



VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F.Y. B.Sc. Microbiology

ENGLISH (Higher Level)

Unit No.	Topic
	Text – A spectrum of English Writing
1	SPORTS
	1.1 Our Young Don 1.2 Uncle Ken at the Wicket
2	LETTERS
	2.1 A Letter to a Well-Intentioned Parent 2.2 A Daughter writes to her father
3	USE OF TECHNOLOGY
	3.1 Methyl Bromide 3.2 New Vaccines
4	ENVIRONMENT
	4.1 Cleaner Cities 4.2 The Tuskers Trial
5	SCIENCE
	5.1 Superstition must give way to Science 5.2 The life cycle of a mosquito
6	EDUCATION
	6.1 Best Teacher I ever had 6.2 The Legacy
7	INTERVIEWS
	7.1 Soul Search 7.2 Ratan Tata
8	ADVERTISING
	8.1 100 Years of Auto Advertising 8.2 Some more ads
9	Women
	9.1 Educating Amina 9.2 The Lady or the tiger
10	STRUGGLE FOR FREEDOM
	10.1 The Birth of Satyagrah 10.2 Sardar Patel
	Text – Strengthen your English by M.P. Bhaskaran & D.horsburgh
11	Basic Grammar
12	Phonetics

Environmental Studies Paper I

Unit No.	Topic
1	1.1 Natural Resources
	<p>1.1.1 Forest: Past and the present status. Exploitation pressure, threats, conservation measures. Forest as a reservoir of biodiversity. Forest as a renewable source. Problems of monoculture.</p> <p>1.1.2 Water: Water cycle, Types of water sheds. Marine, Rivers, Ponds & Lakes underground. Dams and their social and Environmental impact, over utilization of water and consequences, Recharging and conversation.</p> <p>1.1.3 Mineral: Uses, Exploitation and further projections. Mines and minerals. Impact on Environment.</p> <p>1.1.4 Food: Food for humanity and pets(Poultry, cattle) Problems and processes of food production.</p> <p>1.1.5 Cultivars: diversity Vs. monocultures, Aspects of modern Agro industry: high yielding varieties, fertilizers vs. Manures, irrigation and water logging, pesticides.</p> <p>1.1.6 Energy: Renewable & non renewable energy resources. Alternative sources of energy. Limitations and impact of fossil fuels.</p> <p>1.1.7 Land: Present status of land use pattern arable, fallow, user lands. Land degradation, soil erosion, desertification, conservation measures wasteland reclamation.</p>
2	Ecosystems
	<p>2.1 Concept and types of the Ecosystems.</p> <p>2.2 Procedures, Consumers and decomposers.</p> <p>2.3 Energy flow in ecosystem</p> <p>2.4 Ecological succession.</p> <p>2.5 Food chains, food webs and ecological pyramids.</p> <p>2.6 Introduction and features of ecosystems:</p> <p>2.7 Forest ecosystem</p> <p>2.8 Desert ecosystem</p> <p>2.9 Aquatic ecosystems</p>
3	Productivity and its conservation
	<p>3.1 Concepts, types</p> <p>3.2 Importance of diversity</p> <p>3.2 Mega biodiversity centers, & Biodiversity hot spots</p> <p>3.4 Status of Biodiversity in India and Gujarat.</p> <p>3.5 Threats of Biodiversity</p> <p>3.6 Concept of threaten, vulnerable and rare species</p> <p>3.7 Measures of conservation: In situ and ex-situ conservation of biodiversity</p>
4	Environmental Pollution
	<p>4.1 Causes and effects of pollution for.....</p> <p>4.1.1 Air (including thermal changes, acid rains, ozone layer depletion)</p> <p>4.1.2 Water – Marine & fresh waters</p> <p>4.1.3 Land</p> <p>4.1.4 Noise</p> <p>4.1.5 Nuclear hazards and radiation pollution</p> <p>4.1 Effects of urbanization: Congestion, solid waste management</p> <p>4.3 Effects of Industrialization</p> <p>4.4 Disasters: Types, causes, management.</p>

	Case study: Earthquake, Bhopal, Japan A- bomb explosion
5	Human population and the Environment
	5.1 Population growth: world scenario with emphasis on Indian scenario 5.2 Women and child welfare 5.3 Environment and human health 5.4 Epidemic and endemic diseases with reference to environmental degradation (Malaria, Typhoid, Diarrhoea, Dysentery, cholera., Rickettsia, 5.5 Role of information Technology in Environment and human health
6	Society, Government and Environment
	6.1 Concept of sustainable development and the bearing capacity of resources 6.2 Problems of development 6.3 Migration, and unbalancing (villages Vs. cities) 6.4 Rehabilitation of displaced communities 6.5 Environmental ethics: Issues and possible Solutions 6.6 Environment Protection Act 6.7 Air (Prevention and control of pollution) Act: 6.8 Water (Prevention and control of pollution) Act: 6.9 Wild life Protection Act 6.10 Forest conservation and Biodiversity Protection act 6.11 Public awareness and human rights 6.12 Case studies on Environmental molestation and Peoples Triumph 6.13 (Silent valley, chipko andolan) 6.14 Global Earth summits
7	Social awareness and participatory Environmental protection as social Responsibility
	7.1 Role of individuals, NGOs and other social institutions like universities, Schools
	7.2 Housing societies, residential settlements and colonies of industries towards following issues 7.3 Illicit cutting of Trees and killing of wild animals 7.4 Green belt near residential society, villages and factory, school, cemetery, Crematorium 7.5 Effluent leakage (Pollution by factories or sewage in the town). 7.6 Dirt-litter accumulation in the street 7.7 Noise near hospitals and noisy industry near residential areas 7.8 Foul smell and eye irritation 7.9 Dying fishes and water shed banks 7.10 Well and river water getting stained due to water pollution 7.11 Pilferage of electricity
8	Remedial measures and protection strategies
	8.1 Control of air and water borne diseases created especially due to pollution 8.2 Food contamination by 8.2.1 Heavy metals 8.2.2 Organic poisons & pesticides 8.2.3 Radio active isotopes 8.3 Noise abatement 8.4 Water treatment and purification for gray water & Black water 8.5 Industrial waste reduction and treatment Plants

