. Conduct of GD on last year's government budget.</p> <p>Find out how a private budget/ finance differs from public budget/ finance</p> <p>Prepare hypothetical master budget for an imaginary company and discuss how you have allocated the funds for each department.</p> <p>Prepare a separate budget for production, personnel and administration, finance, marketing, advertising, etc.</p>
<p>6. International Trade</p> <p>6.1 Comparative cost principal of International Trade.</p> <p>6.2 Free trade Advantages, Disadvantages</p> <p>6.3 Protectionist trade advantages, Disadvantages</p>	<p>1) Collect data on India's direction of trade</p> <p>2) Collect data on India's trade Composition</p>
<p>Theory</p>	<p>Practical</p>
<p>Detailed Syllabus :</p> <p>7.1. Concepts of Economic Growth and Economic Development</p> <p>7.2 Indicators of Economic Development Monetary indicators</p> <p>7.3 Human Development indicators</p>	<p>1) To make a project on discrepancies in India's economic growth and development.</p> <p>2) Discuss the patterns of education among women in the post independence period.</p> <p>3) Collect information on Human Development Index for different Indian states.</p>
<p>8.0. Structural Changes in the Indian Economy since 1991.</p> <p>8.1 Economic reforms since 1991: Need and main features, Liberalization, privatization and Globalization. Their impact on Indian Agriculture, Industries and Service Sector.</p> <p>8.2 Economic Planning – Meaning and Objectives</p> <p>8.3 Achievements and Failures of 10th Five – Year Plan</p>	<p>1) Conduct a GD on the New Economic Policy, 1991 and its impact on the various sectors.</p> <p>2) Visit to Agricultural Produce Market Committee to study the price Fixation of agricultural commodities.</p> <p>3) Collection of market intelligence of agricultural commodities from newspaper and journals.</p> <p>4) A visit to a cottage industry, small scale industry, large scale industry.</p> <p>5) A visit to a MNC. Prepare an assignment on the WTO.</p>
<p>9.0. Current Challenges of Indian Economy</p> <p>9.1 Problem of Population Explosion in India Causes, Effects and Remedial Measures to remove these problems</p> <p>9.2 Problem of Poverty in India Causes, Effects and Remedial Measures to remove these problems</p> <p>9.3 Problem of Unemployment in India Causes, Effects and Remedial Measures to remove these problems</p>	<p>Conduct a GD on population explosion and its impact.</p> <p>Prepare a comparative chart on employment in India during the five year plans.</p> <p>Conduct a GD to find out measures for poverty alleviation.</p> <p>Make ppt presentation on population explosion, poverty, unemployment.</p>
<p>10.0. Infrastructural Development in India</p> <p>10.1 Transport and Communication,</p> <p>10.2 Energy,</p> <p>10.3 Health and Education</p>	<p>Prepare a project report on recent trends in communication.</p> <p>Prepare transport documents of trade namely goods forwarding note, lorry receipt, delivery challan, railway receipt, mates receipt, Bill of lading, airway bill, etc.</p> <p>Conduct case studies on different energy companies like Carin India, Power Corporation of India, Reliance Energy, Coal India Ltd.</p> <p>Collect secondary data on health and education.</p>

Elective - I - Business Economics – 2 nd year

(Subject Code – 90000012)

Theory	Practical
<p>. Introduction Micro Economics – 1.1 Meaning, Definition ,Nature 1.2 Tools of Analysis, 1.3 Role of Assumptions</p>	<p>1) Conduct a GD on the usefulness of Micro economics 2) Prepare a PPT on the role of assumptions in Economics</p>
<p>Consumer Behaviour and Demand Analysis 2.1 Concept of Utility, Total and Marginal Utility, Law of Diminishing Marginal Utility. Law of Equi – marginal Utility. 2.2 Concept of demand, Types of demand, Determinants of Market demand, Law of demand. 2.3 Price elasticity of demand – Concept and Importance</p>	<p>1) Make a ppt presentation on U. TU, MU, Law of diminishing marginal utility and law of equi – marginal utility. 2) Conduct a GD to substantiate the point that consumer behaviour mainly depends on economic theories. 3) Conduct a case discussion on elasticity of demand. 4) A visit to a mall/ departmental store to study consumer behaviour.</p>
<p>Producer Behaviour and Supply Analysis. 3.1 Meaning of Supply 3.2 Market Supply 3.3 Determinants of Market Supply and Law of Supply.</p>	<p>1) Make a PPT differentiating total output, Stock and Supply concepts. 2) Make chart on law of supply with schedules and supply curve. 3) Prepare a project receipt on the Law of supply. 4) Conduct a case discussion on the elasticity of supply.</p>
<p>Forms of Market and Price Determination, 4.1 Perfect competition 4.2 Monopoly and Monopolistic Competition – Meaning and Features 4.3 Price Determination under Perfect Competition</p>	<p>1) Conduct a discussion on ‘prevalence of one price is the best test of perfect competition’ 2) A visit to various markets to study the competition. 3) Write a report on the features of buyers market and sellers market.</p>
<p>Factors of Production 5.1 Meaning and Features of Land as a factor of production, 5.2 Labour as a factor of production, 5.3 Capital as a factor of production, 5.4 Entrepreneur, Qualities and functions of entrepreneur.</p>	<p>1) A visit to SISI, DIC to study about entrepreneurship. practical will consist of: <ul style="list-style-type: none"> • Preparing a project report • How to start a business • Collecting information about Permission/ Licenses required from various government agencies/ authorities • Conducting proto type market surveys using the above statistical tools • Preparing questionnaires for different types of market surveys 2) Prepare a project report on how to start an industry with financial details. 3) Conduct an interview with successful entrepreneurs. 4) Prepare a questionnaire for entrepreneurs. 5) Find out the problems faced by informal sector labour and prepare a report.</p>

Section II	
6.1 Meaning, Scope and Importance of Statistics in Economics	<ol style="list-style-type: none"> 1) Analyze the charts and diagram various statistical reports. 2) Collect secondary data from journals, magazines and newspapers.
<p style="text-align: center;">Collection and organization of data</p> <p>7.1 Collection of data – primary and secondary</p> <p>7.2 Methods of data collection – primary methods – Observation, Interview, Methods of secondary data – Census and sampling, Random sampling.</p> <p>7.3 Organization of data – Census and sampling, Random sampling.</p>	<ol style="list-style-type: none"> 1) Preparation of questionnaire for personal survey method, telephone interview and mail survey. 2) Select sample respondents and conduct socio – economic survey, marketing survey, etc. 3) Choose suitable sampling method to conduct the survey. 4) Classification of collected data, tabulation of data and analysis and interpretation of data.
<p>Graphical presentation of Data</p> <p>8.1 Tables – Components and Types</p> <p>8.2 Graphs – Curves, Bar diagrams,</p> <p>8.3 Pie – diagrams.</p>	<ol style="list-style-type: none"> 1) Prepare a project report using statistical techniques, graphs, etc. 2) Prepare a bar diagram for the data collected. 3) Prepare pie charts.
<p>Measures of Central Tendency</p> <p>9.1 Mean</p> <p>9.2 Median</p> <p>9.3 Mode</p>	<ol style="list-style-type: none"> 1) Solve practical problems of mean, median, etc.

**Elective - I PHYSICAL BIOLOGY (Botany & Zoology) – 1st Year
(Subject Code : 90000013)**

Theory	Practical
<p>Detailed Syllabus : 1.0. General Biology 1.1. Definition and its concept 1.2. Living World: Nature and scope of Biology 1.3. Cell and Cell division: Structure of the cell, Cell division 1.4. Main features of life and its characteristics (Irritability, Homeostasis, Adaptations, Reproduction and Growth & death. 1.5. Origin and evolution of life 1.6. Theories of evolution of life, origin of life, special creation, spontaneous generation, Abiogenesis, Evidences of organic evolution paleontological anatomical & embryological 1.7. Study of Tissues</p>	<p>Study of cells and tissues</p>
<p>2.0. Introduction to Botany 2.1 Origin, development and scope of Botany 1.2 Classification and its need 1.3 Nomenclature 1.4. Taxonomic Hierarchy 1.5. Five Kingdom system of classification 1.6. Two Kingdom system of classification 1.7. Thallophyta, Bryophyta and Pteridophyta 1.8. Gymnosperms, Angiosperms</p>	<p>Study of angiosperms and gymnosperms</p>
<p>3.0. Vegetative Morphology of plants 3.1. Root: Root System – types, modifications of root (storage roots, velaman roots, photosynthetic roots, respiratory roots, parasitic roots, nodular roots) 3.2 Stem: Characteristics and Functions of the stem Modifications of the stems (Aerial – Tendrils, Thorns, Hooks, Phylloclade, Tuberos stems, Bulbils: Sub Aerial – Runners, Stolons, Suckers, Offsets: Underground – Rhizome, Corm, Stem Tuber, Bulb) 3.3 Leaf: Parts and Functions (Types and Modifications of leaf base, stipule, petiole are excluded) Venation Types of leaves (simple and compound) Phyllotaxy (alternate, opposite, Whorled) Modifications of leaves (tendrils, spines, scale leaves, Phyllode, reproductive leaves, trap leaves (details of Nepenthes only)</p>	<p>Study of the structure of a plant (root, stem, leaf)</p>
<p>4.0. Reproductive Morphology of plants 4.1. Inflorescence – Types (racemose, cymose, special) 4.2. Flower – Parts, Sex Distribution, Symmetry, Position of Gynoecium, detailed description of flower (perianth, calyx, corolla, aestivation, androecium – parts, fixation, dehiscence of anther, lengths of stamens, union of stamens), gynoecium – number of carpels, fusion of carpels (excluding variations under syncarpous), ovary – number of locules, placentation, types of styles, stigma.</p>	

SECTION B - ZOOLOGY 5.0. General Biology of Living world 5.1. Main features of life and its characteristics (Irritability, Homeostasis, Adaptations, Reproduction and Growth & death. 5.2. Origin and evaluation of life 5.3. Theories of evaluation of life, origin of life, special creation, spontaneous generation, Abiogenesis, Evidences of organic evolution paleontological anatomical & embryological 5.4. Study of Tissues	
6.0 Diversity of life 6.1 Study and Classification of animals	Classification of animals
7.0. Genetics 7.1. Chromosomal basis of inheritance	
7.0 Study of Phylum: Chordata 7.1 General characters and out line classification of Chordata up to classes with typical examples. 7.2 Fishes: Distinctive features of cartilaginous and Bony fishes with typical examples. 7.3 Amphibia: Distinctive features of Urodela, Anura and Apoda with typical examples	Study of amphibians
8.0 Study of Reptiles, Aves and Mammals 8.1 Reptiles: Distinctive characters of Squamata, Rhynchocephalia, Crocodilia and Chelonia with typical examples. 8.2 Identification of Poisonous and Non- Poisonous Snakes, Poison apparatus, toxicity of Snake venom and treatment of snake bite including the first aid. 8.3 Aves: Distinctive features of Carinatae and Ratitae with typical examples. 8.4 Mammals: Distinctive features of Prototheria , Metatheria and Eutheria.	1) Study of mammals 2) study of reptiles
9.0 Anatomy of Earthworm 9.1. General characteristics of earthworm 9.2. Digestive and reproductive system 9.3. Inter-relation of earthworm with mankind	Study of earthworm

Elective - I PHYSICAL BIOLOGY (Botany & Zoology) – 2nd Year
(Subject Code : 90000013)

Theory	Practical
Detailed Syllabus : SECTION A - BOTANY 1.0. Reproduction in Angiosperms 1.1 Introduction 1.2 Microsporogenesis and development of male gametophyte 1.3 Ovule – structure, types, megasporogenesis, development of embryo sac 1.4 Pollination – Types, Contrivances of cross and self pollination. Agents of Pollination (definition with one example only) 1.5 Fertilization: Post Fertilization changes including seed structure (dicot, Monocot) and types of germination (epigeal, hypogeal & vivipary – definitions with one example)	Detailed Syllabus Study of reproduction in angiosperms in details
1.6 Fruits: – Classification; false fruits, true fruits – simple (fleshy fruits – berry, pome, pepo, hesperidium, drupe: Dry fruits – dehiscent - legume, septicidal capsule, septifragal capsule, loculicidal capsule: Indehiscent – caryopsis, cypsela, nut: schizocarpic – lomentum, schizocarp), Aggregate and multiple fruits	

<p>2.0. Plant Taxonomy 2.1 Introduction – alpha and omega taxonomy , aspects of taxonomy, flora, herbaria, botanical gardens (RBG – KEW , IBG – Kolkatta, NBG – Lucknow), binomial nomenclature, ICBN, Types of classification, Units of classification, brief account of Bentham and Hookers classification 2.2 Study of Malvaceae 2.3 Study of Fabaceae 2.4 Study of Solanaceae 2.5 Study of Liliaceae</p>	
<p>3.0. Internal Organization of plants 3.1 Tissues – Types (meristematic and permanent) and Functions 3.2 Internal Structure of Dicot Root (Primary) and Monocot root 3.3 Internal Structure of Dicot Stem (Primary) and Monocot stem 3.4 Internal Structure of leaf (Dicot and Monocot) 3.5 Secondary Growth in Dicot Stem</p>	Study of monocot and dicot stem
<p>4.0. Genetics 4.1 Introduction to genetics 4.2 Mendel's Principles – Monohybrid, Dihybrid cross, Concept of probability in relation to Mendel's laws 4.3 Linkage and crossing over (only concept and significance) 4.4 Mutations – gene and chromosomal (only definitions of terms: – spontaneous, induced, chromosomal structural and chromosomal numerical changes)</p>	Mendel's principle
<p>SECTION B - ZOOLOGY 5.0. Morphology of Humans 5.1. Nutrition and respiration in man 5.2. Locomotion in man 5.3. Study of Human Skeleton</p>	Study of human skeleton(Bone theory)
<p>6.0 Physiology of Humans 6.1. Circulation 6.2. Osmoregulation and excretion 6.3. Nervous co – ordination 6.4. Hormonal co – ordination</p>	1) Study of hormones 2) study of circulation and excretion(diagrammatic chart)
<p>7.0 Reproduction, growth and development 7.1. Details of Reproduction and human development</p>	Study of reproduction in humans
<p>8.0 Biology in Human welfare 8.1. Aquaculture: List of animals of aquacultural importance in Tabular form only 8.2. Poultry: Poultry farming methods, Layers and Broilers, Poultry diseases (Bacterial, Viral and Fungal - Three each) 8.3. Study of diseases: AIDS, Cancer, Typhoid 8.4. Immunity system 8.5. Biotechnology (Elementary aspects) 8.6. Applications of Biology: Vermiculture and Fishery</p>	Study of various diseases

