

1	Name of Course	Certificate Course in Food Processing Technology									
2	Max no. of Students	25		Course Code - 401403							
3	Duration	2 year									
4	Course Type	Full Time									
5	No. of Days per week	6 days									
6	No. of hours per day	7 Hrs									
7	Space require	Theory Class Room – 200 sqft Three Practical Lab – 500 sqft each									
8	Entry qualification	S.S.C. Pass									
9	Objective of syllabus	To acquaint students with fast growing industry of packed and ready to eat food. To understand the role of chemistry, microbiology, hygiene and nutrition to ensure quality standards.									
10	Employment opportunities	Self owned food packed industry Employment in food processing industry.									
11	Teachers Qualification	1) For Vocational subject - B.E. in HMCT 2) For Non Vocational Subject - Master Degree in Concern subject									
12] Teaching Scheme –											
Ppr		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	Basic Food Preservation and Packing	40140005	3 Hrs	8 Hrs	11 Hrs						
5	Microbiology, Quality Control, Hygiene and Catering Science	40140006	3 Hrs	8 Hrs	11 Hrs						
6	Advanced Packing and Law	40140007	3 Hrs	8 Hrs	11 Hrs						
Total					42 Hrs						
13] Internship Two Month Summer Internship from 1st May to 30th June is Compulsory.											
14] Examination Scheme – Final Examination will be based on syllabus of both years.											
P	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	Basic Food Preservation and Packing	40140005	3 Hrs	100	35	3 Hrs	100	50	200	85	
5	Microbiology, Quality Control, Hygiene and Catering Science	40140006	3 Hrs	100	35	3 Hrs	100	50	200	85	
6	Advanced Packing and Law	40140007	3 Hrs	100	35	3 Hrs	100	50	200	85	
Total									900	375	
15] Teachers – Three Teachers per batch for vocational component. For English, Elective-I & II guest faculty on clock hour basis.											
16] Student have to choose any one subject for Elective-I and Elective-II from below given subjects											
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								
90000015			Psychology								

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

		EXERCISES
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
Detailed Syllabus: 1.0. 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 compound angles 1.7. Factorization formulae 1.8. Inverse trigonometric functions 1.9. Properties of a Triangle	Detailed Syllabus: Solve problems on: 1) Conversion of radian to degree 2) Conversion of degree to radian
2.0. Plane co-ordinate geometry 2.1. Locus 2.2. Line	
3.0 Vectors and Linear Equalities 3.1. Definition of vector, position vector 3.2. Algebra of vectors (Equality, addition, subtraction and scalar multiplication) 3.3. Dot (Scalar) product with properties. 3.4. Vector (Cross) product with properties. 3.5. Solutions of Linear inequalities in one variable and two variables	
4.0. Determinants and Matrices 4.1. Definition and expansion of determinants of order 2 and 3. 4.2. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns 4.3. Definition of a matrix of order $m \times n$. 4.4. Types of matrices. 4.5. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. 4.6. Transpose of a matrix. 4.7. Minor, cofactor of an element of a matrix, adjoint Of matrix and inverse of matrix by adjoint method. 4.8. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.	Solve problems on Cramer's rule
5.0 Statistics and Probability 5.1. Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. 5.2. Analysis of frequency distributions with equal means but different variances. 5.3. Random experiments: outcomes, sample spaces (set representation). 5.4. Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events 5.5. Probability of an event, probability of 'not', 'and' & 'or' events.	State and prove Baye's theorem
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 it's 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 2.7. Derivative of implicit and parametric functions 2.8. Second order derivatives	Proof of derivative using the first principle with the help of an example
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 –</p> <p>1.1 Meaning & Scope -</p> <p>1.2 Relevance of Economics to different disciplines - Economics & Management, Economics & Law- Economics and Humanities –</p> <p>1.3 Micro Economics and Macro economics</p>	<p>1) Prepare a project on usefulness of micro – economics.</p> <p>2) Prepare a project on usefulness of micro – economics.</p> <p>3) Conduct a GD on the importance of Micro Economics and Macro Economics</p>
<p>2. Macro Economics –</p> <p>2.1 Meaning, Definition and Features.</p> <p>2.2 Aggregates-Nature of Aggregates , problems of Aggregation.</p> <p>2.3 National Income, Meaning, Definition of National Income Different National Income Concepts</p> <p>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.</p> <p>2) Prepare a chart on the circular flow of National Income.</p> <p>3) Make a comparative study of closed economy and open economy.</p> <p>4) Conduct a case study of 5 individual families and find out the Disposable income to the individuals.</p>
<p>3. Determinants of Aggregates</p> <p>3.1. Aggregate Demand and their components</p> <p>3.2 Aggregate Supply and their components</p> <p>.</p>	<p>Prepare a chart on the components of aggregate demand.</p> <p>Conduct a GD on Keynes theory of employment and principles of effective demand.</p> <p>Take 2 or 3 case studies on entrepreneurship and discuss to what extent they provide employment to people.</p>
<p>4. Money and Banking</p> <p>4.1 Meaning, definitions and functions of Money</p> <p>4.2 Commercial Banks: Meaning and Functions.</p> <p>4.3 Central Banks: Meaning and Functions.</p>	<p>Find out RBIs concept of money supply.</p> <p>A visit to various financial institutions.</p> <p>A visit to a rural bank, cooperative bank, commercial bank.</p> <p>A visit to the RBI Training college, NABARD OR IDBI</p> <p>Further For the first year the practical will consist developing familiarity with banking functions and will comprise Of</p> <p>what are different types of banking services, facilities, available to individuals/organizations? (to increase the financial literacy)</p> <p>how to open a bank account?</p> <p>different investments like – FD,MF</p> <p>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.</p> <p>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>