Biology (Botany) Paper I

Unit No.	Topic
1	Morphology
	1.1 Placentation – Definition and types with Examples
	1.2 Aestivation - Definition and types with examples
2	Diversities of plants Cryptogams
	2.1 Algae: General Characters, Classification, Thallus, Cell Structure and reproduction in Spirogyra.
	2.2 Fungi: General Characters, Classification, Thallus, Cell Structure and reproduction in Mucor.
	2.3 Bryophyta: General Characters, Classification, External and Internal Structure, Reproduction, Alternation of Generation Funaria.(Except development)
	2.4 Pteridophyta: General Character, Classification, External and Internal Structure, Reproduction, Alternation of Generation in Nephrolepis (Fern) (Except development).
3	DEVERSITIES OF PLANTS: Phanerogams
	3.1 Gymnosperms: General Characters, Classification, External and Internal Structure, Reproduction, Alternation of Generation in Cycas. (Except development)
	3.3 Angiosperms: Classification as per Bentham & Hooker’s systems of classification, general characters, economic and medicinal importance, Botanical name of common important plants of the following families. 1)Malvaceae 2) Cucurbitaceae 3)Apocynaceae 4) Solanaceae 5)Nyctaginaceae 6)Amarillidaceae
4	Anatomy
	4.1 Stele : Definition and types
	4.2 Vascular Bundles : Definition and types
	4.3 Ergastic matters : Starch grain, Aleurone grains, Raphides, Sphaerephides, Cystolith
5	Plant Physiology
	5.1 Imbibition
	5.2 Photosynthesis – Definition, Pigments, Quantasome (Photosynthetic units) C3 and C4 Plants and their characteristics. C3 Cycle (Calvin cycle) & C4 Cycle(Hatch & Slack cycle).
	5.3 Plant Movement :
	5.3.1 Movement of locomotion:
	5.3.1.1 Autonomous movements: 1)Cilliary,2)Amoeboid.
	5.3.1.2 Paratonic Movements: 1) Phototactic, 2) Chemotactic, 3) Thermotactic.
	5.3.2 Movement of curvature:
	5.3.2.1 Growth Movements: 1) Phototropism, 2) Geotropism, 3) Hydrotropism 4) Chemotropism.
	5.3.2.2 Variation Movements: – 1) Seismonastic, 2) Nyctinastic, 3) Thigmonastic

6	Ecology
	6.1 Ecological adaptations of Hydrophytes, Mesophytes and Xerophytes with appropriate examples. 6.2 General account of biotic factors on vegetation
7	Plant Pathology
	7.1 Casual organisms, Symptoms and control measures of the following plant diseases. 7.1.1 Citrus canker 7.1.2 Rust of Wheat (Puccinia) 7.1.3 Red rot of Sugarcane 7.1.4 Green ear of Bajara
8	Human Affairs
	8.1 Forests: Importance of forests and their conservation.
	8.2 Agriculture: Definition and importance of Aqua culture. Silviculture and Horticulture.
9	Medicinal Plants
	9.1 Santalum album. 9.2 Adhatoda vasica. 9.3 Tinospora cordifolia. 9.4 Aloe barbadensis. 9.5 Azadirachta indica
10	BIOTECHNOLOGY
	10.1 Introduction to 'Biotechnology'. 10.2 Transgenic plants:- Method, any four examples. 10.3 Somatic hybridization, any three examples. 10.4 Artificial seed:- Definition, importance.

**Biology (Zoology)
Paper II**

Unit No.	Topic
1	1.1 Scope and branches of Zoology 1.2 Life Processes 1.2.1 Nutrition and its control – Ingestion, digestion, absorption, assimilation and egestion, Control of metabolism at gene, hormone and enzyme level in the cell, Feedback mechanism. 1.2.2 Reproduction. Sexual reproduction and its hormonal regulation in vertebrates.
2	Animal Diversity General morphology and functional anatomy of the following : (1) Earthworm (2) Rabbit (except skeletal system)
3	Histology and Cytology 3.1 Structure of connective tissue and nervous tissue 3.2 Structure prokaryotic and eukaryotic cells (animal cell organelles)
4	Environmental biology and Human Welfare 4.1 Adaptations of animals- Arboreal, Aquatic, Volant and Desert 4.2 Pollution- air, water and soil 4.3 Wildlife sanctuary and national parks- introduction, importance and causes of depletion and conservation. Sanctuary and national parks located in Gujarat – Gir national park, marine national park and nal sarovar bird sanctuary. 4.4 Human diseases- Aids, Typhoid, Cholera, Filariasis and Malaria.
5	Applied Zoology 5.1 Poultry: introductory idea of poultry birds, poultry farm management with reference to various methods of bird keeping, appliances Brooder, feeder, and water appliances. Poultry excreta as manure, egg as a nutritive food, care of egg laying hen, effects of light on egg laying hen. 5.2 Biotechnology . 5.2.1 Introduction, Scope, Techniques of tissue and organ culture in vitro , gene cloning. 5.2.2 Gene concept, genetic mapping, basic concepts of genetic engineering, recombinant DNA (including vectors) and human genome project (introduction only). 5.3. Fisheries 5.3.1 Introduction of marine and fresh waters fisheries of Gujarat. 5.3.2 Prawn fisheries, Pearl Oyster fisheries and Bombay duck fisheries
6	6.1 Evolution Ethology and evolution , introduction to ethology , patterns of behaviour, approach to the study of behavior, social behavior with example of honeybee. 6.2 Study of Homologous & Analogous organs.