Subject Name : ENTREPRENEURSHIP – 1st Year

(Subject code : 90000014)

Theory	Practical
<p>Detailed Syllabus :</p> <p>1.0. Entrepreneurship</p> <p>1.1. Concept, Functions and need</p> <p>1.2. Entrepreneurship: Characteristics and Competency</p> <p>1.3. Relevance of Entrepreneurship to Socio-Economic Gain: generating National Wealth, creating Wage and Self -Employment, Micro, Small and Medium Enterprises, Optimizing Human and Natural Resource and Solving Problems in the path of prosperity, building enterprising Personality and Society.</p> <p>1.4. Process of Entrepreneurship Development.</p>	<p>Detailed Syllabus</p> <p>I. Study visit by students to any enterprise of own choice. With the help of a schedule/questionnaire the students will record observation regarding – the background of entrepreneur, reasons for selecting the entrepreneurial career, starting the enterprise, the type of enterprise, the process of setting this enterprise, products/services, production process, investment made and marketing practices followed, profit or loss, growth and development, problems faced, institutions/organizations which offer support and entrepreneur’s level and type of satisfaction.</p>
<p>2.0. Entrepreneurial Pursuits and Human Activities:</p> <p>2.1. Nature, Purpose and pattern of Human Activities: Economic and Non-Economic, Need for innovation.</p> <p>2.2. Rationale and Relationship of Entrepreneurial pursuits and Human Activities.</p>	<p>II. Preparation of a brief report based on the observations made during study-visit to an enterprise.</p>
<p>3.0. Acquiring Entrepreneurial Values and Motivation</p> <p>3.1 Entrepreneurial Values, Attitude and Motivation-Meaning and concept.</p> <p>3.2 Developing Entrepreneurial Motivation and Competency – concept and process of Achievement Motivation, Self-efficacy, Creativity, Risk Taking, Leadership, Communication and Influencing Ability and Planning Action.</p> <p>3.3. Barriers to Entrepreneurship</p> <p>3.4. Help and support to Entrepreneurs</p>	
<p>4.0. Introduction to Market Dynamics</p> <p>4.1. Understanding a Market</p> <p>4.2. Competitive Analysis of the Market</p> <p>4.3. Patents, Trademarks and Copyright</p>	
<p>5.0. Project Selection</p> <p>5.1. Product Identification</p> <p>5.2. Project Formulation</p>	

ENTREPRENEURSHIP – 2nd Year

Theory	Practical
<p>Detailed Syllabus :</p> <p>1.0. Entrepreneurial Opportunities and Enterprise Creation</p> <p>1.1. Sensing Entrepreneurial Opportunities</p> <p>1.2. Environment Scanning</p> <p>1.3. Market Assessment</p> <p>1.4. Identification of Entrepreneurial Opportunities</p> <p>1.5. Selection of an Enterprise</p> <p>1.6. Steps in setting up of an Enterprise</p>	<p>Detailed Syllabus</p>
<p>2.0. Enterprise Planning and Resourcing</p> <p>2.1. Business Planning – Preparation of a Project Report</p> <p>2.2. Resource Assessment -Financial and Non – Financial.</p> <p>2.3. Fixed and Working Capital Requirement, Funds, Flows, Profit Ratios, Break Even Analysis etc.</p> <p>2.4. Mobilizing Resources – Sources and Means of Fund, Facilities and Technologies for starting an Enterprise.</p>	
<p>3.0. Enterprise Management</p> <p>3.1. General management: Basic Management functions.</p> <p>3.2. Organizing/Production of goods and services – quality, quantity and flow of inputs.</p> <p>3.3. Managing Market: Meaning, Functions of Marketing, Marketing Mix:</p> <ul style="list-style-type: none"> * Product * Price * Place * Promotion (advertising and sales promotion). <p>3.4. Managing Finance – Sources of Long Term and Short Term Finances, Determination of Cost, Income, Calculation of Profit/Loss.</p> <p>3.5. Managing Growth and Sustenance -Affecting Change, Modernization, Expansion, Diversification and Substitution.</p> <p>3.6. Entrepreneurial Discipline – Laws of Land, Ecology, Consumer’s Concept, Adherence to Contract and Credits.</p>	
<p>4.0. Industrial Relations and Personnel Management</p> <p>4.1. Meaning, Source of recruitment, Internal/External recruitment procedure</p> <p>4.2. Incentives, appraisal and training, Industrial relations, Industrial disputes.</p>	
<p>5.0. Report Writing</p> <p>5.1. Guidelines</p> <p>5.2. Model project reports</p>	

PRACTICAL (Second Year)

Introduction:

The Main objective of the course in Entrepreneurship is to generate in the students initiative, self reliance and enthusiasm so as to empower them to become entrepreneurs both in spirit and performance. A number of skills such as observation, evaluation, communication, resource mobilization and management, risk assessment, team building etc. is also to be developed in the students. Leadership qualities, sensitivity to business ethics and adherence to a positive value system are the core issues that the course highlights while presenting different concepts related to entrepreneurship.

Such a course should necessarily have a strong experiential component in the form of practical work. The objectives of the practical work are:

- 1 To introduce the students to the world of business by developing in them the core skills and competencies required for an entrepreneur.
2. To develop in the students qualities such as leadership, self-confidence, initiative, facing uncertainties, commitment, creativity, people and team building, integrity and reliability.
3. To enable the students to acquire the skills and knowledge needed for conducting surveys, collecting, recording and interpreting data and preparing simple estimates of demand for products and services.
4. To guide the students to prepare a Project Report.
5. To equip the students with knowledge and skills needed to plan and manage an enterprise through case studies conducted and recorded by the students in different fields such as resource assessment, market dynamics, finance management, cost determination, calculation of profit and loss etc.
6. To instill in the students important values and entrepreneurial discipline.

FORMAT

	Total marks: 30
1. Project Report/Survey Report	10 Marks
2. Viva-Voce on PW /SR	05 Marks
3. Case Study	10 Marks
4. Problem Solving	05 Marks

1. Project Report/Market Survey Report 10 Marks

a) Project Report:

Preparation of a Project Report for an enterprise involving products/services Students may be provided adequate guidance to choose a project based on their interests and availability of information and authentic inputs in the locality. The specimen proforma of project report given in the textbook may be used for preparing the report. However, mechanical preparation of the report by filling in the information in the proforma should be discouraged.

Further, as the students will be required to appear for a Viva-voce on the basis of their projects, sufficient care should be taken by the students to prepare the report after studying the various aspects involved thoroughly. In a nutshell, the project report should lead to viable enterprise.

b) Market Survey Report

Market research is the process and technique of finding out who your potential customers are and what they want. The survey may be on products and services already available in the market or students may also conduct surveys for new products and services. The report of the survey should be organised under the following broad headings :

1. Objectives.
2. Methods and tools (interviews ,questionnaires etc.) to be used to collect information.
3. Records of data and information.
4. Analysis of data and information.
5. Interpretation and conclusion.

For example, a survey may be conducted to find out the choice of households in toiletry soap, tooth paste etc. The data may be analysed to establish a pattern that may be useful to an entrepreneur.

Guidelines for assessment of Project Report / Survey Report

1. Presentation: Format, Clarity, Use of graphs, tables and other visuals, organisation, methodical recording of data and information and general neatness of execution. 5 marks
2. Originality and Creativity 3 marks
3. Authenticity of information and correctness of calculations and general feasibility of the project/ sustainability of conclusion drawn in the survey. 2 marks

2. Viva Voce on the Project /Market Survey Report

5 Marks

The questions should establish that the report is the original work of the student and that the student has a reasonably clear understanding of the work carried out by him/her. Entrepreneurial qualities such as leadership, self-belief, creativity, originality, initiative etc. may also be assessed by asking a variety of questions related to the report.

3. Case Study

10 marks

A case study is a focused research on an organisation, enterprise, practice, behaviour or person undertaken to highlight an aspect that the study attempts to examine. For instance, a case study may be conducted on the pollution control methods being employed by an industry. Or a successful industrialist may be chosen as a subject of a case study to analyze and understand the strategies that the industrialist adopted :to achieve success.

Ideally, a case study should be conducted on subjects with the objectives of bringing to the fore beliefs, practices, strategies, values etc. that have made them what they are. Such studies help us to understand the way in which great minds think and operate. We may also conduct case studies on failures; why a company collapsed, how a service lost its market etc. From both the types of case study, we learn lessons; how to do something or how not to do something. They also provide valuable insight into the processes involved in an enterprise.

A few topics are suggested for carrying out case studies :

- i) Drawing a profile of a successful entrepreneur.
- ii) Studying a public sector undertaking and highlighting its success/failure, by analyzing the factors responsible.
- iii) Studying a small scale unit in the locality to bring out the procedures and processes adopted by the unit to become a feasible business venture.
- iv) A study of competition in business by choosing two or more rivals in the market and analyzing their strengths and weaknesses.
- v) Take the school itself for a case study and analyze any two aspects of the school plant for chalking out a plan of action: infrastructure, academics, co-curricular activities etc.
- vi) A case study on a thriving fast food shop/restaurant in your locality. What makes it so popular?
- vii) A case study on the ways in which a business unit has mobilised its financial resources.
- viii) A case study on the enterprise management techniques adopted by a business house.
- ix) A case study on the marketing strategies of a successful consumer durable company.
- x) A case study on the financial management of a Public Limited Company.
- xi) A case study on any Specialized Institution that supports and guides the establishment of a small scale unit.
- xii) Studying the balance sheets of two big private companies to assess their trade and credit worthiness.
- xiii) Studying the inventory management of a large manufacturing industry to ascertain the processes involved for optimizing cost.
- xiv) Carrying out a case study on an established industrial house/company to find out the value system of the company and how it fulfils its social commitment/obligations.
- xv) Carrying out a case study on an established industry to ascertain the processes followed to reduce/prevent pollution.
- xvi) Study on environment friendly companies and their contribution to preservation.

Assessment of Case Studies

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|---|---------|
| i) Presentation: Format, accuracy, clarity, authenticity and general neatness | 7 marks |
| ii) Analysis and Conclusions | 3 marks |

4. Problem Solving

5 marks

In this session, the students will be required to solve a problem in the form of a written test. The examiner may choose any problem related to the units in class XII Text Book and set it for the class. The problem may be in the following areas :

- a. How to scan the environment to establish the feasibility of a project.
- b. Given certain figures showing the consumption pattern of a product, drawing conclusions that have a bearing on similar products.
- c. Carrying out market assessment for a given product/service to ascertain the feasibility factor.
- d. Assessment of Working Capital.
- e. Calculation of total cost of production.
- f. Calculation of break-even point.
- g. Determining location of a manufacturing unit.
- h. Problems in inventory control (calculation of the Economic Order Quantity and carrying out ABC analysis).
- i. Applying Pricing methods to determine the price of a product or service.
- j. Applying promotion mix to plan a sales campaign for a product or service.
- k. Working out a simple budget for a given task or job.

Assessment of Answers

The examiner may prepare five problems which are solved by him/her before they are presented to the students. The student may choose anyone of the problems and solve it, showing the different steps/different reasons involved in the solution. If the problem does not involve actual calculations, it may not have anyone correct answer. So weightage should be given not only to the final answer but to the entire process of problem solving that the student has followed. Originality and innovative spirit should be rewarded. The students should not be penalized for spelling errors, grammatical mistakes etc. as long as the answer is coherent. Where definite formulas are involved, accuracy should be given due weightage.

LIST OF SUGGESTED REFERENCE BOOKS

01. Entrepreneurship – Class XI – C. B. S. E., Delhi.
02. Entrepreneurship – Class XII- C. B. S. E., Delhi.
03. Udyamita (in Hindi) by Dr. M M.P. Akhouri and S.P Mishra, pub. by National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla.
04. Trainer’s Manual on Developing Entrepreneurial Motivation, By M.M.P. Aukhori, S.P. Mishra and R. Sengupta, Pub. by (NIESBUD), NSIC-PATC Campus, Okhla.
05. Behavioral Exercises and games – manual for trainers, learning systems, by M. V. Despande, P. Mehta and M. Nandami.
06. Product Selection by Prof. H.N. Pathak, Pub. By (NIESBUD), NSIC-PATC Campus, Okhla.
07. Entrepreneurial Development – Dr. S. Moharana and Dr. C.R.Dash, Pub. by RBSA Publishers, Jaipur.
08. Entrepreneurial Development by S.S.Khanna, Published by S.Chand & Company Ltd., Ram Nagar, New Delhi.
09. Entrepreneurial Development by C.B. Gupta and N.P.Srinivasan, Publisher Sultan Chand & Sons, 1992.
10. Entrepreneurship Development – Principles, Policies and Programmes by P. Saravanel, Publishers Ess Pee Kay Publishing House, Madras.
11. Entrepreneurship, Growth and Development, by Rashi Ali, Pub. by Chugh Publication and Strech Road, Civil Lines, Post Box No. 101, Allahabad-211991.
12. Entrepreneur and Entrepreneurship Development and Planning in India, by D.N.Mishra, pub. by Chugh Publication, Allahabad.
13. Aoudhogik Disha Nirdesh (in Hindi) Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP), 60, Jail Road, Jhangerbad, Bhopal-462008.
14. Entrepreneur, Industry and Self-employment Project, Part-1 and 2(in Hindi), Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal-462008.
15. Small Scale Industry & Self-Employment Projects, Part-1 and 2 (in Hindi), Pub. by Centre for Entrepreneurship Development, M.P. (CEDMAP),60 Jail Road, Jhangerbad Bhopal.

