Syllabus Completion Report
F. Y. B. Sc. - Botany: 2022-23
Plant life and utilization I (BO 111)
(Semester – I; Paper – I)

Sr. No.	Month	Topics
1	August	**INTRODUCTION -** General outline of plant kingdom (Lower Cryptogams: Thallophytes- Algae, Fungi & Lichens; Higher Cryptogams: Bryophytes and Pteridophytes; Phanerogams: Gymnosperms and Angiosperms- Dicotyledons and Monocotyledons). Distinguishing characters of these groups and mention few common examples from each. **ALGAE –** Introduction, General Characters, Classification (Bold and Wynne 1978) up to classes with reasons. Life Cycle of *Spirogyra* w.r.t. Habit, Habitat, Structure of thallus, structure of typical cell, Reproduction- Vegetative, Asexual and Sexual, systematic position with reasons. **Revision and Assignment** **Class test**
2	September	Utilization of Algae in Biofuel Industry, Agriculture, Pharmaceuticals, Food and Fodder **LICHENS** – Introduction, General Characters, Nature of Association, forms- Crustose, Foliose and Fruticose. Utilization of lichens. **FUNGI –** Introduction, General Characters, Classification (Ainsworth, 1973). **Revision and Assignment** **Class test,Seminar**
3	October	Life Cycle of Mushroom- *Agaricusbisporus* w.r.t. Habit, Habitat, Structure of thallus, Structure of SporocarpStructure of Gill, Reproduction- Asexual and sexual, Systematic position. Utilization of Fungi in Industry, Agriculture, Food and Pharmaceuticals. **Revision and Assignment** **Seminar**
4	November	**BRYOPHYTES** – Introduction, General Characters, Classification (G.M. Smith 1955) Life Cycle of *Riccia* w.r.t. Habit, habitat, external and internal structure of thallus, Reproduction- vegetative, asexual and sexual- Structure of sex organs, fertilization, **BRYOPHYTES** Structure of mature sporophyte, structure of spore, systematic position with reasons. Utilization:. Bryophytes as ecological indicators, agriculture, fuel, industry and medicine **Revision and Assignment** **Theory Internal Exam**
5	December	**Revision and Assignment, Question paper discussion**

Total lectures conducted:50 lectures
Student strength: 65

Dr. K. M. Nitnaware

Syllabus Completion Report

F. Y. B. Sc. - Botany: 2022 -23

Plant Morphology and Anatomy (BO 112)

(Semester – I; Paper – II)

Sr. No	Month	Topics
2	September	**MORPHOLOGY** Introduction, definition, descriptive and interpretative morphology. Importance in identification, nomenclature, classification, phylogeny and Plant breeding. **Revision and Assignment, Tutorial** **MORPHOLOGY OF REPRODUCTIVE PARTS:** **Inflorescence** Introduction and definition, Types: a) Racemose -Raceme, Spike, Spadix, Corymb, Umbel, Catkin and Capitulum. b) Cymose -Solitary, Monochasial- Helicoid and scorpiod; Dichasial and Polychasial. c) Special types -Verticillaster, Cyathium and Hypanthodium; Significance. **Revision and Assignment, Tutorial** **Flower** Introduction and definition, Parts of a typical flower: Bract, Pedicel, Thalamus- forms, Perianth- Calyx and Corolla, Androecium and Gynoecium. Symmetry: Actinomorphic and zygomorphic, Sexuality- Unisexual and bisexual, Insertion of floral whorls on thalamus- Hypogyny, Epigyny and perigyny, Merous condition-Trimerous, tetrmerous and pentamerous. Floral whorls: a) **Calyx:** Nature- Polysepalous, Gamosepalous; Aestivation- types, Modifications of Calyx- Pappus, Petaloid and Spurred. identification.
3	October	b) **Corolla:** Forms of Corolla- i) Polypetalous- Cruciform and Papilionaceous. ii) Gamopetalous- Infundibuliform, Bilabiate, Tubular and Campanulate. iii) Aestivation- types and significance. c) **Perianth:** Nature- Polytepalous, Gamotepalous.d) **Androecium:** Structure of typical stamen, Variations- cohesion and adhesion. e) **Gynoecium:** Structure of typical carpel, number, position, cohesion and adhesion; placentation- types and significance.
4	November	**Fruits** Introduction and definition. Types of fruits: a) **Simple: Dry-** Indehiscent - Achene, Cypsela, Nut and Caryopsis; Dehiscent - Legume, Follicle and Capsule, Fleshy: Drupe, Berry, Hespiridium and Pepo. b) **Aggregate:** Etaerio of Berries and Etaerio of Follicles. c) **Multiple fruits:** Syconus and Sorosis. **Revision** **ANATOMY** Introduction and definition Importance in Taxonomy, Physiology, Ecological interpretations, Pharmacongnosy and Wood