BOTONY PRACTICAL

Unit No.	Topic
1	MORPHOLOGY
1.1	<p>Aestivation.</p> <p>i) Circular</p> <p style="padding-left: 40px;">a) Valvate: Calyx of Hibiscus</p> <p style="padding-left: 40px;">b) Twisted: Corolla of Hibiscus.</p> <p>ii) Spiral</p> <p style="padding-left: 40px;">a) Imbricate: Corolla of Caesalpinia.</p> <p style="padding-left: 40px;">b) Quincuncial: Corolla of Antigonon.</p> <p style="padding-left: 40px;">c) Vexillary: Corolla of Clitoria.</p>
1.2	<p>Placentation :</p> <p>Study of placentation to be demonstrated by permanent slides.</p> <p style="padding-left: 20px;">i. Marginal</p> <p style="padding-left: 20px;">ii. Axile</p> <p style="padding-left: 20px;">iii. Free Central</p> <p style="padding-left: 20px;">iv. Parietal</p> <p style="padding-left: 20px;">v. Superficial Vi Basal</p>
2	CRYPTOGAMES :
2.1	<p>(1) Spirogyra :</p> <p>To study the thallus structure and reproduction (Scalariform and Lateral conjugation). (Permanent slides of thallus W.M., Scalariform conjugation, Lateral conjugation.)</p>
2.2	<p>(2) Mucor:</p> <p>To study the thallus and reproductive structure. Permanent slides of Mucor vegetative W.M. Mucor sporangia, Mucor, Zygospor</p>
2.3	<p>(3) Moss (Funaria):</p> <p>To study the external features of Funaria.. Permanent slides of Funaria antheridia W.M. Funaria archegonia W.M. and Funaria capsule L.S.</p>
2.4	<p>(4) Nephrolepis:</p> <p>Preparation of Slides from the fresh material by the students – T.S. of Stolon. Permanent slides: T.S. Stolon, T.S. of rachis, T.S. of leaflet passing through sori Nephrolepis prothallus, Fern sori W.M., prothallus with antheridia, prothallus with archegonia, prothallus with sporophyte.</p>
3	PHANEROGAMES:
3.1	<p>Gymnosperm: Cycas,</p> <p>Preparation of slides from the fresh material by the students of T.S. of Rachis, T.S. of leaflet. Permanent Slides : T.S. of leaflet, T.S. of Rachis, T.S. of Coralloid root, T.S. of microsporophyll, T.S. of megasporophyll, L.S. of Ovule. Preserved specimen: Coralloid root. Microsporophyll and Megasporophyll.</p>
3.2	<p>2) ANGIOSPERM : (Families)</p> <p>Study of Morphological characters following families. Floral dissection, T.S. of Ovary and floral formula.</p> <ol style="list-style-type: none"> 1. Malvaceae: Hibiscus rosasinensis, Thespesia, Gossypium. 2. Cucurbitaceae: Coccinia India or any locally available plant. 3. Apocynaceae : Nerium, Allamanda, Catharanthus roseus, Vinca rosea 4. Solanaceae: Solanum xanthocarpum or any locally available plant. <p>Nyctaginaceae : Bougainvillea, Mirabilis Amaryllidaceae : Crinum, Polianthes</p>

4	ANATOMY:
4.1	(1) Stele: Study of stele from permanent slides: (i) Actinostele (ii) Plectostele (iii) Amphiphloic siphonostele (iv) Eustele (v) Atactostele
4.2	(2) Vascular Bundles: Study of various types of Vascular bundles from Permanent slides. (i) Radial (ii) Amphicribal (Hadrocentric) (iii) Amphivasal (Leptocentric) (iv) Collateral and open (v) Collateral and closed (vi) Bicollateral
4.3	(3) Non living cell cotents: Slides are to be prepared by the students from the given materials. (i) Starch grains: Potato tuber, Wheat or Rice Euphorbia tiruculli. (ii) Aleurone grains: Castor seed. (iii) Mineral Crystals: i. Raphides : Pothos, Colocasia petiole ii. Sphaeraphides : Opuntia, Nerium leaf iii. Cystoliths : Ficus (Banyan) leaf
5	ECOLOGY
5.1	(1) Hydrophytes : a. Fresh specimens to be shown to the students : Hydrilla, Vallisneria, Chara, Eichhornia, Pistia, Nymphaea, Marsilea.
5.2	(2) Mesophytes : Fresh Specimens to be shown to the students : Coriander, Trigonella, Allium, Garlic (Entire plants).
5.3	(3) Xerophytes : a. Fresh specimens to be shown to the students: Solanum xanthocarpum, Argemone mexicana, Casurina, Aloe vera, Opuntia Euphorbia tiruculli.
5.4	(4) Qurdrates Method
6	PHYSIOLOGY : (Experiment To be demonstrated)
	(a) Imbibition and Imbibition force. a. Test tube experiment b. Indicator experiment (b) Difference between C ₃ and C ₄ plant in leaf structure. (c) Test for Amino acid. (d) Photosynthetic pigments: Separation of pigment by paper chromatography. (e) To demonstrate chlorophyll is necessary for photosynthesis. (f) Plant movements: To demonstrate a phenomenon of phototropism, hydrotropism and geotropism.
7	CYTOLOGY:
	Preparation of slide by squash technique for mitosis.
8	GENETICS:
	Study of interaction of gene 9:7 and 9:3:4 ratio by demonstration.