Magazines

01. Udyamita Samachar Patra,(Monthly, Hind), Pub. by Centre for Entrepreneurship Development, M.P.(CEDMAP), 60 Jail Road, Jhangerbad, Bhopal-462008.
02. Science Tec. Entrepreneur (A Bi Monthly Publication), centre for Enterprenurship Development, M.P. (CEDMAP), 60 Jail Road, Jhangerbad , Bhopal -462008.
03. Laghu Udyog Samachar.
04. Project Profile by DCSSI.
05. Project Profile by Pub. Centre for Enterpreurship Development, M.P. (CEDMAP), 60 Jail . Road, Jhangerbad, Bhopal-462008.

Elective – II - APPLIED SCIENCE (Physics & Chemistry) – 1st Year

(Subject Code – 90000021)

Theory	Practical
<p>Detailed Syllabus : SECTION A : PHYSICS 1.0. Measurement, Units, and Dimension 1.1 Introduction: Need for measurement, Units and documents, accuracy, precision of measuring instruments. 1.2 Types of Errors: Constant error, systematic error, environment error (errors due to external causes). Error due to imperfection, random error, gross error, percentage error. 1.3 Combination of Error: Error due to addition, subtraction, multiplication, division, powers of observed quantities. 1.4 Units and Dimensions: Fundamental and derived physical quantities, systems of units in SI systems. Rules for writing units in SI, derived units in SI. Multiples and submultiples of SI units. 1.5 Dimensions: dimensional formulae and dimensional equations, dimensional constants and dimensionless quantities, principle of homogeneity of dimensions. 1.6 Application of dimensional method of analysis: Conversion of one system of units into another, to check the correctness of an equation, to derive the relationship between different physical quantities. 1.7 Order of magnitude and significant figures 1.8 Concept of accuracy and estimation of errors</p>	<p>Detailed Syllabus Perform a simple experiment on measurement and error</p>
<p>2.0. Scalars and Vectors 2.1. Introduction to scalars and vectors 2.2. Addition and subtraction of vectors 2.3. Product of vectors</p>	
<p>3.0. Motion & Force 3.1. Definition of Motion, Uniformly accelerated motion along straight line 3.2. Position time graph and velocity-time graph 3.3. Equation of a projectile path 3.4. Time of light, Horizontal range, Maximum height of a projectile 3.5. Definition and types of forces 3.6. Introduction to gravitation, electromagnetic and nuclear forces 3.7. Law of conservation of momentum 3.8. Elastic and inelastic collisions 3.9. Momentum of force, couple and properties of couple 3.10. Centre of mass and gravity 3.11. Conditions of equilibrium of a rigid body</p>	<p>Experiment on gravitational force(example of a ball falling from a certain height)</p>

<p>4.0. Friction</p> <p>4.1. Origin and nature of frictional forces 4.2. Laws of static and kinetic frictions 4.3. Pressure due to fluid column 4.4. Pascal's law and its applications 4.5. Newton's formula 4.6. Stoke's law 4.7. Equation for terminal velocity 4.8. Bernaulli's principle and its applications</p>	<p>Proof of Stoke's theorem and Bernaulli's principle</p>
<p>5.0. Dynamics</p> <p>3.1 Introduction, Newton's Law of Motion. 3.2 Application of Newton's laws – Objects suspended by strings, blocks placed in contact with each other on frictionless horizontal surface, apparent weight in a lift. 3.3 Impulse, Law of conservation of linear momentum, Conservation of linear momentum during collision. 3.4 Work, power, energy potential Energy (PE), Kinetic Energy (KE), definition & derivation for both, relation between KE & linear momentum. 3.5 Conservation and non conservative forces, Work energy theorem, law of conservation of energy in case of freely falling body and vertically projected body.</p>	<p>Derivation for Potential energy and kinetic energy</p>
<p>6.0. Sound waves</p> <p>6.1. Waves and oscillations 6.2. Progressive waves 6.3. Characteristics of transverse waves, longitudinal waves 6.4. Sound as longitudinal wave motion 6.5. Definition of period, frequency, wavelength giving their relations. 6.6. Newton's formula for velocity of sound, laplace's correction</p>	
<p>7.0. Thermal expansion</p> <p>7.1. Expansion of solids, liquid 7.2. Linear expansion, area and volume expansion 7.3. Thermal conduction, temperature gradient and coefficient of thermal conductivity</p>	<p>Experiment on expansion of solids in a thermal envirnment</p>
<p>8.0. Refraction of light and lens</p> <p>8.1. Refraction of light: Refraction of monochromatic light, Snell's law, Total internal reflection, Critical angle, Optical fiber, Dispersion of light, Prism formula, Rainbow, Scattering of light 8.2. Wave Theory of light: Huygen's principle, Construction of plane and spherical wave front, Wave front and wave normal, Reflection at a plane surface, Polarization, Plane polarized light 8.3. Interference and Diffraction: Interference of light, Condition's for producing steady interference, Young's experiment, analytical treatment, expression for path difference and fringe width, Measurement of wavelength by bi prism experiment, Diffraction due to single slit, Rayleigh's criteria, Difference between interference and diffraction 8.4. Critical angle, Optical fiber, dispersion of light, Prism formula, angular dispersion and dispersive power 8.5. Refraction at single curved surface 8.6. Lens maker's equation 8.7. Concept of conjugate foci 8.8. Magnifying power of simple microscope, compound microscope and telescope 8.9. Lens defects</p>	<p>Experiment on Refraction of light using a prism</p>
<p>9.0. Modern Physics <u>Part A – Electrons and Photons</u> 9.1. Discovery of electron 9.2. Charge and mass of electron 9.3. Photo electric current</p>	

<p>9.4. Einstein's equation 9.5. Photoelectric cell and its applications <u>Part B – Atoms, Molecules and Nuclei</u> 9.6. Bohr's model 9.7. Hydrogen spectrum 9.8. Laser as a light source 9.9. Wavelength of an electron 9.10. Davisson and Germer experiment 9.11. Elementary idea of electron microscope</p>	
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<p>SECTION B – CHEMISTRY 1.0. Basics of Chemistry 1.1. Importance of Chemistry 1.2. Fundamental and derived units and their SI units 1.3. Gay-Lussac's law, Avogadro's law 1.4. Derivation of molecular weight, gram molecular volume 1.5. Stoichiometry Mole concept 1.6. Equivalent weight, Atomic weight, Molecular weight 1.7. Percentage composition and molecular formula 1.8. Numerical based on weight-volume relationship</p>	<p>Solve Problems based on weight – volume relationship</p>
<p>2.0. Atomic Structure 2.1 Characteristics of electron, proton and neutron. 2.2 Rutherford model of an atom. 2.3 Nature of electromagnetic radiation, 2.4 Planck's quantum theory. 2.5 Explanation of photo electric effect. 2.6 Features of atomic spectra. 2.7 Characteristics of hydrogen spectrum. 2.8 Bohr's theory of the structure of the atom. 2.9 Bohr's explanation of spectral lines. 2.10 Failure of Bohr's theory. 2.11 Wave-particle nature of electron. 2.12 de Broglie's hypothesis, Heisenberg's uncertainty principle. 2.13 Important features of the quantum mechanical model of an atom. 2.14 Quantum numbers, concept of orbitals, define an atomic orbital in terms of quantum numbers – shapes of s, p and d orbitals, state Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. 2.15 Electronic configurations of atoms. Explanation of stability of half filled and completely filled orbitals.</p>	<p>Study of Planck's quantum theory and Bohr's theory</p>

<p>3.0 Classification Of Element And Periodicity In Properties</p> <p>3.1 The concept of grouping elements In accordance to their properties.</p> <p>3.2 The periodic law.</p> <p>3.3 The significance of atomic number and electronic configuration as the basis for periodic classification.</p> <p>3.4 Classify elements into s, p, d, f blocks and discuss their main characteristics.</p> <p>3.5 Periodic trends in physical and chemical properties of elements.</p> <p>3.6 Periodic trends of elements with respect to atomic radii, ionic radii, inert gas radii, ionization energy, electron gain energy, electro negativity and valence.</p> <p>3.7 Variation of atomic radii in inner transition elements.</p>	<p>Study of Structure of periodic table</p>
<p>4.0. Redox Reaction</p> <p>4.1. Introduction to Oxidation & Reduction</p> <p>4.2. Electron transfer concept</p> <p>4.3. Oxidising & Reducing agents</p> <p>4.4. Redox reactions in aqueous solutions</p> <p>4.5. Oxidation number and rules for assigning oxidation number</p> <p>4.6. Balancing of chemical equations</p>	
<p>5.0. Chemical Equilibrium</p> <p>5.1. Introduction: Reversible and irreversible reactions</p> <p>5.2. Rate of reaction and factors affecting it</p> <p>5.3. Chemical Equilibrium</p> <p>5.4. Laws of Mass action, Equilibrium constant, relationship between K_p and K_c</p>	<p>Numerical problems based on K_p and K_c</p>
<p>6.0. Adsorption:</p> <p>6.1. Concept of adsorption</p> <p>6.2. Difference between absorption and adsorption</p> <p>6.3. Physical and chemical adsorption</p> <p>6.4. Factors affecting adsorption</p> <p>6.5. Applications of adsorption</p>	<p>Experiment on absorption(example of a sponge) to give the difference between absorption and adsorption</p>
<p>7.0 Chemical Bonding and Molecular Structure</p> <p>7.1 Kossel-Lewis approach to chemical bonding.</p> <p>7.2 Factors favorable for the formation of ionic bond, energy changes in ionic bond formation.</p> <p>7.3 Crystal lattice energy – calculation of lattice energy – Bom-Haber cycle.</p> <p>7.4 Crystal structures of sodium chloride and Caesium chloride.</p> <p>7.5 Properties of ionic compounds.</p> <p>7.6 Covalent bond – VSEPR theory and predict the geometry of simple molecules.</p> <p>7.7 The valance bond approach for the formation of covalent bonds.</p> <p>7.8 Directional properties of covalent bond.</p> <p>7.9 Properties of covalent bond.</p> <p>7.10 Different types of hybridization involving s, p and d orbitals and draw shapes of simple covalent molecules.</p> <p>7.11 Definition of coordinate covalent bond with examples.</p> <p>7.12 Description of molecular orbital theory of homonuclear diatomic molecules.</p> <p>7.13 Bonding, antibonding molecular orbitals, o, n bond orbitals, their symmetry.</p> <p>7.14 Energy diagrams of molecular orbitals of H₂, N₂ and O₂.</p> <p>7.15 Concept of hydrogen bond – Types of hydrogen bonds,</p>	

inter and intra molecular hydrogen bonds. 7.16 Effect of hydrogen bonds on some properties of substances with examples. 7.17 Different states of matter in terms of balance between intermolecular forces, thermal energy of particles.	
8.0. S-block, P-block, d-block & F-block elements 8.1. Introduction to S & P blocks 8.2. Position in periodic table, general electronic configuration 8.3. Comparison between alkali and alkaline earth metals 8.4. Sodium occurrence, uses of sodium 8.5. Methods of extraction 8.6. Physical and chemical properties 8.7. Difficulties in isolation of fluorine 8.8. Methods of preparation 8.9. Uses of fluorine	

Elective – II - APPLIED SCIENCE (Physics & Chemistry) – 2nd Year

(Subject Code – 90000021)

Theory	Practical
Detailed Syllabus : SECTION A - PHYSICS 1.0. Electrostatics 1.1 Gauss's theorem, proof and application 1.2 Mechanical force on unit area of a charged capacitor 1.3 Energy density of a medium 1.4 Concept of a condenser 1.5 Capacity of parallel plate condenser 1.6 Effect of dielectric on capacity 1.7 Energy of a charged condenser 1.8 Condensers in series and parallel	Detailed Syllabus 1) Proof of Gauss's theorem 2) Solve numericals on series and parallel plate capacitors
2.0. Current, Electricity and Magnetic effects of electric current <u>Part A – Current Electricity</u> 2.1. Ohm's Law 2.2. Ohmic and non-ohmic resistances , specific resistance, conductance, 2.3. Temperature dependence of resistivity 2.4. Thermistor 2.5. emf of a cell - internal resistance and back e.m.f's 2.6. Kirchoff's laws: statement and explanation, application to wheatstone's bridge for its balance conditions , metre bridge, principle of potentiometer 2.7. Comparison of e.m.f. of cell, determination of internal resistance of a primary cell, Series and parallel combination of cells.	1) Solve numericals on Ohm's law 2) Experiment on wheatstone's bridge
<u>Part B – Magnetic effects of electric current</u> 2.8. Biot Savart's law 2.9. Right hand Thumb rule 2.10. Magnetic induction at the center and at the point along the axis of circular coil carrying current 2.11. Flemming's left hand rule 2.12. Definition of Ampere	