Theory	Practical
Detailed Syllabus : 7.1. Concepts of Economic Growth and Economic Development 7.2 Indicators of Economic Development Monetary indicators 7.3 Human Development indicators	1) To make a project on discrepancies in India's economic growth and development. 2) Discuss the patterns of education among women in the post independence period. 3) Collect information on Human Development Index for different Indian states.
8.0. Structural Changes in the Indian Economy since 1991. 8.1 Economic reforms since 1991: Need and main features, Liberalization, privatization and Globalization. Their impact on Indian Agriculture, Industries and Service Sector. 8.2 Economic Planning – Meaning and Objectives 8.3 Achievements and Failures of 10th Five – Year Plan	1) Conduct a GD on the New Economic Policy, 19991 and its impact on the various sectors. 2) Visit to Agricultural Produce Market Committee to study the price Fixation of agricultural commodities. 3) Collection of market intelligence of agricultural commodities from newspaper and journals. 4) A visit to a cottage industry, small scale industry, large scale industry. 5) A visit to a MNC. Prepare an assignment on the WTO.
9.0. Current Challenges of Indian Economy 9.1 Problem of Population Explosion in India Causes, Effects and Remedial Measures to remove these problems 9.2 Problem of Poverty in India Causes, Effects and Remedial Measures to remove these problems 9.3 Problem of Unemployment in India Causes, Effects and Remedial Measures to remove these problems	Conduct a GD on population explosion and its impact. Prepare a comparative chart on employment in India dusting the five year plans. Conduct a GD to find out measures for poverty alleviation. Make ppt presentation on population explosion, poverty, unemployment.
10.0. Infrastructural Development in India 10.1 Transport and Communication, 10.2 Energy, 10.3 Health and Education	Prepare a project report on recent rends in communication. Prepare transport documents of trade namely goods forwarding note, lorry receipt, delivery challan, railway receipt, mates receipt, Bill of lading, airway bill, etc. Conduct case studies on different energy companies like Carin India, Power Corporation of India, Reliance Energy, Coal India ltd. Collect secondary data on health and education.

Elective - I - Business Economics – 2 nd year
(Subject Code – 90000012)

Theory	Practical
. Introduction Micro Economics – 1.1 Meaning, Definition ,Nature 1.2 Tools of Analysis, 1.3 Role of Assumptions	1) Conduct a GD on the usefulness of Micro economics 2) Prepare a PPT on the role of assumptions in Economics
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	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.
Producer Behaviour and Supply Analysis. 3.1 Meaning of Supply 3.2 Market Supply 3.3 Determinants of Market Supply and Law of Supply.	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.
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	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.
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.	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.

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.
Collection and organization of data 7.1 Collection of data – primary and secondary 7.2 Methods of data collection – primary methods – Observation, Interview, Methods of secondary data – Census and sampling, Random sampling. 7.3 Organization of data – Census and sampling, Random sampling.	<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.
Graphical presentation of Data 8.1 Tables – Components and Types 8.2 Graphs – Curves, Bar diagrams, 8.3 Pie – diagrams.	<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.
Measures of Central Tendency 9.1 Mean 9.2 Median 9.3 Mode	<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
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 evaluation of life 1.6. Theories of evaluation of life, origin of life, special creation, spontaneous generation, Abiogenesis, Evidences of organic evolution paleontological anatomical & embryological 1.7. Study of Tissues	Study of cells and tissues
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	Study of angiosperms and gymnosperms
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, Tuberous 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)	Study of the structure of a plant (root, stem, leaf)
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.	

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	
7.0 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	
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	
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	Study of monocot and dicot stem
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)	Mendel's principle

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	Study of human skeleton(Bone theory)
6.0 Physiology of Humans 6.1. Circulation 6.2. Osmoregulation and excretion 6.3. Nervous co – ordination 6.4. Hormonal co – ordination	1) Study of hormones 2) study of circulation and excretion(diagrammatic chart)
7.0 Reproduction, growth and development 7.1. Details of Reproduction and human development	Study of reproduction in humans
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	Study of various diseases

Subject Name : ENTREPRENEURSHIP – 1st Year

(Subject code : 90000014)