9	MEDICINAL PLANTS:
	Fresh or preserve specimen for demonstration as per theory.
10	PLANT PATHOLOGY:
	(1) Citrus Canker : Infected Lemon Fruit. (2) Rust of Wheat : Infected Wheat leaf or Permanent Slides showing the spores (T.S. Wheat : Leaf infected) (3) Red rot of Sugar cane: Infected Sugarcane. (4) Green ear of Bajra : Infected specimen.

ZOOLOGY PRACTICAL

1	Study of Scope and branches of zoology
2	Study of various parts of microscope and its use(Method to use microscopes)
3	Life processes : 1) To study the control of food ingestion in animals & T.S. of intestine of mammals to show villi for absorption with the help of charts and slides. 2) Study of signetring stage & amoeba stage of plasmodium with the help of permanent slide.
4	Earthworm : Study with the help of permanent slides – T.S. through pharyngeal region, T.S. through Gizzard.T.S. through typhlosolar region, whole amount of testis , ovary,nephridia, setae, spermatheca and blood glands.
5	Dissection : Earthworm Study of external characters. Dissect the animal so as to expose its digestive system , reproductive system and nervous system.Make temporary mounting of setae, Spermatheca , Blood glands.,ovary & Septal Nephridia.
6	Rabbit : 1. Digestive system 2. Urinogenetal system 3. Respiratory system 4. Heart to be shown in dissected animal.
7	Tissue system Study of various types of tissues with the help of permanent slides :- Cardiac muscles, Aerolar tissue,Adipose tissue, Hyaline cartilage,Bone, medulatede nerve fibre and non-medulated nerve fibre of mammals.
8	Enviromental biology :- Ecological adaption of : 1. Arboreal –Chamaeleon, squirrel 2. Aquatic :- Suckerfish, Flatfish 3. Volant :- Draco,Exocoetus 4. Desert :- Phrynosoma, Uromastix.
9	Study of Air, Water and Soil pollution with the help of charts/models.
10	Study of human disease with the help of charts /permanent slides : 1. Aids 2. Typhoid 3. Cholera 4. Filaria 5. Malaria.
11	Wildlife Biology : To study with the help of charts models /photographs of examples: a. National Parks and Sanctuary of Gujarat.(eg. Lion) b. Marine National Parks (eg. Sponges, Coral, Seahorse & Star fish) c. Nal Sarovar Bird Sanctuary (eg. Egrets,Ducks, Pelican, Saras)
12	Study of Poultry Appliances: Brooder, Feeder,Appliances of water and candling of eggs. Evolution : Study of homologous and analogous organs.
13	Fisheries : Pearl oyster, Bombay duck, Zinga, Rohu, and Mrigal.

**Chemistry (Physical & Inorganic)
Paper I**

Unit No.	Topic
1	1.1 Chemical Kinetics
	1.1.1 Chemical kinetics and its scope, rate of reaction, 1.1.2 Factors affecting rate of reaction: temperature, concentration, pressure, solvent, light and catalyst, 1.1.3 Characteristics of simple chemical reactions: 1.1.4 Second order (a=b), Half life and mean life, 1.1.5 Radio active decay as first order phenomenon 1.1.6 Experimental method of Chemical kinetics: Conductometry, Numericals
	1.2 Conduction and Ionic equilibria
	1.2.1 Electrical conductance, specific conductance, equivalent conductance and molar conductance, 1.2.2 Effect of dilution on concentration, cell constant and its determination, 1.2.3 Ostwald's dilution law and its limitations; 1.2.4 Buffer solutions, acid and basic buffer actions, buffer capacity, 1.2.5 Relation between pH of acid and basic buffer concentration of their component, Numericals
2	2.1 Physical properties and Chemical constitution
	2.1.1 Classification of physical properties, 2.1.2 Atomic volume, molar volume, surface tension, parachor, specific refraction, molar refraction, dipole moment, specific rotation, viscosity and their application in determining chemical constitution, 2.1.3 Numericals
	2.2 Thermodynamics
	2.2.1 Second law of thermodynamics(in detail), 2.2.2 Carnot cycle and its efficiency, 2.2.3 Entropy concept: 2.2.4 Change of entropy for reversible, isothermic, isobaric and isochoric processes. 2.2.5 Entropy change for ideal gases, 2.2.6 Numericals
3	3.1 Solid State
	3.1.1 Definition of space lattice, unit cell, difference between crystalline and amorphous state, 3.1.2 Types of crystals with illustrations, 3.1.3 Law of crystallography, Steno's law and law of constancy of symmetry, 3.1.4 Lattice planes, 3.1.5 Miller indices, 3.1.6 Types of cubic systems, diagrammatic representation of cubic systems and d_{100} , d_{110} and d_{111} planes, 3.1.7 Bragg's equation(X-ray diffraction)
	3.2 Chemical Bonding
	3.2.1 Molecular orbital theory : LCAO method, Bonding molecular orbital, anti Bonding, 3.2.2 Molecular orbital and non-bonding, molecular orbital, 3.2.3 Bond order, magnetic properties and molecular orbital energy level diagram of Heterodiatomic molecules : CO and NO, 3.2.4 VSEPR theory
4	4.1 Periodic Properties
	4.1.1 Definition of atomic and ionic radii, ionization energy, electron affinity and electron negativity , 4.1.2 S block elements:

	<p>4.1.3 Comparative study, diagonal relationship</p> <p>4.1.4 Salient features of hydrides</p> <p>4.1.5 Solvation</p> <p>4.1.6 Complexation and tendencies including their function in biosystems.</p>
	4.2 Silver
	<p>4.2.1 Extraction of silver from Argentiferrous ore by cyanide, Pattinson and cupellation process</p> <p>4.2.2 Purification of silver by Electrolysis, Hypo and Zinns process</p> <p>4.2.3 Its properties and uses</p> <p>4.2.4 Electroplating of silver and photography</p>
	4.3 Noble Gases
	4.3.1 Chemistry of noble gases, chemistry of xenon, structure and bonding in xenon compounds
5	5.1 Co-ordination Chemistry
	5.2 Vanadium
	<p>5.2.1 Extraction of Vanadium from carnotite and petronite ores,</p> <p>5.2.2 Its properties and uses.</p> <p>5.2.3 Preparation and uses of V_2O_5.</p>
	5.3 Fertilizers
	<p>5.3.1 Definition and classification of fertilizer, Direct and indirect fertilizer, natural and synthetic fertilizers,</p> <p>5.3.2 Symptoms of deficiency of some elements like N,P and K. Industrial preparation of :</p> <p>5.3.3 Urea from natural gas</p> <p>5.3.4 Single and triple super phosphate of lime</p> <p>5.3.5 Ammonium sulphate</p> <p>5.3.6 Hazardous effect of uses of fertilizers and its preventive measures, Mixed fertilizers, complex fertilizers, Fertilizer grade, fertilizer ratio, fertilizer condition, fertilizer filler.</p>

**Chemistry (Organic)
Paper II**

Unit No.	Topic
1	<p>1.1 Empirical formula, Molecular formula and Structural formula</p> <p>1.1.1 Determination of empirical formula and its relation with molecular formula</p> <p>1.1.2 Determination of molecular weight of (a) organic acid by titration and silver salt method and (b) organic base by chloroplatinate method and its limitations.</p> <p>1.1.3 Determination of molecular formula of gaseous hydrocarbons by Explosion method, Numerical example.</p> <p>1.2 Stereochemistry</p> <p>1.2.1 Isomerism:- Optical activity, Chiral and achiral molecules.</p> <p>1.2.2 Optical isomerism of tartaric acid, Enantiomers, diastereomers (Threo & Erythro), Meso compounds, Resolution of Enantiomers, inversion, retention and racemization.</p> <p>1.2.3 Geometrical Isomerism: Alkene derivative & oximes E & Z system of nomenclature</p> <p>1.2.4 Relative and absolute configuration, sequence rules, D & L and R & S system of nomenclature.</p>
2	<p>2.1 Reaction mechanism</p> <p>2.1.1 Homolytic and Heterolytic fission: free radicals carbonium ions (carbocations) and carbanions reactive intermediates carbenes, arynes and nitrenes.</p> <p>2.1.2 Types of reagents, electrophiles, nucleophiles.</p> <p>2.1.3 Electromeric, inductive, conjugative effect.</p> <p>2.1.4 Types of reactions: Addition, substitution, elimination, rearrangements. Addition and substitution with respect to electrophilic and nucleophilic, SN_1, SN_2</p> <p>2.1.5 Mechanism of (i) addition reaction to alkenes and dienes (ii) substitution in benzene ring-nitration, sulfonation, alkylation, acylation, halogenation, cyanohydrin formation and acetal formation</p> <p>2.1.6 Mechanism of Perkin reaction and Cannizzaro' reaction.</p> <p>2.2 IUPAC nomenclature of organic Compounds</p>
3	<p>3.1 Alkanes and Cycloalkanes</p> <p>3.1.1 Alkanes: nomenclature, sources, methods of formation with special reference to Wurtz reaction, Kolbe reaction and decarboxylation carboxylic acids, Physical properties and chemical reactions.</p> <p>3.1.2 Cycloalkanes: nomenclature, methods of formation chemical reactions, Baeyer's strain theory and its limitations, Theory of strain less ring.</p> <p>3.2 Heterocyclic compounds</p> <p>3.2.1 Nomenclature, aromaticity and synthesis,</p> <p>3.2.2 Properties, uses and canonical structure of Pyridine, Pyrrol, Furan, Thiophane,</p> <p>3.3 Polynuclear hydrocarbons</p> <p>3.3.1 Classification aromaticity and synthesis or industrial preparation,</p> <p>3.3.2 Properties, uses and canonical structures of Naphthalene, Anthracene and Phenanthrene.</p>