2.13. Ampere's law and its applications 2.14. Moving coil galvanometer 2.15. Ammeter 2.16. Voltmeter	
3.0. Magnetism 3.1. Coulomb's inverse square law 3.2. Couple acting on a bar magnet placed in a uniform magnetic field 3.3. Magnetic moment of a magnet 3.4. Expression for Magnetic induction due to a bar magnet on axial and Equatorial lines 3.5. Superposition of magnetic fields 3.6. Tangent law 3.7. Deflection Magnetometer 3.8. Comparison of magnetic moments in Tan-A and Tan-B positions by Equal distance method and null method	
4.0. Electromagnetic waves 4.1. Electromagnetic waves and their characteristics 4.2. Transverse nature of electromagnetic waves 4.3. Electromagnetic spectrum 4.4. Propagation of electromagnetic waves in atmosphere	
5.0. Electromagnetic Induction 5.1. Laws of electromagnetic induction 5.2. Eddy currents 5.3. Self and mutual induction 5.4. Transformer 5.5. Coil rotating in uniform magnetic field 5.6. Alternating currents 5.7. Reactance and impedance 5.8. Power in a a.c. circuit with resistance, inductance and capacitance 5.9. Resonant circuit	Solve numericals on power in a.c circuit, transformers and resonating circuits
6.0. Semiconductors 6.1. Energy bands in solids 6.2. Intrinsic and extrinsic semiconductors 6.3. p – type and n – type semiconductors 6.4. P – N junction diode 6.5. LED 6.6. Rectifiers 6.7. Zener diode as a voltage regulator 6.8. Solar cell 6.9. Transistor as an amplifier 6.10. Oscillators 6.11. Logic gates	

<p>7.0 Communication 7.1. Space communication 7.2. Ground, sky and space wave propagation 7.3. Satellite communication 7.4. Line communication 7.5. Two wire lines 7.6. Cables 7.7. Optical communication</p>	<p>Study of various types of cables and wires</p>
<p>SECTION B - CHEMISTRY 6.0. Electrochemistry 6.1 Electrolytes and Non-electrolytes. 6.2 Faraday's laws of electrolysis. 6.3 Galvanic & Voltaic cells representation 6.4 Nernst equation (No derivation) , e.m.f. calculations.</p>	<p>Experiment on faraday's law of electrosttics</p>
<p>7.0 Nuclear Chemistry 7.1 Composition of Nucleus - Isotopes, Isotones, Isobars, Nuclear stability - Factors effecting Nuclear stability, mass defect, binding energy, Average binding energy, N/P ratio, Magic Numbers). 7.2 Radio-active disintegration and its rate-Half-life and average life. 7.3 Natural and artificial radio-activity, disintegration series-Group displacement law-Types of Nuclear reactions (fission and fusion)-Differences between Nuclear and Chemical reactions- Radio-active isotopes and their applications Idoine 131 , Cobalt 60 , Sodium 24 , C 14 and P 30.</p>	<p>Solve numericals on binding energy and half life rate</p>
<p>8.0 Surface Chemistry 8.1 Adsorption and absorption. Physical and chemical adsorption-distinguishing properties- Adsorption of gases on Metals Adsorption from solutions (Elementary treatment). 8.2 Colloidal state:- True and colloidal solutions – Explanation of the terms - Dispersion medium, dispersed phase, Iyo-phillic and Iyo-phobic sols using the examples; smoke, cloud, blood, milk, starch solution and gold sol. 8.3 Emulsions:- Emulsifying agent and emulsification - its applications. Cleansing action of soap. 8.4 Catalysis - Explanation of the terms – Homogeneous and Heterogeneous catalysis – distinctions with suitable Examples-auto catalysis with one example</p>	
<p>9.0. Acids and Bases 9.1 Theories of Acids and Bases Lowry - Bronsted concept Lewis theory of acids and bases. 9.2 Ionic product of water, PH, Buffers - Numerical problems on these, Indicators - Choice of indicators, PH-range and uses. 9.3 Salt hydrolysis - Types of hydrolysis with examples.</p>	<p>Solve numericals on pH value.</p>

<p>10.0 Alkanes, Alkenes, Alkynes and Aromatic compounds</p> <p>10.1. Introduction and importance of organic chemistry</p> <p>10.2. General characteristics of organic compounds Classification of organic compounds</p>	
<p>11. Ethers</p> <p>11.1 Introduction:- Definition</p> <p>11.2 Classification:-</p> <p>11.3 Nomenclature and metamerism</p> <p>11.4 Preparation, Reactions & Uses</p>	<p>Study of Simple and mixed ethers with examples.</p>
<p>12. Aldehydes and Ketones</p> <p>12.1 Introduction</p> <p>12.2 Carbonyl Compounds & classification</p> <p>12.3 Nomenclature of aldehydes and ketones</p> <p>12.4 Preparation & reaction of Aldehydes and ketones</p>	
<p>13.0 Acids & Esters</p> <p>13.1. Introduction, Nomenclature, preparation, Reaction and uses of Acids & Esters</p>	<p>Study of various types of acids</p>
<p>14.0. Amines</p> <p>14.1. Introduction, Classification and Nomenclature</p> <p>14.2. Preparation of primary amines</p> <p>14.3. Reaction of amines</p>	
<p>15.0. Biomolecules & Synthetic Fibres</p> <p>15.1. Introduction</p> <p>15.2. Carbohydrates and Proteins</p> <p>15.3. Fats & Oils</p> <p>15.4. Classification of Fibres</p> <p>15.5. Preparation of fibres</p> <p>15.6. Physical properties and uses of fibres</p>	<p>Study of fibres</p>
<p>16.0. Chemistry in application</p> <p>16.1. Application of Chemicals in Medicine & healthcare</p> <p>16.2. Application of chemicals in Food preservatives</p> <p>16.3. Application of chemicals in Agricultural products</p>	

**Elective –II - Computer Applications– 1st year
(Subject Code – 9000022)**

Theory	Practical
<p>Detailed Syllabus : 1.0. Introduction 1.1. Basic Computer and its structural theory 1.2. Input devices 1.3. Output devices 1.4. Storage devices 1.5. Computer types and their applications 1.6. Computer Software/Hardware</p>	<p>Detailed Syllabus 1.0. Computer basics 1.1. Identification of Keyboard, Printer, Monitor Scanner, Webcam, Microphone, Speaker 1.2. Sample collection of various type of storage devices, specifications and charts</p>
<p>2.0. Operating systems 2.1. Various types of Operating systems 2.2. Comparison between the different types of OS 2.3. Network Operating systems and their features 2.4. Microsoft Disk Operating System, its nature and history. 2.5. Unix, features, merits and demerits in using Unix as OS. 2.6. Microsoft Windows, development & growth of MS Windows, features, merits and demerits of MS Windows. 2.7. MS Windows NT, features, merits & demerits 2.8. System requirements for various Operating Systems 2.9. Windows default icons and their applications</p>	<p>2.0. Practice 2.1. Practice of MS DOS commands 2.2. Installation of MS Windows 2.3. Practice on Add/Remove programs 2.4. Practice on My computer, Display properties, My documents, My Network places</p>
<p>3.0. Microsoft Word 3.1. Introduction to MS Office 3.2. MS Word applications 3.3. Creation of Document and file operations 3.4. Formatting features of document 3.5. Modification/ editing documents 3.6. Inserting images, files, tables, symbols and various attributes 3.7. Creating and formatting of tables 3.8. Mail merge 3.9. Page layout and design features 3.10. Spell & grammar check in documents 3.10. Print preview & printing of documents 3.11. Converting documents to PDF files.</p>	<p>3.0. Documentation 3.1. Create and save a document 3.2. Format the text with different font size, font styles 3.3. Setting up different page sizes, orientation. 3.4. Making various type of documents like Bio Data, letters, project reports 3.5. Printing of documents</p>
<p>4.0. Microsoft Excel 4.1. Introduction to Excel and its applications 4.2. Features of MS Excel 4.3. Outline of Worksheet & Workbook 4.4. Data types 4.5. Study of various menus of MS Excel 4.6. Creation of worksheet, editing worksheets, save, copy & deleting worksheets. 4.7. Functions of MS Excel 4.8. Formulas of MS Excel. 4.9. Types of charts, creation of data Charts, editing and insertion of charts. 4.10. Sort facility 4.11. Interconnecting Charts 4.12. Page setup, printing worksheets, charts... etc. 4.13. Converting Worksheets to PDF files.</p>	<p>4.0. Practice of Worksheets 4.1. Create and save worksheets 4.2. Editing the worksheets 4.3. Formatting worksheets 4.4. Insert charts 4.5. Making worksheets using formulas & functions 4.6. Making worksheets & printing with different formatting effects 4.7. Making worksheets with images, numbers and print them</p>

Theory	Practical
5.0. MS Power point 5.1. General Introduction 5.2. Features & Applications of MS Power point 5.3. Creating Presentations 5.4. Study of different layouts and making presentations using different layouts 5.5. Using different animation effects. 5.6. Add Audio/Voice and visual effects to slides. 5.5. Filtration 5.6. Converting presentations to PDF files. 5.7. Inserting images, symbols to slides	5.0. Power Point practice 5.1. Create Slides of different types 5.2. Running presentations 5.3. Add slide transition effects and run slide show 5.4. Make presentations with audio/visual effects. 5.5. Printing PPT files 5.6. Making PDF format of PPT files
6.0. Networking & Internet Utilities 6.1. General Introduction of Computer Networking 6.2. Requirements/ Applications of Computer Networking 6.3. Layouts of Different Networks 6.4. Study of various Networking components 6.5. Limitations and merits of different topologies 6.6. Study of Server/client concept 6.7. Internet & its applications 6.8. Email and Chatting 6.9. E-trading concepts 6.10. Downloading files (Text and media files)	6.0. Networking practice 6.1. Identifying different network components 6.2. Collecting samples, charts, images of different networking components. 6.3. Installation of Network Interface card 6.4. Getting connected to Internet and accessing the internet 6.5. Creating personalized Email account 6.6. Chatting (Text and Voice chat) 6.7. Searching/surfing for the information in different sites. 6.8. Downloading
7.0. Project work 7.1. Understand the concept of making projects and preparing the project reports. 7.2. Preparation of a project using the software skills learned during the course.	7.0. Project Work 7.1. Making a working model/project using MS Excel/Power Point 7.2. Project Report

Elective –II - Computer Applications– 2nd year
(Subject Code – 9000022)

Theory	Practical
Detailed Syllabus : 1.0. Introduction MS Access 1.1. Objects of learning MS Access 1.2. Applications of MS Access 1.3. Database and Database Management System 1.4. Elements of Database Management System 1.5. Types of Data Bases & the merits & demerits	1.0. Study of overview of MS Access 1.1. Accessing MS Access and its menus to get familiar with it
2.0. Controlling Data Entry 2.1. Restrict Data Entry using field properties 2.2. Establish a pattern for entering field values 2.3. Create a list of values for a field	2.0. Creating Data Tables, Designing Fields and setting field properties
3.0. Joining Tables and creating Queries 3.1. Create Query joins 3.2. Join unrelated tables 3.3. Relate data within a table 3.4. Set Select Query properties 3.5. Create Parameter Queries 3.6. Create Action Queries	3.0. Creating Queries

<p>4.0. Forms & Reports</p> <p>4.1. Design a Form Layout 4.2. Enhance the appearance of a Form 4.3. Restrict Data entry in forms 4.4. Adding a command button to a Form 4.5. Create a Subform 4.6. Organize report information 4.7. Format the report 4.8. Set Report Control properties 4.9. Control Report pagination 4.10. Summarize Report information 4.11. Add a sub report to an existing report 4.12. Create a mailing label report</p>	<p>4.0. Practicing Forms and Reports</p> <p>4.1. Creating different forms using different layouts 4.2. Data entry in to the forms 4.3. Creating different Reports using different layouts 4.4. Data formatting in to reports</p>
<p>5.0. Sharing data across applications</p> <p>5.1. Import data in to Access 5.2. Export data from Access 5.3. Analyze Access data in Excel 5.4. Export Access data to a Text file 5.5. Merge Access data with a Word document</p>	<p>5.0. Practice:</p> <p>5.1. Import Excel sheets in to Access 5.2. Import Tables in to Access 5.3. Export Access tables in to Excel format 5.4. Export Access data to a Text file 5.5. Merging data</p>
<p>6.0. Study of Application packages</p> <p>6.1. Introduction to application oriented software packages 6.2. Study of Railway reservation Package 6.3. Study of different modules and menus available in online Railway Reservation Package 6.4. Study of Banking packages 6.5. Study of Library Management packages 6.6. Study of Inventory control packages 6.7. Study of School Management Packages</p>	<p>6.0. Practice</p> <p>6.1. Collection of different trial packages 6.2. Visiting Organizations to collect different formats and procedures used in the system 6.3. Creating forms and Reports for the different packages using appropriate data bases</p>
<p>7.0. Project work</p> <p>7.1. Understand the concept of making projects and preparing the project reports. 7.2. Visiting different organizations to have an idea of different packages 7.3. Preparation of a project using the software skills learned during the course.</p>	<p>7.0. Project Work</p> <p>7.1. Making a working model/project using MS Access 7.2. Project Report</p>

Elective – II - Business Mathematics – 1st year

(Subject Code – 9000023)