		identification. **Revision**
		Types of Tissues
		Meristmatic tissues: Meristem, characters and types based on origin, position and plane of division, functions.
		Permanent tissues
		Complex/Vascular tissues:Components of xylem and phloem, types of vascular bundles and functions:Simple tissues - parenchyma, collenchymas, chlorenchyma and sclerenchyma.
		Theory Internal Examination
5	December	**Types of Tissues (cont.)**
		Epidermal tissues:Epidermis, structure of typical stomata, trichomes, motor cells; functions.
		Internal Organization of Primary Plant body
		Internal structure of dicotyledon and monocotyledon root.
		Internal structure of dicotyledon and monocotyledon stem.
		Internal structure of dicotyledon and monocotyledon leaf.
		Seminar and revision
		Revision and Assignment
		Question paper discussion

Total lectures conducted: 37 Lectures
Student strength: 65

                                                                    Dr. Sangeetha J.S.

Syllabus Completion Report

S.Y.B.Sc. Botany (CBCS): 2022 - 23
BO-231. Taxonomy of Angiosperms and Plant Ecology
(Semester III, Paper I)

Sl. No	Month	Topic
1	September	**1. Introduction to Angiosperm Taxonomy** Definition, Scope, objectives and importance of taxonomy, Exploration, Description, Identification, Nomenclature and Classification Concept of Systematics with brief historical background.
2	October	2. **System of classification: Comparative account of various system of classification, Artificial system-Carl Linnaeus System of classification**– Natural System- Bentham and Hooker, Phylogenetic system -Engler and Prantl, APG system -A brief review
3	November	**3. Study of plant families** Study of following families with reference to systematic position (As per Betham and Hooker's System of classification), Salient features, floral formula, floral diagram and any five examples with their economic importance- Annonaceae , Myrtaceae, Rubiaceae**Study of Plant Families** Solanaceae, Apocynaceae,Nyctaginaceae and Amaryllidaceae **Introduction to Ecology:** Definition, concept, scope and interdisciplinary approach, autecology and synecologySpecies diversity: definition, concept, scope and types: Alpha, Beta, and Gamma diversity.Methods of vegetation sampling: quadrate method, transect method, plot less method **Theory Internal Exam**
4	December	**Ecological grouping of plants** with reference to their significance of adaptive external and internal features: a)Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes with examples. **Botanical Nomenclature** Concept of nomenclature, brief history, Binomial nomenclature, International code of nomenclature of Algae, Fungi and Plants (ICN),Principles, Rules and Recommendation, Type specimen and its types (Holotype, Paratype, Isotype, Lectotype, Neotype). Concept of Typification, Ranks and endings of taxa names,. Coining of Genus names and species names Single,double and multipleauthority citation. **Revision and Assignment** **Question paper discussion**

Total lectures conducted: 30 lectures
Student strength: 53

Dr. Sangeetha J.S.

Syllabus Completion Report

S. Y. B. Sc. Botany; CBCS 2022 -23

BO: 232; Plant Physiology

(Semester III, Paper II)