Theory	Practical
Detailed Syllabus : 1.0. Entrepreneurship 1.1. Concept, Functions and need 1.2. Entrepreneurship: Characteristics and Competency 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. 1.4. Process of Entrepreneurship Development.	Detailed Syllabus 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.
2.0. Entrepreneurial Pursuits and Human Activities: 2.1. Nature, Purpose and pattern of Human Activities: Economic and Non-Economic, Need for innovation. 2.2. Rationale and Relationship of Entrepreneurial pursuits and Human Activities.	II. Preparation of a brief report based on the observations made during study-visit to an enterprise.
3.0. Acquiring Entrepreneurial Values and Motivation 3.1 Entrepreneurial Values, Attitude and Motivation- Meaning and concept. 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. 3.3. Barriers to Entrepreneurship 3.4. Help and support to Entrepreneurs	
4.0. Introduction to Market Dynamics 4.1. Understanding a Market 4.2. Competitive Analysis of the Market 4.3. Patents, Trademarks and Copyright	
5.0. Project Selection 5.1. Product Identification 5.2. Project Formulation	

ENTREPRENEURSHIP – 2nd Year

Theory	Practical
Detailed Syllabus : 1.0. Entrepreneurial Opportunities and Enterprise Creation 1.1. Sensing Entrepreneurial Opportunities 1.2. Environment Scanning 1.3. Market Assessment 1.4. Identification of Entrepreneurial Opportunities 1.5. Selection of an Enterprise 1.6. Steps in setting up of an Enterprise	Detailed Syllabus
2.0. Enterprise Planning and Resourcing 2.1. Business Planning – Preparation of a Project Report 2.2. Resource Assessment -Financial and Non – Financial. 2.3. Fixed and Working Capital Requirement, Funds, Flows, Profit Ratios, Break Even Analysis etc. 2.4. Mobilizing Resources – Sources and Means of Fund, Facilities and Technologies for starting an Enterprise.	
3.0. Enterprise Management 3.1. General management: Basic Management functions. 3.2. Organizing/Production of goods and services – quality, quantity and flow of inputs. 3.3. Managing Market: Meaning, Functions of Marketing, Marketing Mix: * Product * Price * Place * Promotion (advertising and sales promotion). 3.4. Managing Finance – Sources of Long Term and Short Term Finances, Determination of Cost, Income, Calculation of Profit/Loss. 3.5. Managing Growth and Sustenance -Affecting Change, Modernization, Expansion, Diversification and Substitution. 3.6. Entrepreneurial Discipline – Laws of Land, Ecology, Consumer's Concept, Adherence to Contract and Credits.	
4.0. Industrial Relations and Personnel Management 4.1. Meaning, Source of recruitment, Internal/External recruitment procedure 4.2. Incentives, appraisal and training, Industrial relations, Industrial disputes.	
5.0. Report Writing 5.1. Guidelines 5.2. Model project reports	

Subject Name : Psychology – 1st Year

(Subject code : 90000015)

Theory	Practical
Detailed Syllabus : 1.0. Psychology Introduction : 1.1. Definition of Psychology 1.2. Methods of Psychology 1.3. Subfields of Psychology 1.4. Schools of Psychology (a) Old (b) New	Detailed Syllabus I. Study until by student to any organization for differently able person with special needs or a centre for the treatment of the mentally ill. With the help of a questionnaire the student will record observation regarding the type of treatment given, different therapies available at the organization/centre, prognosis of the patients improvement in quality of life, support for previous care given to the patient/clients.
2.0 Memory 2.1 A Theory of General Memory Function 2.2 Information Processing Theories 2.3 The Levels of Processing Theories 2.4 The Organization of Long Term Memory 2.5 Retrieval From Long term memory. 2.6 Forgetting	II. Preparation of a brief report based on the observations made during case study-visit to an organization.
3.0 Learning 3.1 Definition 3.2 Classical Conditioning 3.3 Instrumental Conditioning 3.4 Escape Learning 3.5 Avoidance Learning 3.6 Signature of Instrumental Conditioning 3.7 Cognitive Learning	
4.0 Motivation 4.1 Definition 4.2 Motives as References, Explanations and Predictions. 4.3 Theories of Motivation 4.4 A Normal of Biological Motivation 4.5 Biological Motivation 4.6 Social Motives 4.7 Self-Actualization Motivation 4.8 Frustration and Conflict of motives	
5.0 Personality 5.1 Definition 5.2 Theories of Personality	
6.0 Motivation 6.1 Definition 6.2 Etiology 6.3 Diagnosis 6.4 Clinical Features 6.5 Treatment	
7.0 Perception and Attention 7.1 Definition of Perception 7.2 Sensory Processes 7.3 Illusions 7.4 Attention	

8.0 Emotions 8.1 Definition 8.2 Expression and Perception of Emotions 8.3 Physiology of Emotions 8.4 Stress	
9.0 Intelligence 9.1 Definition 9.2 Intelligence Quotient (IQ) 9.3 Intelligence Testing	