Theory	Practical
Detailed Syllabus: 1.0. Logarithms 1.1. Introduction to logarithms 1.2. Laws of logarithm, characteristics and mantissa	Practice: 1. At least 5 to 10 exercises per chapter 2. One home/class assignment per chapter
2.0. Sets, Relations and functions 2.1. Study of Relation, Function 2.2. Types of functions 2.3. Domain, Co – domain, Range of a function 2.4. Composite and Inverse functions 2.5. Graphs of functions	
3.0. Complex Numbers 3.1. Definition of complex numbers 3.2. Line	
4.0 Quadratic Equations 4.1 Nature of roots of Quadratic Equation 4.2 Sum and Product of roots of quadratic equations 4.3 Formation of Quadratic Equations 4.4 Symmetric functions of roots 4.5 Cubs roots unity	
5.0. Determinants 5.1 Determinant of order three 5.2 Applications of Determinants	
6.0. Trigonometric ratios 1.1. Angles & its measurements 1.2. Trigonometric ratios 1.3. Relation between degree and radian. 1.4. Fundamental identities. 1.5. Examples based on Fundamental Identities 1.6. Trigonometric ratios of sum and difference of two angles 1.7. Factorization formulae 1.8. Inverse trigonometric functions 1.9. Properties of a Triangle	
7.0. Plane Co-ordinate Geometry 7.1. Locus 7.2. Line	
8.0 Partition values and measure of dispersion 8.1 Partition values 8.2 Measures of Dispersion	
9.0. Moments Skewness Kurtosis 9.1 Moments 9.2. Skewness 9.3 Kurtosis	
10.0. Bivariate frequency distribution and correlation 10.1. Bivariate frequency distribution 10.2 Bivariate Correlation 10.3 Rank correlation	
11.0. Permutations and Combinations 11.1 Factorial notation 11.2 Principle of counting 11.3 Permutations 11.4 Combinations	

12.0. Probability 12.1 Types of Event 12.2 Addition Theorem 12.3 Conditional Probability	
13.0. Random Variable and Probability Distribution 13.1 Definition and Types of Random variable 13.2 Probability Distribution of random variable 13.4. Risk and uncertainty	
14.0. Commercial Arithmetic 14.1 Commission Brokerage 14.2 Discount 14.3 Insurance	

Elective – II - Business Mathematics – 2nd year

(Subject Code – 90000023)

Theory	Practical
1. Mathematical Logic 1.1 Statements and logical connectives 1.2 Statement pattern and logical equivalence 1.3 Venn Diagram	
2. Matrices 2.1 Definition and Types matrices 2.2 Algebra Matrices 2.3 Inverse of a Matrix 2.4 Solution of Equations	
3. Limit and Continuity 3.1 Definition 3.2 Algebra of limits 3.3 Application of Standard limits 3.4 Continuity of a function at a point	
4. Differentiation 4.1 definition of Derivative 4.2 Derivative from first principles 4.3 Rules of Differentiation 4.4 Derivative of composite functions 4.5 Derivative of Inverse functions 4.6 Logarithmic Differentiate 4.7 Derivates of Implicit functions 4.8 Derivatives of Parametric functions. 4.9 Second order derivatives	
5. Application of Derivatives 5.1 Increasing and Decreasing functions 5.2 maxima and Minima 5.3 Approximation and Error	
6. Integration 6.1 Definition of an integral 6.2 Integral of standard functions 6.3 Rules of Integration 6.4 Methods of Integrations Integration by parts 6.5 Definite Integrals	
7. Differential Equations 7.1 Definition 7.2 Formation of Differential Equations 7.3 Solution of first order and first degree differential equations 7.4 Applications of Differential equations	

<p>1.Theory of Attributes 1.1 Introduction Notation and class frequencies 1.2 Consistency of data 1.3 independence of Attributes 1.4 Association of Attributes</p>	
<p>8. Regression Analysis 8.1 Introduction 8.2. Data and information 8.3. Tabulation of data 8.4. Graphs and diagrams, scatter diagrams, histograms, bar charts...etc 8.5 Equation of lines of regression 8.6 Regression coefficient and its properties</p>	
<p>9. Numerical Methods 9.1 Finite differences 9.2 Interpolation with equal intervals 9.3 Interpolation with unequal intervals 9.4 Numerical integration</p>	
<p>10. Discrete Probability Distribution 10.1 Binomial Theorem 10.2 Binomial Distribution 10.3 Poisson Distribution</p>	
<p>11. Management Mathematics 11.1 linear programming problem 11.2 Assignment problem 11.3 Sequencing</p>	
<p>12. Demography 12.1 Introduction, definition, Uses of vital statistics 12.2 Measurements of Mortality 12.3 Life tables</p>	
<p>13. Index Number 13.1 Introduction 13.2 Definition and Notations of index numbers 13.3 Types of index number 13.4 Construction of index number 13.5 cost of living index number 13.6 Uses of cost of living index number</p>	
<p>14.0. Spread sheets 14.1. Introduction to spread sheets 14.2. Features and functions of spread sheet softwares 14.3. Use and limitations of spread sheet softwares in business 14.4. Apply spread sheet software to the manual work of chartered management accountant.</p>	<p>Practice: 1. Using spread sheet package 2. Entering data in to Spread sheet 3. Making graphs the selected data using Spread sheet packages 4. Using functions and formulas 5. Making accounts using Spread sheet packages</p>

Subject Name - **Mechanical Technology and Material Science**

Subject Code - 30340001

Theory – 1 st year	Practical – 1 st year
<p>1] Fundamental of material</p> <p>Introduction of metals and non metals</p> <p>Structure of metal</p> <p>Formation of grain</p> <p>Imperfection in crystals</p> <p>Deformation in metal and change in properties</p> <p>Fracture</p> <p>Equilibrium diagram</p> <p>Iron, carbon equilibrium diagram</p> <p>Time temperature transformation diagrams</p>	<p>1. Take the tensile test of M.S. specimen & Draw stress strain diagram, yield pts.</p>
<p>2 Ferrous metals and alloys</p> <p>Pig iron and cast iron</p> <p>Effect of chemical elements on iron</p> <p>Classification of steel and its application</p> <p>Alloy steel and special alloy steel</p> <p>3 Non Ferrous metals and alloys</p> <p>Introduction to non ferrous alloys</p> <p>Aluminum and its alloys</p> <p>Copper and its alloys</p> <p>Lead and its alloys</p> <p>Nickel and its alloys</p> <p>Alloys for high temperature service</p>	<p>2. Study the mechanical properties like Elasticity, ductility, malleability, Brittleness, toughness of Different materials – M.S., C.S. Bronze, Copper, Aluminum</p> <p>Study the Hardness test</p> <p>Brinell Hardness test</p> <p>Rockwell hardness test</p>

Metal for nuclear energy

4 Crystal Structures

Fundamental concept

Unit Cells

Metallic crystal structures

FCC Structure

BCC Structure

HCP Structure

Weld ability

5 Properties of Metal

Mechanical properties of Metal

Elasticity, ductility, malleability, brittleness, Toughness, Stress strain behavior, Elastic limit, hooks Law, UTS, poissons ratio, factor of safety, hardness and hardness tests shear strength, resistance.

Electrical properties of Metal

Electrical conductivity, resistivity, electrical Characteristic of commercial alloys

Theory – 1 st year	Practical – 1 st year
<p>Thermal properties of metal</p> <p>Heat capacity, thermal expansion, thermal Conductivity, thermal stress</p> <p>6 Magnetic Properties of metal</p> <p>Basic concepts, diamagnetism and Para magnetism, ferromagnetism, influence of temperature on magnetic behavior, domain and hysteresis, soft and hard magnetic material.</p> <p>7 Heat Treatment of material</p> <p>Normalizing</p> <p>Hardening</p> <p>Quenching and tempering</p> <p>Annealing</p> <p>Stress Relieving</p> <p>Case carburizing and case hardening.</p> <p>Toughening</p> <p>Weld ability of Metal definition and concept Effect of alloying elements on weld ability Purpose and types of weld ability tests</p>	<p>3. Study the Electrical Properties of some conductors (conductivity, Resistivity) Aluminum, Copper, Brass, Tungsten</p>
<p>8 Cracking phenomena in steel</p> <p>Cold crack due to hydrogen</p> <p>Hydrogen cracking</p> <p>Measurement and control of hydrogen in the deposited weld metal</p> <p>Cracking mechanism in the weld metal and HAZ</p> <p>Weld decay</p> <p>Lamellar tearing</p> <p>Hot cracking</p> <p>Reheat cracking</p>	<p>4. Study the effect on materials with heat treatment Normalizing, Hardening, Quenching & Tempering Anne ling, Stress Reliving, Case Hardening, Toughing For Different Material's M.S., C.S., Nickel, Capper</p>

Theory – 2 nd year	Practical – 2 nd year
<p>1 Bench work and fitting</p> <p>Introduction- Vices – Hammers- Chisels-</p> <p>Chipping- Files- Filing- Scraper-Scraping- Grinding and Polishing- Hacksaw sawing- Marking tools – Surface plate- Scriber – Punch- V block- Angle plate- Try square – Marking out –</p> <p>Drill- Drilling- Reamer- Reaming- Taps- Tap drill size-Tapping – Dies and stock- Dieing.</p> <p>2 Sheet Metal Work</p> <p>Introduction – Metal used in sheet metal work-</p> <p>Sheet metal hand tools- Sheet metal operation-Sheet metal joint- Hems and Sems – Sheet metal allowance- Sheet Metal working</p> <p>machine-Laying out a pattern</p> <p>3 Plumbing, Threading, Fasteners & joints</p> <p>Plumbing- Specifications of pipes- Material used</p> <p>for pipes-Pipe fitting & Joints-Taps & valves – Plumber tools – Threaded fasteners- screw threads and their uses- Indian standard</p> <p>threads-Cap screw and machine screw-Set screw- Methods of producing screw threads- Bolts- Studs- Forms of nuts- Riveting joints.</p> <p>4 Smithy and Forging</p> <p>Maintenance and application of smith health- Anvil- Swage block-Tongs-Hammer-Flatters- Measuring tools e.g.-Try square- Steel rules-Calipers-Operations e.g. up setting- drawing down- bending setting- forge welding.</p> <p>5 Welding Technology</p> <p>Welding Welding introduction to different</p>	<p>Fitting</p> <p>1. Filing Flat surfaces:</p> <p>Checking flatness and square ness using a try square –</p> <p>Types of filing – Cleaning files.</p> <p>2. Chipping: Hints on chipping</p> <p>3. Hack sawing: Selection of blades for different metal sections - Fix hack</p> <p>sawing the material for the job blades maintaining. Correct tension and</p> <p>direction – Hack sawing. Filing ‘V groove and complex profile by file &</p> <p>check with profile gauge.</p> <p>4. Filing radius –check with radius gauge</p> <p>5. Check profile with profile gauges.</p> <p>6. Drill plate, Drilling, counter sinking, counter boring. Operations on job</p> <p>7. Drilling and Tapping: Internal threading of holes by using hand taps –</p> <p>determine the tap drill size, drilling, counter-sinking and tapping –</p> <p>precautions with tapping a blind hole.</p> <p>8. External thread cutting using die.</p>

<p>welding processes, like gas Welding, ARC welding TIG, MIG, submerged arc welding, spot Welding, electrodes etc. Brazing methods & application, Knowledge of welding skills.</p> <p>6 Metal Turning (Lathe)</p> <p>6.1 Function of lathe, Types of lathe, the size of lathe, Descriptions & function of lathe parts,</p> <p>6.2 Lathe accessories and attachments.</p> <p>6.3 Operation on Lathe</p> <p>6.4 Cutting Tools, Classification , Influence of tool angles.</p> <p>6.5 Types of tools, cutting speed, Feed, Depth of cut,</p> <p>6.6 Machining time. Cutting tool signature.</p>	
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Theory – 2 nd year	Practical – 2 nd year
<p>7 DRILLING</p> <p>Introduction Types of drilling machine, Portable drilling machine, Sensitive drilling machine. Upright drilling machine, Radial Drilling Machine; Gang drilling machine, Multiple spindle drilling machine Automatic drilling machine, Deep hole drilling machine; The size of a drilling machine, Upright drilling machine parts. Radial drilling machine parts, Work holding devices, Tool holding devices, Drilling machine operation, Drilling machine tools.</p> <p>Twist drill nomenclature. Drill size Designation of drill material Reamer, reamer nomenclatures. Counter bore, Countersinks and spot face, Taps. Tap nomenclatures. Cutting speed Feed, Depth of cut, Machining time in drilling</p>	<p>Basic Workshop Practice</p> <ol style="list-style-type: none"> 1. Step turning and Radius forming: Free hand form turning – by using form tool. 2. Drilling and Boring-Use of inside caliper and outside Micrometer for bore measurement. 3. Drilling and reaming: by hand-Method of checking the bore With a plug gauge. 4. Drilling and step Boring: Boring blind hole with a boring tool.
<p>8 SHAPER</p> <p>Introduction. Types of shapers. Principal parts. Shaper size; Shaper mechanism; Work holding devices. Shaper operations. Shaper tools; Cutting speed, feed and depth of cut; Machining time.</p> <p>9 SLOTTING</p> <p>Introduction. Types of slotting machine; Slotter size; Slotting machine parts; Work holding devices; Slotter operation; Slotter tools; Cutting speed, feed and depth of cut.</p>	<ol style="list-style-type: none"> 5. Drilling, Boring and Recessing: Internal recessing to a size broader than the width tool – Form a recess. 6. Shaping blind & open keyways on shaping machine 7. Shaping irregular surfaces.(Concave / Convex)
<p>Powder Metallurgy</p> <p>Introduction- Process Description- Manufacture of metal powder- Blending of powders- competing profiteering- Sintering- Secondary operation –ISO Static pressing – Product of powder metallurgy-Advantages of process – Disadvantages and limitation-Design</p>	<ol style="list-style-type: none"> 8. Slotting internal grooves on slotting machine 9. Welding Practical-fusion run with/without filler rod on MS Sheet – squire butt joint on MS sheet LAP, T& Edge joint on M.S. Sheet

considerations Introduction to CNC	
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List of Books

- 1 M. N. Uppal A Text - book of ngineering Chemistry
- 2 V. P. Mehta A Text - book of polytechnic Chemistry
- 3 Banswal, Mahajan and Mehta A Text - book of,Applied Chemistry
- 4 Hazra Choudhary Elements,of workshop technology
- 5 S.K.Hajra Choudhary Elements of workshop technology Vol-I First 1964 Media promoters & Publisher pvt. Ltd.
- 6 Mahajan Mechanical Technology Third 1989 Vrinda publication

Sr. No. Name of the equipment/ machinery NOS.