4	<p>4.1 Alkenes, dienes and alkynes</p> <p>4.1.1 Alkenes: Nomenclature, methods of preparation, properties and uses of ethylene and propylene Markownikoff's rule and Saytzeff rule, polymerization of ethylene, styrene and vinyl chloride</p> <p>4.1.2 Dienes: nomenclature, classification of dienes, methods of formation of Butadiene, chemical reactions, 1,2 and 1,4 additions, Diel's-Aider reaction</p> <p>4.1.3 Alkynes: nomenclature, methods of formation, chemical reactions, electrophilic and nucleophilic addition reactions of acetylene</p> <p>4.2 Oils and fats</p> <p>4.2.1 Natural fats, edible and industrial oils of vegetable origin, common fatty acids,</p> <p>4.2.2 Synthetic detergents, alkyl and aryl sulfonates.</p> <p>4.2.3 Glycerides saponification determination of saponification value,</p> <p>4.2.4 Acid value and iodine value of an oil.</p> <p>4.3 Carbohydrates</p> <p>4.3.1 Definition and classification structure of D-glucose and D-fructose,</p> <p>4.3.2 Conversion of glucose to fructose and</p> <p>4.3.3 Fructose to glucose.</p>
5	<p>5.1 Arenes</p> <p>5.1.1 Method of preparation of benzene, toluene, xylene from petroleum and chemical reaction.</p> <p>5.1.2 Activating and Deactivating substituents,</p> <p>5.1.3 Orientation</p> <p>5.1.4 Ortho/Para ratio,</p> <p>5.1.5 Method of formation and chemical reactions and application of styrene</p>
	<p>5.2 Insecticides Preparation and uses of DDT, BHC and Methoxychlor</p>
	<p>5.3 Method of preparation, chemical reactions And Application of following Ethanol, Resorcinol, Diethyl ether, Acetone, Anthranilic acid, Citric acid and Acetamide</p>
	<p>5.4 Problem based on different reactions</p>

CHEMISTRY PRACTICAL

Unit No.	Topic
A	INORGANIC QUALITATIVE ANALYSIS LIST OF INORGANIC CHEMICALS
1	CHLORIDES:- $\text{Cu}^{+2}, \text{Fe}^{+3}, \text{Mn}^{+2}, \text{Co}^{+2}, \text{Ni}^{+2}, \text{Ca}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
2	BROMIDES:- $\text{Sr}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
3	IODIDE:- K^{+1}
4	NITRATE:- $\text{Pb}^{+2}, \text{Co}^{+2}, \text{Ni}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
5	SULPHIDE:- $\text{Zn}^{+2}, \text{Sb}^{+3}$
6	SULPHATE:- $\text{Cu}^{+2}, \text{Al}^{+3}, \text{Fe}^{+2}, \text{Zn}^{+2}, \text{Mn}^{+2}, \text{Co}^{+2}, \text{Ni}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
7	CHROMATE:- $\text{Na}^{+1}, \text{K}^{+1}$
8	CARBONATE:- $\text{Cu}^{+2}, \text{Zn}^{+2}, \text{Mn}^{+2}, \text{Co}^{+2}, \text{Ni}^{+2}, \text{Ca}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
9	PHOSPHATE:- $\text{Cu}^{+2}, \text{Al}^{+3}, \text{Fe}^{+3}, \text{Zn}^{+2}, \text{Mn}^{+2}, \text{Ca}^{+2}, \text{Ba}^{+2}, \text{Sr}^{+2}, \text{Mg}^{+2}, \text{Na}^{+1}, \text{K}^{+1}, \text{NH}_4^{+1}$
10	OXIDE:- $\text{As}^{+3}, \text{Sb}^{+3}, \text{Zn}^{+2}$
B	VOLUMETRIC EXERCISE
1	$\text{HNO}_3 \quad \text{NaOH} \quad \text{H}_2\text{C}_2\text{O}_4, 2\text{H}_2\text{O}$
2	$\text{H}_2\text{SO}_4 \quad \text{NaHCO}_3 \quad \text{HNO}_3$
3	$\text{NaOH} + \text{Na}_2\text{CO}_3 \quad \text{HCL}$
4	$\text{Na}_2\text{CO}_3 + \text{NaHCO}_3 \quad \text{H}_2\text{SO}_4$
5	$\text{KMnO}_4 \quad \text{H}_2\text{C}_2\text{O}_4 + \text{H}_2\text{SO}_4 \quad \text{NaOH}$
6	$\text{KMnO}_4 \quad \text{H}_2\text{C}_2\text{O}_4 \quad \text{KOH}$
7	$\text{KMnO}_4 \quad \text{FeSO}_4 \quad \text{K}_2\text{Cr}_2\text{O}_7$
8	$\text{K}_2\text{Cr}_2\text{O}_7 \quad \text{Fe-NH}_4\text{-SO}_4 \quad \text{KMnO}_4$
9	$\text{H}_2\text{C}_2\text{O}_4 \quad \text{KMnO}_4 \quad \text{FeSO}_4$
10	$\text{I}_2 \quad \text{Na}_2\text{S}_2\text{O}_3 \quad \text{K}_2\text{Cr}_2\text{O}_7$
C	ORGANIC SPOTTING
	Primary tests, Ignition test, detection of Elements, Nature of the substance (solubility test), Functional Group tests, C.T., Molecular formula, Structural formula & M.P./B.P. of the given substance
1	ACID – Benzoic, Phthalic acid, Succinic acid.
2	BASE - Aniline, p- Toluidine
3	PHENOL – Phenol, Resorcinol
4	NEUTRAL –
5	CARBOHYDRATE – Glucose, Fructose
6	KETONE – Aceton, Acetonphenon Methyl salicylate
7	ESTER – Methyl salicylate, Methyl Acetate,
8	ALCOHOL – Methenol, Ethenol
9	HYDROCARBON – Benzene, Toluene, p- Xylen
10	NITRO HYDROCARBON – NitroBenzene, m- di-NitroBenzene