Abnormal Psychology - 2nd Year

Theory	Practical
Detailed Syllabus : 1.0. Abnormal Psychology 1.1. Definition of Psychological Disorder 1.2. Classification of Psychological Disorder	Detailed Syllabus <p>The Main objective of the course in Psychology is to help the students establish a better rapport with their clients. A basic understanding and knowledge of this subject will enable the students to deal with each client as an individual, while also being aware of his/her unique needs. Also, due to the established mind-body connection, some patients requiring Physiotherapy have a Psychological cause as the basis of their physiological symptoms. Severe physiological symptoms requiring therapy can lead to psychological conditions in the patient. Relevant knowledge of psychology can help sensitize the physiotherapist to the needs of the client and treat the patient in a more holistic manner.</p> <p>Such a course would need to have an experimental component in the form of practical work. The objectives of the practical work are :-</p> <ol style="list-style-type: none"> 1. To give the students firsthand experience in field work with hospitals / centers catering to the psycho-physiological needs of patients. 2. To develop in the students the skill and sensitivity to deal with each patient as an individual with his or her own unique need. 3. To guide the students to prepare a project report. 4. To equip the students to make a note of patients psychological conditions in the case history of the patient. 5. To instill in the students the right values and a greater understanding of their patients.

2.0 Schizophrenia 2.1 Definition 2.2 Symptoms 2.3 Subtypes 2.4 Treatment 2.5 Prognosis	
3.0 Paranoia 3.1 Definition 3.2 Symptoms 3.3 Subtypes 3.4 Treatment	
4.0 Manic Depressive Psychosis 3.1 Definition 3.2 Symptoms 3.3 Subtypes	
5.0 Melancholia 5.1 Symptoms 5.2 Treatment	
6.0 Anxiety 6.1 Symptoms of anxiety 6.2 Difference between normal fears and anxiety disorder 6.3 Peripheral manifestations of pathological anxiety. 6.4 Classification of anxiety disorder. 6.5 Treatment	
7.0 Phobia 7.1 Definition 7.2 Symptoms 7.3 Types of phobia 7.4 Treatment	
8.0 Obsessive Compulsive neurosis (OCN) 8.1 Definition of Obsession 8.2 Definition of Compulsion 8.3 Symptoms 8.4 Treatment	
9.0 Hysterical Conversion Disorder 9.1 Definition 9.2 Clinical features (Symptoms) 9.3 Treatment	
10.0 Neurasthenia 10.1 Definition 10.2 Symptoms 10.3 Treatment	
11.0 Personality Disorders 11.1 Definition 11.2 Symptoms 11.3 Classification / Types of Personality Disorders 11.4 Anti-social Personality Disorder (i) Etiology (ii) Treatment	
12.0 Psychotherapy 12.1 Definition 12.2 Types of Psychotherapy	

13.0 Organic Psychosis 13.1 Definition 13.2 Symptoms 13.3 Types of Organic Psychosis (i) Causes (ii) Clinical Features (iii) Treatment (iv) Course and Prognosis	
14.0 Alcohol Related Mental Disorders 14.1 Definition 14.2 Etiology 14.3 Classification 14.4 Treatment and Rehabilitation.	
15.0 Epilepsy 15.1 Definition 15.2 Varieties / Types of epilepsy 15.3 Cause of epilepsy 15.4 Aggravating factors 15.5 Post-ictal disorders 15.6 Epilepsy Vs. Pseudo-seizures 15.7 Status Epilepticus & treatment 15.8 Treatment of Epilepsy	
16.0 Mental Retardation (MR) 16.1 Definition 16.2 Classification 16.3 Etiology 16.4 Diagnosis 16.5 Clinical Features 16.6 Treatment	
17.0 Frustration and conflict 17.1 Definition of Frustration 17.2 Sources of Frustration 17.3 Types of conflict	
18.0 Mental Mechanisms 18.1 Classification	

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

- 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 pelling 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-I 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-I 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 Enterpreeurship Development, M.P. (CEDMAP), 60 Jail . Road, Jhangerbad, Bhopal-462008.

Elective – II - APPLIED SCIENCE (Physics & Chemistry) – 1st Year
(Subject Code – 90000021)

Theory	Practical
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	Detailed Syllabus Perform a simple experiment on measurement and error
2.0. Scalars and Vectors 2.1. Introduction to scalars and vectors 2.2. Addition and subtraction of vectors 2.3. Product of vectors	
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	Experiment on gravitational force(example of a ball falling from a certain height)
4.0. Friction 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	Proof of Stoke's theorem and Bernaulli's principle
5.0. Dynamics 5.1 Introduction, Newton's Law of Motion. 5.2 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.	Derivation for Potential energy and kinetic energy