1	TRAINEES TOOL KIT	5
2	Try Square 10 cm Blade	5
3	Calipers outside 15 cm spring	5
4	Caliper inside 15 cm spring	5
5	Dividers 15 cm Spring	5
6	Calipers 15 cm Hermaphrodite	5
7	Scriber 15 cm	5
8	Punch center 10 cm	5
9	Screw driver 15 cm	5
10	Chisel cold 20 cm	5
11	Trammel 30 cm	5
12	Hammer ball peen 0.5 kg with handle	5
13	Hammer Mallet	5
14	Hammer Plastic	5
15	Hammer ball peen 0.5 kg with handle	5
16	File flat 25 cm second cut	5
17	File flat 25 cm second cut	5
18	Hacksaw frame adjustable 20-30 cm	5
19	Dot slot punch	5

20	Steel rule 15 cm English and metric	5
21	Steel rule 30 cm English and metric	5
22	Try square 20 cm Blade	5
23	Steel tool box	5
24	Scriber	5
25	Lock and keys	5
26	Combination plier	5
27	Jenny calipers	5
28	Aluminum tray 15 cm X 10 cm	5
29	Fellow polish cloth standard size	5

	SHOP OUTFIT & MEASURING INSTRUMENTS	
30	Straight edge 45 cm X 45 cm	1
31	Marking table 90X90 cm	1
32	Surface plate 45 cm X 45 cm	1
33	Vee Block pair 7 cm and 15 cm with clamps	1
34	Angle plate 10 X 20cm	1
35	Number Punch 3 mm set	2
36	letter Punch 3 mm set	2
37	Round punch 3 mm X 4 mm set of 2	2
38	File flat 20 cm bastard	2
39	Oil Stone 15 X 5 cm X 2.5 cm	
40	Spanner adjustable 10 cm	1
41	Chisel cold 20 cm cross cut	2
42	Chisel 10 cm flat	2
43	Drill twist 1.5 mm to 15mm (various sizes) by 0.5	2
44	Files assorted sizes and type including safe edge	10
45	Micrometer inside 50-150 mm with screen	2
46	Bench Vice 12 cm jaw	5
47	Work Bench 240 X 120 60 mm with screen	3
48	Drill point angle gauge	1
49	Vernier Calipers 20 cm	2
50	Vernier height gauge 30 cm	1
51	Huntington and diamond dresser	1
52	Taps and dies complete set (metric)	2 set
53	Hacksaw frame	5
54	Fire buckets with stand	1
55	Thread pitch gauge metric, BSX, BSF, MC, MF & SAE	1 each
56	D.E. spanner ser of 12 metric 6 mm to 32 mm	1 set
57	Ring spanner set at 12 metric 6 mm to 32	1 set

58	Stud extractor set of 3	1 set
59	Universal puller for removing pulleys, bearings	1 set
60	Unserviceable engine/gear box rear axle	1
61	Stud remover with socket handle	1
62	Combination pliers 15 cm	5
63	Depth guage (inch and metric	1
64	Screw pinch gauge (inch and metric)	1 set
65	Feeler gauge 20 blades (inch and metric)	1
66	Aluminum tray 45 X 30 mm	5
67	Oil can 0.5 liter capacity	1
68	Surface gauge	1
69	Cylinder bore gauge (mercer)	1
70	Telescopic gauge	1
71	Steel measuring tape 10 meter in a case	2
72	Sets of Morse socket MT 0-1,1-2,and 2-3	1 set
73	Blow lamp	1
74	Torque wrenches 5-35 Nm,12-68 Nm&50-225 Nm.	1 each
75	Outside micrometer English 0-1,1-2,2-3,3-4,4-5,And 5-6 inches	1 each

76	Micrometer outside 1 to 25 mm,25mm to 50mm ,50 to75 mm,75 to100mm,100 to 125mm,125 to 150mm.	1
77	Surface gauge with dial test indicator plunger type i.e. 0.01 mm	1
78	Printed wall chart framed for display showing measuring instruments.	10
79	Inside micrometer English 2" to 6" with extension road	1
80	Vernier bevel protractor (metric and inch)	1
81	Vernier calipers (inch and metric) 6"x12"	1
82	Vernier micrometers(inch and metric)	1
83	Vernier height gauge 150 mm height (inch and metric)	1
84	Dial micrometer (inch and metric)	1
85	Small bore gauge (standard)	1
86	Dial test indicator to read (inch an metric)0.02mm	1
	GENERAL INSTALLATION /MACHINERIES	
87	Radial Drilling Machine 25mm capacity	1
88	Power Hacksaw	1
89	Rotary Cut off Machine	1
90	Shaping machine	1
91	Hydraulic Press 2 ton capacity	1
92	Surface plate (small)	1
93	Surface plate (big)	1
94	Standard Arc Welding machine	1
95	Horizontal milling machine	1
96	Bench Drilling machine 6-12mm cap Motorized with chuck and key	1
97	Grinding machine (general purpose)D.E. pedestal with 300mm dia wheels rough and smooth	1
98	Hydraulic Trainer with Power pack	1
99	Pneumatic Trainer	1
	Workshop furniture	
100	Suitable Work Tables with vices As required	1
101	Stools 25 Nos	25

102	Tool Cabinet 2 nos	2
103	Trainees locker 2 nos	2
104	Fire fighting equipment , first aid box etc As required	1
105	Book shelf (glass panel) 1 nos	1
106	Storage Rack As required	2
107	Storage shelf As required	2

Subject Name: Engineering Drawing and CAD

Subject Code : 30340002

Theory – 1 st year	Practical – 1 st year
<p>1 INTRODUCTION OF DRAWING</p> <p>Use of different drawing instruments, equipments & Drafting Techniques, Types of letters, conventions of line, Scales; plane scale and diagonal scales.</p> <p>2 CURVES & TANGENTIAL EXERCISES</p> <p>To draw an ellipse by</p> <ol style="list-style-type: none">1. Arcs of circle method2. Concentric circle Method3. Rectangle / oblong method; <p>To draw a parabola by</p> <ol style="list-style-type: none">1. Dircetrix focus method2. Rectangle method; <p>To draw hyperbola</p> <ol style="list-style-type: none">1. Transverse axis and focus Method2. Passing Through a given point; <p>To draw an Involutess of</p> <ol style="list-style-type: none">1. A polygon (up to Hexagon)2. A circle. To draw a cycloid, epic cycloid & hypocycloid. <p>3 ORTHOGRAPHIC PROJECTIONS</p> <p>Introduction to orthographic projections, first and third angle Method of projection, conversion of simple pictorial view into Orthographic view Dimensioning technique</p>	<p>PRACTICAL</p> <ol style="list-style-type: none">1. Practice: Layout of drawing sheet <p>Types of lines – Thickness, shade of lines and its General applications. Practice: Draw type of lines as per IS-70714-1983</p> <p>Type of Angle, Triangles and their types.</p> <p>Dimensioning- Types of dimension, elements of dimensions, Methods of indicating</p> <p>Values, Arrangement and indication of dimensions.</p> <p>Place dimensions in the drawing by aligned system and unidirectional system, Give dimension to the given drawing by following dimensioning principles as per BIS Method of dimension common features</p> <p>Geometrical construction using drawing instruments-Lines, Angles, patterns, Circle, Arc, Tangents, Triangles, Quadrilaterals, Regular Polygons. Different type of Tapers, Related Exercise on this topic.</p> <ol style="list-style-type: none">1. Practice: Construct square, rectangle, parallelogram, rhombus, trapezium and quadrilateral2. Practice: Draw a regular pentagon by circum scribing & inscribing3. Practice: Draw a regular hexagon by arc method4. Practice: Draw a regular pentagon, octagon and various types of tapers5. Free hand sketching of straight lines, rectangular, circles, squares, Polygons,

<p>4 SECTIONAL VIEWS</p> <p>Conversion of given pictorial view into sectional orthographic views.</p> <p>5 ORTHOGRAPHIC VIEWS</p> <p>Isometric scale and views of simple objects; isometric views of Rectangular, cylindrical objects and Representations of slots on Sloping faces.</p> <p>6 PROJECTIONS OF LINES</p> <p>Projections of solids- prism, prism, cone, cylinder, Tetrahedron; axis Inclined to one reference plane only.</p> <p>7 SECTION OF SOLIDS</p> <p>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</p>	<p>ellipse.</p> <p>6. Practice: Prepare proportionate free hand sketches of plane figures</p> <p>7. Practice: Sketch horizontal, vertical and inclined line by free hand, Draw circles by free hand using square and radial line method, Draw arcs and ellipse by free hand</p> <p>Orthographic projection I and III angle – Simple machine elements, Procedure for preparing a scale drawing.</p> <p>8. Practice: Draw a plan, elevation and side view of prism and cylinder, cone and pyramids</p> <p>9. Practice: Draw 1st angle and 3rd angle projection (i) Front View (ii) Top view and (iii) side view of object having stepped blocks with curved surfaces – simple machine elements. Drawing Isometric views out of orthographic views – Simple Machine Elements</p> <p>10. Practice: Construct an isometric scales to a given length</p>
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<p>8 CONVENTIONAL REPRESENTATION</p> <p>Introduction; Conventional Representation of Material; Conventional breaks, Machine components such as splinted shaft; bearings, slotted heads, raced & pinion, Internal & External Threading, Springs, Gears, Pipe fitting & pipe joint, Welded joint; Practice Drawing of all type of Conventions in the sketch book.</p> <p>9 LIMIT FITS & TOLERANCES</p> <p>Process Tolerance, Machining symbol, Induction of machining Symbol, Indication of surface roughness characteristics, symbol for direction of lay; Induction of machine allowance, position of Specification of surface roughness, Indication of drawing, Introduction of dimensional; Tolerances Element of Interchangeable system, Tolerance; Fundamental tolerance, Calculation of limit size, Method of specifying dimensions of fit, limit & Tolerance, Geometrical Tolerance, form tolerance, Position Tolerance, Indication of Geometrical Tolerance; types of geometrical Tolerance.</p>	<p>11. Practice: Draw the isometric projection of cube, hexagonal prism, cylinder and cone</p> <p>12. Practice: Draw the isometric view of the objects/blocks/solids with curved surfaces</p> <p>Missing lines and views.</p> <p>13. Practice: Visualize the shape of the object from the given two views and add the third</p> <p>views – simple machine elements</p> <p>14. Practice: Identify the lines missed in multi views and supply them. Identify at least five shapes satisfying a given view.</p> <p>One problem on each projection of lines and plane are to be drawn in A-3 size sketch book.</p> <p>15. Identify the third view for the given two views of similar in shapes and size.</p> <p>Development of regular objects bounded by plane surfaces-cube, prisms, cylinder and cones.</p> <p>16. Practice: Draw the development of surfaces of a cube and prism</p> <p>17. Practice: Draw the development of surfaces of a cylinder and cones</p> <p>Explanations of full – sectional view, half-sectional view, aligned sections.</p>
<p>10</p> <p>PRODUCTION DRAWING</p> <p>Introduction, need, scope; Production drawing procedure,</p> <p>Production drawing for, Nut & Bolt, Spur gear, Fly – cotter joint Wheel, V belt pulley.</p>	<p>18. Practice: Draw full and half sectional view of simple machine elements.</p> <p>Conventions and symbols used in drawing, Abbreviations used in engineering drawing, surface finish symbols, Welding symbols and Annotations.</p> <p>19. Practice: Draw surface finish symbols, Welding symbols and Annotations.</p> <p>Machining</p> <p>symbol, Induction of machining Symbol, Indication of surface roughness characteristics,</p> <p>symbol for direction of lay; Induction of machine allowance, position of Specification</p>

	<p>of</p> <p>surface roughness, Indication of drawing, Blue print reading of various Engineering drawing and Machine drawing.</p> <p>20. Practice: Blue print reading of Engineering Drawings and Machine drawing.</p> <p>Introduction to free hand sketching of machine parts. Tracing and printing of drawing.</p> <p>Introduction to Auto CAD, 3D modeling concept.</p> <p>21. Practice: Draw the elevation, plan and the side view of Nut & Bolt, Spur gear, and Fly cotter joint Wheel, V belt pulley.</p>
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Engineering Drawing and CAD – 2nd Year

Theory	Practical
A] Computer Fundamental	
1] Fundamentals Of Computer Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers	List of Practical 1. Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop 2. The Windows 2000 accessories, WordPad – editing an existing document, Use of Paint – drawing tools The Calculator, Clock 3. The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation, Moving or copying files, Renaming, Deleting files ,and folders 4. Printing, Installing a printer driver, Setting up a printer, Default and installed printers, Controlling print queues, Viewing installed fonts, The clipboard and 'drag and drop', Basic clipboard concepts Linking vs. embedding,
2] Introduction To Windows 2000/Xp Working with window Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows	5. Moving through a Word document menu bar and drop down menus toolbars 6. Entering text into a Word 2000 document, selection techniques Deleting text 7. Font formatting keyboard shortcuts 8. Paragraph formatting Bullets and numbering 9. Page formatting What is page formatting? Page margins Page size and orientation Page breaks, Headers and footers 10. Introducing tables and columns
3] GUI Based Editing, Spreadsheets, Tables & Presentation Application Using MS Office 2000 & Open Office.Org Menus Opening, menus, Toolbars, standard toolbars, formatting toolbars & closing Quitting Document , Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs	11. Printing within Word 2000 Print setup Printing options Print preview 12. Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter 13. Creating and using macros in a document 14. Creating and opening workbooks Entering data 15. Navigating in the worksheet Selecting items