11	HALOGENATED HYDROCARBON – Carbon Tetrachloride, ChloroBenzene
12	AMIDE – Urea
13	ANILIDE – Acetanilide

**Physics
Paper I**

Unit No.	Topic
1	1.1 Mechanics
	1.1.1 Rest and motion, reference frame. 1.1.2 Inertial frame of reference 1.1.3 Application of Newton's Laws – projectile DSM : 2.1 to 2.5, 4.2 1.1.4 Rigid body- translational and rotational motion 1.1.5 Torque 1.1.6 Angular momentum 1.1.7 Moment of inertia-radius of gyration 1.1.8 Dimensions and units of moment of inertia analogous parameters in translational and rotational motion, 1.1.9 General theorems on moment of inertia, 1.1.10 Calculation of moment of inertia, particular cases of moment of inertia. DSM: 10.1 to 10.9
2	2.1 Properties of Matter
	2.1.1 Elastic moduli, 2.1.2 Poisson's ratio, limiting values of Poisson's ratio, 2.1.3 Elastic constants and their relationships. 2.1.4 Bending of beams and Cantilever DSM POM: 8.12 to 8.18, 8.29 and 8.30.
	2.2 WAVE MOTION
	2.2.1 Wave motion. What propagates in wave motion?, 2.2.2 Characteristics of wave motion, 2.2.3 Transverse wave motion, longitudinal wave motion, Definitions, relations between frequency and wavelength, 2.1.4 Properties of longitudinal progressive waves, equation of SH waves, 2.1.5 Differential equation of wave motion, 2.1.6 Particle velocity wave velocity, distribution of plane progressive waves, energy of progressive waves. Ref: SB (W&O): 4.1 to 4.8, 4.11 to 4.15
3	3.1 OSCILLATIONS
	3.1.1 Lissajous figures, 3.1.2 Composition of two S H M in a straight line, 3.1.3 Composition of two simple harmonic vibration of equal time periods acting at right angles, 3.1.4 Composition of two simple harmonic motion at right angles to each other having time periods in the ratio 1:2, 3.1.5 Experimental methods for obtaining Lissajous figures, 3.1.6 Uses of Lissajous figures. Ref: SB (W&O): 2.1,2.2,2.4, 2.6,2.8 and 2.9
	3.2 ULTRASONIC
	3.2.1 Ultrasonic's, production of ultrasonic waves, detection of ultrasonic waves, applications of ultrasonic waves. Ref: SB(W&O) 11.23 to 11.25,11.27.
4	4.1 HEAT & THERMODYNAMICS

	4.1.1 Entropy and the second law of thermodynamics, 4.1.2 Entropy changes of closed system during an irreversible process, 4.1.3 Entropy 4.1.4 Change in a reversible process(Carnot's cycle) 4.1.5 Change in entropy in an irreversible process 4.1.6 Third law of thermodynamics 4.1.7 Temperature entropy diagram, entropy of a perfect gas 4.1.8 Zero point energy, negative temperatures Ref: SB(H&T) – 6.42 to 6.51
5	5.1 ATOMIC AND NUCLEAR PHYSICS
	5.1.1 Radioactivity: Soddy Fajan's Displacement laws, Laws of radioactive 5.1.2 Ddisintegration, the mean life, laws of successive disintegration, radioactive dating, 5.1.3 Biological effects of nuclear radiations. Ref: RM- 31.29 to 31.31, 31.34 to 31.36 5.1.4 X-rays: introduction, production of X-rays, 5.1.5 The absorption of X-rays, X-ray space absorption edges, 5.1.6 Bragg's law, the Bragg's X-ray Spectrometer, 5.1.7 X-ray spectra, Characteristic X-ray spectrum, 5.1.8 Moseley's law. Ref: RM – 7.1, 7.2,7.4 to 7.7, 7.11 to 7.13