<p>5.3 Impulse, Law of conservation of linear momentum, Conservation of linear momentum during collision.</p> <p>5.4 Work, power, energy potential Energy (PE), Kinetic Energy (KE), definition & derivation for both, relation between KE & linear momentum.</p> <p>5.5 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>6.0. Sound waves</p> <p>6.1. Waves and oscillations</p> <p>6.2. Progressive waves</p> <p>6.3. Characteristics of transverse waves, longitudinal waves</p> <p>6.4. Sound as longitudinal wave motion</p> <p>6.5. Definition of period, frequency, wavelength giving their relations.</p> <p>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</p> <p>7.2. Linear expansion, area and volume expansion</p> <p>7.3. Thermal conduction, temperature gradient and coefficient of thermal conductivity</p>	Experiment on expansion of solids in a thermal environment
<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</p> <p>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</p> <p>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</p> <p>8.4. Critical angle, Optical fiber, dispersion of light, Prism formula, angular dispersion and dispersive power</p> <p>8.5. Refraction at single curved surface</p> <p>8.6. Lens maker's equation</p> <p>8.7. Concept of conjugate foci</p> <p>8.8. Magnifying power of simple microscope, compound microscope and telescope</p> <p>8.9. Lens defects</p>	Experiment on Refraction of light using a prism
<p>9.0. Modern Physics</p> <p><u>Part A – Electrons and Photons</u></p> <p>9.1. Discovery of electron</p> <p>9.2. Charge and mass of electron</p> <p>9.3. Photo electric current</p> <p>9.4. Einstein's equation</p> <p>9.5. Photoelectric cell and its applications</p> <p><u>Part B – Atoms, Molecules and Nuclei</u></p> <p>9.6. Bohr's model</p> <p>9.7. Hydrogen spectrum</p> <p>9.8. Laser as a light source</p> <p>9.9. Wavelength of an electron</p> <p>9.10. Davisson and Germer experiment</p> <p>9.11. Elementary idea of electron microscope</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	Solve Problems based on weight – volume relationship
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.	Study of Planck’s quantum theory and Bohr’s theory
3.0 Classification Of Element And Periodicity In Properties 3.1 The concept of grouping elements In accordance to their properties. 3.2 The periodic law. 3.3 The significance of atomic number and electronic configuration as the basis for periodic classification. 3.4 Classify elements into s, p, d, f blocks and discuss their main characteristics. 3.5 Periodic trends in physical and chemical properties of elements. 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. 3.7 Variation of atomic radii in inner transition elements.	Study of Structure of periodic table
4.0. Redox Reaction 4.1. Introduction to Oxidation & Reduction 4.2. Electron transfer concept 4.3. Oxidising & Reducing agents 4.4. Redox reactions in aqueous solutions 4.5. Oxidation number and rules for assigning oxidation number 4.6. Balancing of chemical equations	
5.0. Chemical Equilibrium 5.1. Introduction: Reversible and irreversible reactions 5.2. Rate of reaction and factors affecting it 5.3. Chemical Equilibrium 5.4. Laws of Mass action, Equilibrium constant, relationship between K_p and K_c	Numerical problems based on K_p and K_c

6.0. Adsorption: 6.1. Concept of adsorption 6.2. Difference between absorption and adsorption 6.3. Physical and chemical adsorption 6.4. Factors affecting adsorption 6.5. Applications of adsorption	Experiment on absorption(example of a sponge) to give the difference between absorption and adsorption
7.0 Chemical Bonding and Molecular Structure 7.1 Kossel-Lewis approach to chemical bonding. 7.2 Factors favorable for the formation of ionic bond, energy changes in ionic bond formation. 7.3 Crystal lattice energy – calculation of lattice energy – Bom-Haber cycle. 7.4 Crystal structures of sodium chloride and Caesium chloride. 7.5 Properties of ionic compounds. 7.6 Covalent bond – VSEPR theory and predict the geometry of simple molecules. 7.7 The valance bond approach for the formation of covalent bonds. 7.8 Directional properties of covalent bond. 7.9 Properties of covalent bond. 7.10 Different types of hybridization involving s, p and d orbitals and draw shapes of simple covalent molecules. 7.11 Definition of coordinate covalent bond with examples. 7.12 Description of molecular orbital theory of homonuclear diatomic molecules. 7.13 Bonding, antibonding molecular orbitals, o, n bond orbitals, their symmetry. 7.14 Energy diagrams of molecular orbitals of H ₂ , N ₂ and O ₂ . 7.15 Concept of hydrogen bond – Types of hydrogen bonds, 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. <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	1) Solve numericals on Ohm's law 2) Experiment on wheatstone's bridge
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	
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	Study of various types of cables and wires
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.	Experiment on faraday's law of electrosttics
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.	Solve numericals on binding energy and half life rate

<p>8.0 Surface Chemistry</p> <p>8.1 Adsorption and absorption. Physical and chemical adsorption-distinguishing properties- Adsorption of gases on Metals Adsorption from solutions (Elementary treatment).</p> <p>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.</p> <p>8.3 Emulsions:- Emulsifying agent and emulsification - its applications. Cleansing action of soap.</p> <p>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</p> <p>9.1 Theories of Acids and Bases Lowry - Bronsted concept Lewis theory of acids and bases.</p> <p>9.2 Ionic product of water, PH, Buffers - Numerical problems on these, Indicators - Choice of indicators, PH-range and uses.</p> <p>9.3 Salt hydrolysis - Types of hydrolysis with examples.</p>	<p>Solve numericals on pH value.</p>
<p>10.0 Alkanes, Akkenes, Alkynes and Aromatic compounds</p> <p>10.1. Introduction and importance of organic chemistry</p> <p>10.2. General characteristics of organic compounds</p> <p>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. Aidehydes 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 & Easters</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 – 90000022)