<p>Presentation Working With PowerPoint and Presentation</p>	<p>within Excel 2000 Inserting and deleting cells, rows and column Moving between worksheets, saving worksheet, workbook</p>
<p>4] Introduction To Internet</p> <p>What is Internet</p> <p>Equipment Required for Internet connection</p> <p>Sending &receiving Emails</p> <p>Browsing the WWW</p> <p>Creating own Email Account</p> <p>Internet chatting</p>	<p>16. Formatting and customizing data</p> <p>17. Formulas, functions and named ranges</p> <p>18. Creating, manipulating & changing the chart type</p> <p>19. Printing, Page setup, Margins</p> <p>Sheet printing options, Printing a worksheet</p> <p>20. * Preparing presentations with Microsoft Power Point. Slides and presentations, Opening an existing presentation , Saving a presentation</p>
<p>5] Usage of Computer System in various Domains</p> <p>Computer application in Offices, books publication data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.</p>	<p>21. Using the AutoContent wizard ,Starting the AutoContent wizard, Selecting a presentation type within the AutoContent wizard Presentation type</p> <p>Presentation titles, footers and slide number</p> <p>22. Creating a simple text slide, Selecting a slide layout</p> <p>Manipulating slide information within normal and outline view, Formatting and proofing text, Pictures and backgrounds, drawing toolbar, AutoShapes, Using clipart, Selecting objects, Grouping and un-grouping objects, The format painter</p>

Engineering Drawing and CAD – 2nd Year

Theory	Practical
	<p>23. Creating and running a slide show, Navigating through a slide show, Slide show transitions, Slide show timings. Animation effects</p> <p>24. Microsoft Internet Explorer 5 & the Internet</p> <p>Connecting to the Internet The Internet Explorer program window, The on-line web tutorial Using hyper links, Responding to an email link on a web page</p> <p>25. Searching the Internet, Searching the web via Microsoft Internet Explorer, Searching the Internet using Web Crawler, Searching the Internet using Yahoo, Commonly used search engines</p>
<p>6] Information technology for benefits of community</p> <p>Impact of computer on society</p> <p>Social responsibilities</p> <p>Applications of IT</p> <p>Impact of IT</p> <p>Ethics and information technology</p> <p>Future with information technology</p>	<p>26. Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced</p> <p>27. * Using the Address Book Adding a new contact</p> <p>Creating a mailing group, Addressing a message, Finding an e-mail address</p> <p>28. Using electronic mail, Starting Outlook Express</p> <p>Using the Outlook Express window, Changing the window layout, Reading file attachment, Taking action on message-deleting, forwarding, replying</p> <p>29. Email & newsgroups, Creating and sending emails</p> <p>Attached files, Receiving emails, Locating and subscribing to newsgroups, Posting a message to a newsgroup</p> <p>30. Chatting on internet, Understating Microsoft chat environment, Chat toolbar</p>
<p>Minimum system requirement for AutoCAD</p> <p>Starting AutoCAD – Use a Wizard, Use a Template, Start from Scratch, Open a Drawing, Quick Setup method, Advanced Setup method, Types of Units,</p> <p>AutoCAD Window Details – Menus, Toolbars, Command line area, Drawing area, WCS icon etc, Use of Function keys,</p> <p>Modes in AutoCAD – Snap, Grid, Ortho, Osnap, Polar, Otrack, Model</p> <p>Using various Toolbars, Creating new drawing, Saving</p>	<p>Practical related Creating New file, Closing Drawing, Saving Drawing, Startup Methods, Modes in AutoCAD,</p> <p>Use of Function Keys, Use of Keyboard and Mouse in AutoCAD Practice.</p> <p>CAD Command Practice on small objects</p>

<p>a drawing, Closing a drawing, Opening a drawing, Use of mouse in AutoCAD, Use of Keyboard,</p> <p>Coordinate system – Types of Coordinate, Absolute, relative, polar coordinate</p> <p>Draw commands – Line, Ray, Construction line, Spline, rectangle, Polygon, circle, ellipse, Arc, Donut, Polyline, Multiline, Multiline Style, Point, Point Style, Divide, measure</p> <p>Zoom commands – Real-time zoom, pan real-time, zoom window, zoom all, zoom in, zoom out, zoom center, zoom dynamic. Zoom scale, zoom previous.</p>	
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Engineering Drawing and CAD – 2nd Year

Theory	Practical
<p>Object Snapping – Dialog box, Toolbar, Tracking, snap from, end point, mid point, center, intersection, apparent intersection, insertion, quadrant, tangent, perpendicular, node etc.</p> <p>Editing commands – Setting drawing limit, setting units, drawing area parameter, Copy, move, erases, opps, scale, rotate, stretch, lengthen, break, trim, extend, chamfer, fillet, mirror, offset, align, explode, array – rectangular & polar, editing using grips, edit Polly line, edit multiline, using property dialog box., Match property, using single line text, using multiline text, editing text, creating text style.</p> <p>Dimensioning technique – Linear, Aligned, Radius, Diameter, Angular, Baseline, Continuous, Leader, Center mark, creating dimensioning style.</p> <p>Block, Wblock, Attribute.</p> <p>Hatch, Boundary, Region.</p> <p>Object property toolbar – layer control, color control, Line type control, line weight control, working with layers, (freeze, thaw, lock, unlock, plot etc.)</p> <p>Printing and using scale in the drawing.</p>	<p>Practice on Small Drawing Objects using Commands in</p> <p>Draw Menu Practice of Editing command on above drawing objects, Dimensioning Drawing</p> <p>Creating Title block, Creating Part List, Material List using Text in AutoCAD,</p> <p>Drawing Plan, Elevation, Section, in AutoCAD for various mechanical objects, machine part etc.</p>
<p>Viewing Orthographic projections, Viewing Isometric projections, Plan View, Aerial View Window, Using Named Views, Using multiple Tiled View ports – New view ports, Polygonal View ports, object viewports, named view ports, joining viewports, Floating viewports in paper space, Region, Redraw, Regen all command.</p> <p>Shading the model – 2D wireframe, 3D wireframe, Flat shaded, Gauged shaded, hidden view Region, Redraw, Regen all command.</p> <p>Interacting Viewing in 3D – 3D orbit command, panning, zooming, adjusting the view, Adjusting the camera distance, swiveling the camera, Continuous orbit, using Visual aids – Compass, Grid, UCS icon etc Concept of Wire frame modeling, Surface modeling, Solid modeling, Concept of Thickness & Elevation</p>	<p>Suitable CAD Practical (Command Practice) based on the Theory.</p> <p>Creating Simple 3D Model of Machine assemblies required 3D view from all sides.</p> <p>Practice of using AutoCAD Mechanical Desktop package for creating various 3D Machine Elements.</p>
<p>Surface modeling – Ruled surface, Edge surface, Revolve surface, Tabulated surface, 2D solid, 3D face, Using Predefined 3D surface objects – Box, pyramid, Wedge, dome, sphere, cone, tours, dish, mesh.</p> <p>Solid modeling – Extruding solid, Revolving solid, Slicing & Interfering solid, using predefined 3D solid</p>	<p>Creating, Rendering, and Viewing Various Machine parts and assemblies Elements like different types of</p> <p>Screws, bolt, nut, nail, rivet, keys, cotter, locking devices, stud, plates, angle, channel, sockets, cover, packings, gasket, belt, wheels, gear, grooved parts, casting, supports base plates, pipe joints, I</p>

<p>objects - Box, pyramid, Wedge, Cylinder, Cone, Torus</p> <p>Modifying 3D Solid object – 3D array, 3D mirror, 3D Rotate, Trim, Extend, Fillet, Chamfer etc.</p> <p>Boolean operation – Union, Subtract, intersect.</p>	<p>section joints etc.</p>
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Engineering Drawing and CAD – 2nd Year

Theory	Practical
<p>Solid Editing – Extrude face, move face, offset face, delete face, rotate face, taper face, color face, copy face, color edge, copy edge, imprinting the object, Cleaning, separating objects, shelling the solid Checking validity of solid object.</p> <p>Rendering 3D solid – Rendering options / Rendering procedure – query, crop window, skip dialog box method, Rendering, using light effects in rendering – Distance light, point light, spot light, using Sun angle calculator for shaded model, modifying lights parameter, using lights in scene.</p> <p>Applying material effect to solid object. Using material library. Mapping background. Using background images</p> <p>Printing the 3D rendered view / drawing.</p>	<p>Creating, Rendering, Viewing, Generating JPEG images for Complete assembly model, Printing Photo with various View of machine assemblies,</p> <p>Creating Slide show presentation of such views of assembly model including All four side view, 3D view from four corner, Isometric View, Perspective View etc.</p> <p>Introduction to 3DS Max Software Package for animation Purpose.</p> <p>Introduction to Pro-Engineer, CATIA Software.</p>

List of Books

Engineering Drawing

1] N.D.Bhatt Elements of Engineering Drawing 49TH 2005 Charotar publishing house,opposite Amul

dairy, court road Anand India

2] N.D.Bhatt Machine Drawing 40TH 2005 Charotar publishing house,opposite Amul dairy, court

road Anand India

Computer Fundamental

1] Vikas Gupta Comdex Computer Course Kit First Dreamtech

2] Henry Lucas Information Technology for management 7Th Tata Mc-Graw Hills

3] B.Ram Computer Fundamentals Architecture and Organisation Revised 3rd New Age

International Publisher

CAD Books

1] Reference Manual of AutoCAD AutoDesk

2] Reference Manual of Felix cad Felix CAD

3] Reference Manual of Intel CAD

4] Reference Manual of Auto Civil

5] Reference Manual of 3D-Max

List of Tools and Equipment

A] General Class room

Sr	Name of Item	No.
1	Steel lockers 8 compartments with individual lockers (1980 x 910 x 480 mm)	4
2	Chair with writing pad	25
3	Steel almari with self 6.5' x 3' (18 gauge)	2

4	Steel table 4' x 3'	2
5	Teacher chair	2

B] For Computer Fundamental and CAD Practical

Sr	Name of Item	No.
1	Computer System P4 with accessories Complete with license OS. Compatible for- to run AutoCAD 2010 and Windows 7 OS.	5+1
2	Plotter- HP Design Jet 500 latest model	1
3	Scanner	1
4	Computer table	5+2
5	Chair for computer	10+2
6	Laser Printer	1
7	AutoCAD 2010 or above Software	1
8	M. S. Office Software	1
9	Pro- Engineering –V-4 Student Version	1
10	CATIA R-17 – Evolution Student Version	1

Subject Name - Mechanical Drafting

Subject Code - 30340010

First Year

Theory	Practical
Units of dimension, system of dimensioning, method of dimensioning and common feature	Dimensioning technique, symbols for machining and surface finishes.
Tolerance dimensioning. Indication of symbols for machining and surface finishes on drawing	1 st & 3 rd angle projection with dimension of machine parts.
Screw thread , terms & nomenclatures , types of screw threads proportion and their uses, thread conventions	Screw threads with IS conventions (freehand sketching as well as with instruments)
Types of bolts & nuts their proportion uses different types of locking devices	Nuts, bolts, washers & locking devices with is conventions (freehand sketching as well as with instruments)
Different types of machine screws, cap screws and their specifications, different types of foundation bolt.	Machine screw, cap screws, studs and set screws. Foundation bolts with IS conventions (freehand sketching as well as with instruments)
Purpose , terms , different types of keys and proportions , use of cotters pins and circlips.	Keys , cotters ,circlips , and pins with IS conventions
Types of fastener material, types of rivets their proportional uses, types riveted joints, terms and proportion of riveted joints. Conventional representation.	Types of rivets, types of riveted joints with IS conventions
Causes of failure of riveted joints, efficiency of riveted joints	To prepare working drawing of a riveted structure, from a conventional one
Description of welding joints and their representation. Indication of welding symbols on drawings	Welding joints. Use of welding symbols. Working drawings of welded strictures
Description and uses of drafting machine. Different sizes of drawing sheets as per ISI.	Drafting practice with the help of the drafting machine. Layout of drawing sheets with title block and reversionary panel for A0 , A1,A2 ,A3,A4, sizes of sheet
Safety precaution description , uses and care of hand tools including contraction rule	: PATTERN MAKER Uses of saws, chisels, rasps, planes, etc. use of steel rules, squares scribes and dividers for making out from drawing

<p>Safety precautions , hand tools used for molding. Description of the use and care of hand tools. Description of different types of molding. Description of different types of core, sand, dressing material. Description of cupola</p>	<p>: MOULDING</p> <p>Different types of mould, cores and core dressing , use of molding tools simple core making floor and box molding using to part patterns</p>
<p>Description of measuring tools and hand tools used in forge work. Description and use of the mechanical hammer. Color coding of different metals and identification.</p>	<p>: BLACKSMITHY</p> <p>Use of different types of blacksmithy hand tools, hand forging of different types of jobs.</p>
<p>Description and application of simple measuring tools, Description of vices, hammers, cold chisel, files etc. and proper method of using them.</p>	<p>FITTING</p> <p>Use of different types of fitters hand tools, use center punch different types of files, calipers, hack saws and hack sawing chisels, hammers.</p>
<p>Safety precaution for Lathes. Description of parts of Lathe & its accessories.</p>	<p>: TURNING</p> <p>Plain parallel turning, stepped turning, Taper turning with offset stock method.</p>
<p>Method of using precision measuring instrument such as inside and outside micrometers, depth gauges, verniers, dial indicators, slip gauges, sine bars, universal bevel protector etc.</p>	<p>: MACHINIST</p> <p>Use of jigs and fixtures. Simple operations on milling M/C such as plain milling and key way cutting.</p>
<p>Brief description of milling shaping, slotting and planing machines. Quick return mechanism of these machines.</p>	<p>Marking out castings and forgings. Setting up & operation of shaping, slotting and planing machines.</p>
<p>Names and brief description of common equipment necessary for sheet metal work. Different types and uses of joints employed in sheet metal work.</p>	<p>: SHEET METAL</p> <p>Use of hand tools such as planishing hammers, stakes, mallet, bricks prick punch etc. Development of surfaces from blue print.</p>
<p>Names and brief description of the hand tools. Identification of gas cylinders. Different types of welded joints and necessary preparation required for these. Welding symbols as applied to drawing.</p>	<p>: WELDING</p> <p>Use of hand tools used in Gas and in electric welding. Welding of object by gas and electric according to drawing.</p>
<p>A.C. & D.C. Motors, Generators of common types and their uses.</p>	<p>: ELECTRICIAN</p> <p>Familiarization with the measuring instruments, machinery and panels used in Electrical.</p>
<p>Brief description of internal combustion engines, such as cylinder block, piston , carburetor spark plug, camshaft, crank shaft, injector fuel pump etc.</p>	<p>: I.C. ENGINE</p> <p>Familiarization & Identification of different parts of i.e. Engines (Both spark ignition and compression/</p>

	ignition-2 stroke & 4 stroke engines).
Types of Ferro-printing papers. Specification of Sensatised. Ammonia Papers- Expiry- precautions in Ammonia Printing.	Tracing Exercises on tracing paper and Tracing cloth. Ammonia printing with the help of machine.