**Physics
Paper II**

Unit No.	Topic
1	1.1 VECTORS
	1.1.1 Product of vectors 1.1.2 Vector product of a vector. A with the sum of two vectors B and C 1.1.3 Product of three and four vectors 1.1.4 Differentiation of vectors 1.1.5 Differentiation rules 1.1.6 Partial differentiation 1.1.7 Scalar and vector field 1.1.8 Gradient of a scalar field 1.1.9 Divergence of a vector field 1.1.10 Curl of a vector field 1.1.11 Important vector relationships. Vector integration 1.1.12 Statement of Gauss divergence theorem. stokes theorem, Ref: R –1.9 to 1.19, 1.22 to 1.24.
	1.2 ELECTROSTATICS
	1.2.1 The conservative nature of electrostatic field 1.2.2 Electric potential energy I definition of electric potential 1.2.3 Principle of superposition of potential 1.2.4 Poisson's and Laplace's equations. Ref: SCS - 4.2, 4.3, 4.10, 4.24
2	2.1 CURRENTS AND MAGNETOSTATICS
	2.1.1 <u>Transients currents</u> : the growth and decay of current in an inductive circuit 2.1.2 <u>The charge and discharge</u> of a capacitor through a resistance 2.1.3 The physics of the LC oscillator 2.1.4 Circuit with inductance, capacitance and resistance: charging process of the capacitor I the discharge of the capacitor in a series LCR circuit 2.1.5 Logarithmic decrement of the circuit. Ref: SCS -17.3 to 17.9 2.2.1 Definition, Sources of magnetic induction B 2.2.2 Some properties of magnetic induction B 2.2.3 Ampere's law, definition of ampere, magnetic dipole, Ref: RM - 7.1 to 7.3, 7.5, 7.7, 7.9
	2.2 MAGNETIC INDUCTION
	2.2.1 Definition, Sources of magnetic induction B 2.2.2 Some properties of magnetic induction B 2.2.3 Ampere's law, definition of ampere, magnetic dipole, Ref: RM - 7.1 to 7.3, 7.5, 7.7, 7.9
3	3.1 ELECTRONICS (DIODES)
	3.1.1 Current voltage characteristics of semiconductor diode 3.1.2 Resistance of semiconductor diode 3.1.3 Breakdown mechanism. Zener diode 3.1.4 Zener diode as a voltage regulator 3.1.5 Single phase full wave bridge rectifier 3.1.6 Filters. Ref: BS - 2.6,2.8,2.9 to 2.11,2.15,2.16. 3.2.7 Clipping circuits, applications of clippers 3.2.8 Clamping circuits, basic idea of a clamper 3.2.9 Positive clamper, negative clamper. Ref: VKM - 20.18 to 20.23. 3.2.10 LED,Photodiode, Ref:M-5.8
4	4.1 ELECTRONICS (TRANSISTORS)

	4.1.1 Introduction, Construction of a junction transistor 4.1.2 Operation of PNP transistor 4.1.3 Operation of NPN transistor 4.1.4 Supply voltage connections 4.1.5 current amplification factors 4.1.6 Characteristic curves of a transistor in CE connection and definitions of the h parameters. Ref: BS – 3.2 to 3.6,3.8
	4.2 DIGITAL ELECTRONICS(Logic circuits)
	4.2.1 Introduction 4.2.2 The AND gate 4.2.3 The OR gate 4.2.4 The NOT gate 4.2.5 The NAND gate. Ref. BS- 13.1 to 13.9
	4.3 ELECTRIC AND MAGNETIC INSTRUMENTS:
	4.3.1 Tangent Galvanometer 4.3.2 The D'Arsonval moving coil Galvanometer 4.3.3 The construction of the pivoted moving coil galvanometer 4.3.4 The merits and the demerits of moving coil galvanometer. Ref: SCS- 11.2,11.6,11.8,11.9
5	5.1 OPTICS:
	5.1.1 Geometrical optics: Image formation: Equivalent focal length of two thin lenses separated by a finite distance 5.1.2 Power of a lens 5.1.3 Cardinal points of an optical system Principal foci and focal planes, principal points and principal planes, nodal points 5.1.4 Retraction through a thick lens 5.1.5 Power of a thick lens. Ref: SB(O) 2.6 to 2.11,2.15,2.16
	5.2 PHYSICAL OPTICS
	5.2.1 Review of interference: introduction 5.2.2 Young's experiment, coherent sources 5.2.3 Interference in thin films, interference due to reflected light (thin films) 5.2.4 Interference due to transmitted light(thin film) 5.2.5 Fringes produced by a wedge shaped thin film 5.2.6 Newton's rings, determination of wavelength of sodium light using Newton's ring. Ref : SB(O): 8.1 to 8.3,8.15 to 8.17,8.21,8.23, 8.24

PHYSICS PRACTICAL

Unit No.	Topic
GROUP – A	
1	Moment of inertia by Torsional pendulum
2	Verification of parallel axis theorem
3	Verification of perpendicular axis theorem
4	Elastic constants by Searl's method.
5	' η ' by dynamic method
6	' η ' by static method.
7	Melde's experiment
8	Thermal conductivity of a bad conductor by Lee's method
9	Bending of a beam using cathetometer or traveling microscope (cantilever)
10	Bending of a beam supported at two ends and loaded in the middle.
11	Bifilar suspension
12	Sonometer determination of speed of transverse waves in wire.
13	Computer simulation of Lissajous figures. [D].
14	Computer simulation of projectile motion with and without resistive forces [D].
GROUP – B	
1	Cardinal points of a lens's system.
2	Newton's rings
3	Dispersive power of prism.
4	Low resistance by projection method.
5	Study of magnetic field due to a solenoid.
6	LCR Circuit.
7	Study of decay of current in CR circuit.
8	Conversion of a galvanometer into an ammeter and calibration by tangent galvanometer.
9	Full and half wave rectifier.
10	Logic Gates.
11	Zener diode as voltage regulator.
12	Study of calculation of different types of errors (average, standard deviation and probable error)
13	Computer simulation of transistor amplifier [D].
14	Study of multimeter Digital and Analogue [D].