Theory	Practical
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	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
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	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
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.	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
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.	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

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. 5.7. Filtration 5.8. Converting presentations to PDF files. 5.9. 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 – 90000022)

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
4.0. Forms & Reports 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	4.0. Practicing Forms and Reports 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
5.0. Sharing data across applications 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	5.0. Practice: 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
6.0. Study of Application packages 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	6.0. Practice 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
7.0. Project work 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.	7.0. Project Work 7.1. Making a working model/project using MS Access 7.2. Project Report

Elective – II - Business Mathematics – 1st year
(Subject Code – 90000023)

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	
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	
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	

9. Numerical Methods 9.1 Finite differences 9.2 Interpolation with equal intervals 9.3 Interpolation with unequal intervals 9.4 Numerical integration	
10. Discrete Probability Distribution 10.1 Binomial Theorem 10.2 Binomial Distribution 10.3 Poisson Distribution	
11. Management Mathematics 11.1 linear programming problem 11.2 Assignment problem 11.3 Sequencing	
12. Demography 12.1 Introduction, definition, Uses of vital statistics 12.2 Measurements of Mortality 12.3 Life tables	
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	
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.	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

Subject - 1 :- Basic Food Preservation and Packing – 1st YEAR
(Subject Code - 40140005)

Theory	Practicals
Introduction: Post harvest technology Storage of various foods General principles underlying spoilage and its causes Basic principles and methods of preservation	Canning of mango slices, pineapple slices and mushrooms
Use of high temperature Thermal processing of foods, thermal death time Heat penetration, Factors affecting heat resistance Canning, Pasteurization and Sterilization principles- Effect on foods	Sun drying and dehydration of grapes, sapota, amla slices etc
Use of low temperature Low temperature methods, Freezing changes during preparation and frozen storage, Thawing Slow and quick freezing, IQF(frozen peas, Onion, Okra etc), Dehydrofreezing	Preparation and analysis of sugar syrup and brine
Drying and dehydration Drying rate curve, principles, methods of drying and dehydration, effects on foods	Preparation of mango and lime pickles
Use of preservatives Classification of preservatives, principles of preservation by salt, sugar and acids Pickles, jams, jellies, syrups, tomato sauces Use of chemical preservatives- Benzoic acid, sorbic acid, sulphurdioxide, acetic acid, lactic acid and others	Preservation of foods using sugar, acid, chemicals and heat e.g., jam, jellies and sauces etc
Irradiation and other methods Irradiation principles, uses , dose levels, advantages and disadvantages Other methods- Solar, Microwaves, wax, Emulsion, Controlled atmospheric storage	Preservation of foods by using salt e.g., salted fish, meat etc
Drying & Dehydration a) Definition b) Advantages of this method c) Principle of preservation d) Different types of dryers List of some commercially important dries products & names of the equipment used to dry them	Preparation of various types of candies e.g., ashgourd petha, bel murabba, alma morabba, mango candies etc
Sanitary standards, personal hygiene	Preparation of different types of jams: Apple, Pineapple, strawberry, papaya, mango, mixed fruit etc
Food Additions a) Use of artificial colours and Flavourings b) use of other substitutes c) use of chemical preservatives d) merits and demerits of all three. Food grades and standards F. P. O. AGMark.	Preparation of different types of Jellies & Marmalades: Guava, rose-apple, woodapple, orange marmalade, plum marmalade, mint jelly etc

Subject - 1 :- Basic Food Preservation and Packing – 2nd YEAR

Theory	Practicals
Meat and meat products Structure and composition of meat tissues, cuts and grades of meat, Post mortem changes, tenderization of meat and ageing Pre-slaughter treatment, slaughtering and related practices	Preparation of frozen meat and burger
Meat processing- canning, drying, freezing, irradiation, smoking, curing, packing Value added meat products-Burger, patties,pies By-products of meat processing	Dehydration of meat
Poultry and poultry products Classification, composition, nutritive value Poultry processing- Slaughter and bleeding, scalding, defeathering, eviscerating, chilling, packaging Value added products- tandoori chicken, RTE products	Roasting and mincing of poultry
Fish and fish products Types of fish, composition and nutritive value Fish spoilage, storage of fish- freezing at sea and freezing at land Value added products- coated fish products, white fish products, fish cakes and burgers Fish recipe products, smoked fish, surmai technology, processing of shrimps, crab, lobsters, scampi, mollusks	Preparation of salted fish and coated products
Egg processing Structure, composition, nutritive value Quality and storage Processing- PASTEURIZATION, desugarization, freezing, dehydrated products	Microbiological testing of meat, fish, poultry and eggs
Planning of food preservation production unit sources of finance specification and lay out of planning Government licenses and other conditions required.	Vinegar Production Preparation of Synthetic Vinegar Preparation of spiced vinegar
F.P.O. (Fruit Products order) a) Introduction to F.P.O. b) Importance & necessity of F.P.O. c) Rules & Regulations F.P.O. specifications for different fruit & vegetable products	Frozen Products: frozen peas, frozen guava pulp, frozen pineapple slices, frozen mango pulp