Second Year

Theory	Practical
Brief description of production of cast iron, wrought iron, steel and alloy steels.	Handling of Inking instruments.
Procedure of inking a drawing. Conventional colours used for different metals as per ISI materials and equipment for colouring procedure of colouring.	Drawing of Rams bottom & safety valve in pencil. Inking and colouring the same. (Hand made paper should be used).
Necessities of training, equipment and materials (both conventional and modern like rotoring pen etc.) required for training procedure for tracing specification of Tracing paper.	Drawing of screw jack (Details and assembly) Preparation of tracing from the drawing on tracing paper by ink.
Procedure of tracing on tracing cloth and specification of tracing cloth.	Drawing of plummer block (Details and assembly). Preparation of tracing from the drawing on tracing cloth.
Types of assembly drawing. Different types of detailed drawings and preparation of bill of materials.	Working drawing of a simple bearing and a Foot step bearing.
Use of bearing types of bearing and materials used.	Details and assembly drawing of a angular plummer block.
Difference between frictional and anti frictional bearing. Advantages of anti frictional bearing over frictional bearing. Materials and proportion of parts for drawing purpose.	Details and assembly drawing of Roller and Ball bearing including tapered roller bearing.
Belts-power transmitted by belt. Materials of belt slip and creep Velocity of belt. Arc of contact.	Pulleys-solid, stepped and built up pulleys.
Simple exercise in calculation of belt speeds, nos. of belt needed in V-belt drive, velocity, pulley ratio etc. standard pulleys width of pulley face, velocity ratio chain drive.	Pulleys-pulley with different types of arms, rope pulleys, belt pulleys and drive.
Necessity of coupling. Types uses and proportion of different types of couplings. Materials used for couplings.	Working drawing of coupling (Muff coupling , flange coupling, friction grip coupling).
Heat treatment of steel.	Working drawing of coupling (claw coupling, universal coupling, knuckle joint).
Shade lines & their use on machine drawings. Conventional method for drawings shade lines, surface shading by means of lines.	Application of shade lines on machine drawings.
Piping materials and specifications of W.I. & Steel pipes. Pipe thread pipe fittings. Specifications of fittings.	Pipe fittings flanges, unions, valves etc.

Brief description of different types of pipe joints.	Different types of pipes layout systems. Different types of pipe joints.
Use of gears in transmission of power. Different types of gears. Cast gears and machined gears. Use of odontograph for drawing profile of gears etc.	Working drawings of gears such as spur, helical, bevel & worm, worm and worm wheel.
Use of cams in industry. Types of cam, kinds of motion, displacement diagrams. Terms used in cam. Types of followers.	Cams with different motions to followers, different types of followers.
Steam engine, important parts such as cylinder, piston, piston rod, crank shaft etc.	Working drawings of Eccentrics. Piston (I.C.C. Engines,) steam with the application of tolerances.
Brief description of petrol, diesel and gas engines.	Working drawings of connecting rods (I.C. Engine) with the application of tolerances.
Working principles of valves and their description.	Valve : such as lever safety valve, dead wt. Safety valve.
Brief description and function of reciprocating & centrifugal pump and water turbines.	Assembly drawing of a reciprocating pump.
Brief description, working principle and function of hydraulic jack, press accumulator, ram etc.	Sketching and drawing of a tail stock. On the spot sketching to be done.
Electrical units and quantities. Laws of electricity. Simple examples of calculation of current voltage, resistance in series and parallel connection (D.C. Circuit).	Electrical and Electronic symbols and simple wiring diagrams.
Structural Steel I.S. Specification for rolled sections. Structural steel roof trusses, truss joints and supports.	Detailed drawing of a built up and north light roof truss elevated gallery for a workshop.
Use of Jigs and Fixtures. Principle of selecting standard bushing.	Detailed drawing of a milling fixture.
Different locating methods clamping devices.	Drawing of a fixture for drilling hole.
Machine foundations. Brief treatment of the principle involved and the precaution to be observed.	Practice in designing a simple drilling Jig for drilling holes in a given component.
Function of gauges, different types of gauges and their uses. Use of templates in industry.	Different types of gauges, such as plug, snap, thread, taper etc.
Limits and limit systems. Types of fit and tolerance IS-919.	Sketching of a Press Tool giving nomenclature of each part. Drawing of dies & punches for the production of simple work pieces.
Working of Blow off cock & simple carburetor.	Blow off cock & simple carburetor.
Drg. Office practice, general arrangements of	Making foundation drawing for machinery section of R.S.I. and beams. Simple plate girder and built up

drawing, standard method of drawing.	trusses.
Numbering of drawings and standard parts. Familiarization with I.S. 696.	Sketching & Assembly Drg. Of Machine Swivel vice & pipe vice.
<ol style="list-style-type: none"> 1. What is Computer? General terms used in Computer. 2. Elementary DOS commands. 3. Word processor commands and their uses. 4. Window command and their uses. 5. Auto CAD commands and use of different Menus of AUTO CAD. 	<ol style="list-style-type: none"> 1. Elementary DOS 2. Knowledge of Editor 3. How to install Auto CAD 4. How to load Auto CAD 5. Elementary command of Auto CAD. 6. Knowledge window software. 7. Free hand working practice on Auto CAD.
Production of interchangeable parts, Fits Limits, tolerance & familiarization with IS-919 & IS-2709. Different methods of showing machine surfaces on drawings.	Preparation of Detailed drawings from Assembly. Drawings of simple Machine parts such as : Tool Post of Shaping machine, head stock etc. Valves- Non-return and safety valves.
Familiarization with : IS-1444(Drg. Board) IS-1360 (T-Sqr.) IS-1561(Set Sqr.) IS-696 (Code of Engg.Drg.)	Making working drawing of projects.

Reference Book ;

NIMI – D’man Mechanical Theory & Practical Book

N.D.Bhatt - Elements of Engineering Drawing.

N.D.Bhatt - Machine Drawing

LIST OF TOOLS & EQUIPMENT

S.NO.	DESCRIPTION	QUANTITY
	TRAINEES KIT	
1	Draughtsman drawing instrument Box containing compasses with pencil point , point divider, interchangeable, divider penpoint interchangeable, divider spring bow, pen spring bow lengthening bar, pen drawing liner, screw driver instrument, tube with leads	5 sets
2	Scale set card board in case (Metric)	5 sets
3	Set square celluloid 45 degree 9250 x 1.5 mm) IS: 1561	5 sets
4	-----do-----6o degree (do) IS : 1561	5 sets
5	French –curves (set of 12 celluloid)	5 sets
6	Drawing Board (700 x 500) IS :1444	5 Nos.,
7	Tee –square (700 mm blade) IS : 1360	5 nos.
8	Steel Rule 300 mm (inches and millimeters)	5 nos.
	GENERAL OUTFIT	
1.	Mini drafter	5 Nos.
2.	Rotoring Pens (0.1 to 0.7)	2 Nos.
3.	Plastic models for development and geometrical solids	2 sets
4.	Universal drafting Machine 1500 x 1000 mm	2 nos.
5.	PC-AT for Auto –CAD with plotter & Dot –Matrix Printer	2 nos.
6.	Wooden Geometry Box for Black- Board work	1 set
7.	Ammonia Printing Machine (continuous Type)	1 nos.
8.	Caliper Outside 150 mm (spring)	5 nos.
9.	Caliper Inside 150 mm (spring)	5 nos.
10.	Stencil set complete in box	2 set
11.	Steel tape 2 meters (pull type)	1 no.
12.	Radius and Fillet templates	1 set
13.	Drawing Table	5 nos.
14.	Steels	5 nos.
15.	Print trimmer 1050 mm cutting edge	1 no.
16.	Chalk Board (roll type)	1 no.

Importance of safety & general precautions observed in the institute & in the section. Importance of the course in the development of industrial economy of the country. Related instruction. Subject to be taught-achievement to be made. Recreational, medical facilities & other extra curricular activities of the institute. (all necessary guidance to be provided to the new comers to become familiar with working of industrial training institute. System including stores procedures etc.)
Nomenclature, description & use of drawing instruments & various equipment in drawing office. Their care and maintenance. Lay out of drawing sheets.
Type of lettering proportion & spacing of letters & words.
Terms and definitions – polygons and circles.
Definition of ellipse, parabola, hyperbola, different methods of their construction definition and method of drawing involute cycloidal curves, helix & spiral.
Planes and their normal, projections, projection and orthographic projection, first angle & 3 rd angle projection.
Principle of orthographic projection of solids like prisms, cones, pyramids & frustums in various positions.
Solutions of problems to find out the true shape of surfaces when solids are cut by different cutting planes.
Lines and their meaning, section lines of different material, conventional signs, symbols & abbreviations, hatching tinting and shading, norms of dimensioning.
Construction of different types of scales, their appropriate uses, RF principle of diagonal and vernier scale.
Importance of freehand sketching in machine drawing. Material equipment required in sketching.
Importance of sectional views. Types of sectional views & their uses of parts not shown in section.
Definition of inter-penetration and interpenetration curves. Common methods to find out the curves of inter-penetration.
Solution of problems on inter-penetration of prisms cones and pyramids with their axes intersecting at an angle.
Theory of projection as specified in SP:46-1938
Definition of development it's need in industry and different methods of developing the surfaces.
Principal of isometric projection, difference b/n isometric drawing & isometric projection. Isometric scale. Dimensioning an isometric drawing.
Different methods of drawing isometric views.
Principals and types of oblique projections. Advantage of oblique projection over isometric projection
Types of perspective projection. Fundamental concept, definition, location of a station point.
Terminology-feature, functional feature, functional dimension, datum dimension.

<p>Induction Training</p> <p>Familiarization with the institute importance of course training, machinery used in the course, type of work done by the trainees in the institute, types of jobs made by the trainees in the course introduction to safety including fire fighting equipment and their uses etc.</p>
<p>Practice in using instruments. Drawing of straight and curved lines, drawing angles, circles etc.</p>
<p>Letters, block letters, italics etc. & numerals</p>
<p>Plane geometrical construction triangles, polygons, circles.</p>
<p>Construction of ellipse parabola, & hyperbola construction of involute, cycloidal curves, helix & spiral.</p>
<p>Projection of points and lines. Projection of plane figures.</p>
<p>Projection of solids-prisma, cones , pyramids and frustums.</p>
<p>Projections of solids, finding out the true shape surfaces cut by the oblique planes.</p> <p>Intensive freehand sketching of m/c. parts along with projection of simple machine parts-1st angle projection, projection of machines parts drawn in the above exercise 3rd angle projection.</p>
<p>Conventional signs and symbols. Different types of section lines and abbreviations as per ISI. Different types of lines and their uses in drawing . Norms of dimensions</p>
<p>Scales-plain scales, diagonal scales. Comparative scales, vernier scale & chord scale.</p>
<p>Free hand sketching, practice in drawing freehand straight lines, curved lines polygons, circles, elliptical figures, figures with irregular contour and freehand sketch of a machine part such as tool post of a lathe.</p>
<p>Sectional views different types of sections.</p>
<p>Inter-penetration of two prisms with their axes intersecting at right angles and inter-penetration of cone and pyramids intersecting each other.</p>
<p>Inter-penetration of Prisms with their axes intersecting at an angle and inter-penetration of cone and pyramids with their axes intersecting at an angle.</p>
<p>General principles of presentation that is orthographic projections in 1st & 3rd angle.</p>
<p>Development of surfaces bounded by plane development of surface bounded by plane revolution.</p>
<p>Development of an oblique cone with elliptical base etc. development of solids intersecting each other.</p> <p>Isometric projection of geometrical solids.</p>
<p>Isometric projection of a machine part with irregular curves. Freehand isometric drawing of actual objects.</p>