Marketing <ul style="list-style-type: none"> a) What is marketing? b) The core concepts of marketing <ul style="list-style-type: none"> - Needs, wants & Demands - Products - Value & satisfaction - Exchange & transaction - Markets c) Market segmentation targeting & position <ul style="list-style-type: none"> a) Concept of a product life cycle b) Advertising & Sales Promotion 	Miscellaneous Products:preparation of raisins, preparation of dried potato chips, lye peeling of orange segments
Food Adulteration - ;identification, Food Laws. Prevention of food Adulteration Act.	
Types of spoilages in preserved production causes control	

Books for reference:

1. Food preservation by irradiation- Arun Behre, Arun Sharma
2. Principles of Food preservation- Fennema and Owen
3. Food Processing and preservation – G. Subbulakshmi, Shobha Udipi
4. The technology of food Preservation- N.W. Desoroiser
5. Frozen food technology- C.P.Mallett
6. Food science 5th edition-Norman Potter

**Subject - 2 :-Microbiology, Quality control, hygiene and catering science – 1st YEAR
(Subject Code - 40140006)**

Theory	Practicals
Introduction History of microbiology, micro-organisms and men Classification of micro-organisms- Bacteria, Yeast, Fungi, Algae, Protozoa, Viruses	Handling of laboratory instruments, their requirements, use and care- Incubator, Autoclave, Inoculating chamber etc
Culture methods Methods of isolation of pure culture, culture maintenance media Techniques of culturing, Asepsis	Sterilization of glassware
Microscopy Microscope, Methods of microscopic examination, Staining Techniques	Preparation and sterilization of standard media
Morphology Morphological and cultural characteristics of bacteria and fungi Vegetative cells, Spore motility	Plating techniques, viable count and total counts
Physiology Physiology in micro-organisms Autotrophs and Heterotrophs, Aerobes and anaerobes, Micro aerophilic, Psychrophiles, Mesophiles and Thermophiles	Microscope construction and working of microscope
Growth Factors affecting growth and death, Cell division, Budding, Sporulation, Fragmentation Growth optima, Phases of growth	Microscopy of standard cultures- bacilli, cocci, fungi, yeasts, algae
Sources of micro-organisms-Green plants, fruits, animals, sewage, soil, water, air etc	Staining procedures- simple, negative, gram, acid fast capsule, spore flagella
Cereals, vegetables and fruits Contamination, source, causative agents and prevention Cereal and cereal products Sugar and sugar products Vegetables and fruits Canned foods	Preparation of biochemical media for identification of micro-organisms
Meat, Fish and Poultry Contamination, spoilage and prevention Meat and meat products Fish and fish products Egg and poultry	Identification of micro-organisms by various methods – cereal and cereal products, vegetables, fruits and their products, compare above products with available standards
Milk and milk products Contamination, spoilage and prevention of milk and milk products	Isolation of micro-organisms from milk and curd

Subject - 2 :-Microbiology, Quality control, hygiene and catering science – 2nd YEAR

Theory	Practicals
Food Poisoning and food borne diseases Bacterial- Botulism, Staphylococcus aureus, Salmonellosis, Vibrio etc., Mycotoxins, Viral diseases Air Borne diseases	Isolation of micro-organisms from meat and meat products
Definition – Nutrition, optimum nutrition, malnutrition and under- nutrition. Definition of calories – Daily requirements; factors that affect the daily requirements. Food groups and their role in balanced diets. Carbohydrates – Composition, classification, sources, functions, daily requirements, excess and deficiency. Protein – Composition, classification, sources, daily requirements, excess and deficiency., improving protein quality by supplementation. Fat – Classification according to source, difference between animal fat and vegetable fat, functions, daily requirements, excess and deficiency. Digestion of food; absorption and metabolism of food. Vitamins in diet – Fat soluble – A,D,E and K, water soluble –B complex and vitamin C- Sources, functions, daily requirements, excess and deficiency. Effects of heat on vitamins.	Detection of salmonella, staphylococci, shigella, vibrio, clostridium
Light – Spectrum, use of colours – natural and synthetic food colours; measurement of colours. Chemical constituents of foods. Structure and texture of foods. Flavour and aroma of fruits and vegetables. Pigment in fruits and vegetables. Food additives.	Method of preparing slides and use of simple stains. Differentiation of yeasts, moulds and bacterial cells.
Storage of food – Correct handling of food, techniques of correct storage. Temperature at which bacteria are killed or their growth retarded; storage temperatures of different commodities to prevent bacterial contamination and spoilage or growth. Safe and correct disposal of garbage.	Determination of acidity in fruit and vegetable products. Methods of determining reducing sugar and salt contents of foods.
Heat and temperature – types of heat – sensible heat., latent heat; heat transfer – conduction, convection and radiation. Types of fuel gases – properties., principle of bunsen burner; striking back; safety precautions; meter reading. Conductors and non-conductors; meaning of Ampere, Volt, Watt, fuse and earthing. Short circuit - causes and remedies; Different types of thermostat. Meter reading. Breakdown maintenance and preventive maintenance equipment	Fermentation test technique for juices and beverages. Bacterial count in tomato products.

Rodents and insects as carriers of food borne diseases - rodent and insect control techniques. Special stress on control of flies; rats and cockroaches. Daily weekly and spring cleaning.	Water analysis- colony count. Microbiological examination of canned foods.
Care of premises and equipment – Layout of the premise; impervious washable floors and walls. Cleaning table tops, floors etc. With sodium hypochlorite (100 p.p.m.). Good ventilation and lighting. Smooth flow of work- prevention of over-crowding and back tracking, care of dark corners, crevices and cracks	Examination of raw material. Examination of can seam. Determination of brix by (a) Hydrometer (b) Refractometer (c) Indirect method.
Cleaning of equipment and personal tools immediately after use. Use of hot water in the washing process.	Methods of determining sulphur dioxide and benzoic acid contents of foods. Detailed cut-out analysis of fruit and vegetable products.
Fire precautions – different types of fires– extinguishers, common fire hazards. The equipment available for the specific craft, their specifications and cost. Use care & Maintenance and cleaning of fixed & Moveable equipments	Test for adulterants in common foods.
Legal administration and quality control – laws relating to food hygiene	Detection of pathogens in foods.

Books for reference:

1. Microbiology- S.S.Purohit
2. Food Microbiology- W.C.Frazier and D.C.Westhoff
3. Modern food microbiology- James Jay
4. Basic food microbiology-G.J. Banwart
5. Food chemistry- Owe R. Fennema
6. Food, Facts and Principles- Maney Shakuntala
7. Food Chemistry- Meyer L. H.
8. Smt. Kukade S. etal Food Preservation manual . S. N. D. T. university Publication 1994.
9. Goplalan Indira & Mohan Ram. Fruits National Institute of Nutrition.
10. Smt. Radha Puri, jam, jelly, Marmalade.
11. Dr. Kadam S. S. & Shree Dhotre Vasant Phal Prakriya – ek Mahatvacha Laghu udyog.

Subject - 1 :- Advanced packing and law – 1st YEAR
(Subject Code - 40140007)

THEORY	PRACTICALS
Food legislation and legal requirements for laboratory Food legislation and legal requirements of food analysis Maintenance of samples and records	Estimation of moisture
Sampling tools and sample preservative Oil thief, tube, trier, drill, pelican Sample preservative methods and techniques Viz., container, field, requirement, procedure	Preparation of standard solution e.g., 1N NaOH, 1N I ₂ , 0.1N AgNO ₃ , and 0.1NK ₂ Cr ₂ O ₇
pH measurement and analytical balance Definition of pH, concept of acidity and basicity, buffer systems Mono-pan mechanical balance, mono-pan electronic balance, least count, accuracy and precision	Estimation of acidity and pH measurement
Analytical results and techniques of separation and purification Accuracy, precision, reliability and reproducibility of results of food analysis Filtration, centrifugation, sublimation, electrophoresis	Qualitative and Quantative measurement of CHO
Proximate constituents Proximate constituents of foods(moisture, free and bound, carbohydrate, protein, fats, crude fibre, ash minerals)	Qualitative and Quantative measurement of Proteins
Adulteration Definition, types, detection of adulteration- methods based on proximate composition	Estimation of total ash Estimation of NaCl in food Estimation of fat by Soxhlet method and gravimetric method Estimation of Vitamin C
Advances Recent developments in food analysis techniques	Detection of adulteration of various food products

Subject - 3 :- Advanced packing and law – 2nd YEAR

THEORY	PRACTICALS
Packaging- Definition, importance, Functions, Various types of packaging and primary elements of packaging forms	Collection of packaging material as an album
Packaging material Various packaging materials e.g., aluminium, tinned steel, glass, paper, paperboard, carton board, flexible films, laminates and others Metal container- can fabrication, can lacquers, types of can, advantages and disadvantages Glass container- manufacturing process, advantages and limitations Plastic films- food grade plastic films, properties and uses Paper films- Types of paper, properties and uses	Cut out examination of canned food
Methods of packaging Aseptic packaging – sterilization of packaging material, sterilization of product, aseptic can system, aseptic sup system and aseptic carton system	Testing of glass container
Retort packaging Packaging material, properties requirement and retort packaging system	Testing of packaging material for its bursting strength and tearing strength
Decorative packaging Decoration, different graphic designs and suitable printing methods	Identification of plastic films by visual methods
Size and shape of packaging Storage, distribution and transportation, shipping containers, secondary containers, boxes, crates, baskets etc.	
Quality of packaging and its material Packaging specification and control of packaging quality, testing of packaging material- glass, flexible film and corrugated board	
Shelf life and legislation Shelf life testing and factors affecting food packaging laws and food labeling	

Books for reference:

1. Textbook of analytical Chemistry 1st edition- S.M. Khopkar
2. Handbook of food analysis- S.N. Mahindru
3. Chemical Analysis of food 8th edition – Pearson David
4. The Chemical analysis of food and food products 3rd edition- M.B. Jacobs