Sr. No.	Month	Topic
1	22 September	**Introduction to Plant Physiology** Brief history, Scope and applications of plant physiology
2	October	**Absorption of water** Role of water in plants Mechanisms of water absorption with respect to crop plants Factors affecting rate of water absorption **Revision, Assignment** **Ascent of sap** Introduction and definition. Transpiration pull or cohesion-tension theory; evidences and objections Factors affecting ascent of sap **Transpiration** Definition Types of transpiration – cuticular, lenticular and stomatal Structure of stomata Mechanism of opening and closing of stomata
3	November	Steward's hypothesis, Active K+ transport mechanism Factors affecting the rate of transpiration Significance of transpiration Antitranspirants Guttation Exudation **Nitrogen metabolism** Introduction, Biological nitrogen fixation, Symbiotic nitrogen fixation, nitrogenase enzyme- structure and function , Non-symbiotic nitrogen fixation ,Denitrification, ammonification and nitrification, Reductive amination and transamination Role of nitrogen in plants, **Theory Internal Examination**
4	December	**Seed dormancy and germination** Definition, types of seed dormancy and germination Methods to break seed dormancy Metabolic changes during seed germination Role of phytohormones to improve seed germination Vigor Index **Physiology of flowering**

		Photoperiodism – Concept, definition, short day plants, long day plants and day neutral plants, Photoperiodic induction, phytochrome and flowering , Phytohormones and initiation of flowering , Applications of photoperiodism; Vernalisation – concept and definition, mechanism of vernalisation, applications of vernalisation, devernalization
		Revision, Assignment
		Question paper discussion
		Practical Internal Examination
		Revision and Assignment, Question paper discussion

Total lectures conducted:32 lectures
Student strength: 53

                                                            Dr. K.M.Nitnaware

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022 - 23

BO: 351 Cryptogamic Botany

(Semester– V; Paper – I)

Sr. No	Month	Topics
1	October	**Introduction**: Cryptogams- meaning. Types- Lower Cryptogams, brief Review with examples **Algae**: General characters, distribution, Thallus organization, habit and Habitat reproduction and Classification (G.M.Smith 1955) up to classes. **Study of life cycle** of algae with reference to taxonomic position, Occurrence, Thallus structure, and reproduction of *Nostoc*, *Oedogonium Chara*, *Sargassum* and *Batrachospermum*. Economic importance of algae- Role in industry, agriculture, fodder and medicine.
2	November	**Fungi:** General characters, Habit and habitats, thallus organization, cell wall composition, nutrition and Classification. (Alexopoulos and Mims 1979) up to classes. **Study of life cycle fungi** with reference to taxonomic position, thallus structure, and reproduction of Mucor (Zygomycotina),*Saccharomyces* (Ascomycotina), *Puccinia* (Basidiomycotina), *Cercospora* **Theory Internal Exam**
3	December	Study of life cycle of fungi with reference to taxonomic position, thallus structure, and reproduction of *Penecillium* Symbiotic Associations - Lichens, *Mycorrhiza* and their significance **Revision, Assignment & question paper discussion** **Practical Internal Exam**

Total lectures conducted: 21 lectures
Student strength: 9

Prof. S. S. Katkar

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022 -23

BO.352: Archegoniate

(Semester– V; Paper – II)

Sr. No	Month	Topics
1	August & September	**Introduction to Archegoniate:** **Introduction**, general characters, distribution of Bryophytes to land habit, classification of **Bryophytes** according to G.M. Smith (1955) up to classes with reasons. **Range of thallus organisation**, origin of Bryophytes - Pteridophytes and Algal hypothesis, evolution of sporophyte. Study of Life Cycle of Bryophytes with respect to Taxonomic position, Morphology, Anatomy, Reproduction, Gametophytes and sporophytes of *Marchantia*, **Revision, Assignment**
2	October	*Anthoceros* and *Funaria.* Ecological and economic importance of **Bryophyte.** **Introduction**- Vascular Cryptogams, General characteristics, Classification according to K.R. Sporne (1975) up to classes with reasons,
3	November	Diversity and Distribution of **Pteridophytes**. Resemblances of Pteridophytes with Bryophytes, Differences between Pteridophytes and Bryophytes, Origin of Pteridophytes -Algal and Bryophytes, Evolution of **Pteridophytes**- Telome Theory and Enation Theory. Study of Life Cycle of **Pteridophytes** with respect to Taxonomic position, Morphology, Anatomy, Reproduction, Sporophytes and Gametophytes of *Psilotum*, *Selaginella* and *Equisetum.* **Theory Internal Exam**
5	December	Ecological and Economical Importance of Pteridophytes. **Revision, Assignment and Question paper discussion.**

Total lectures conducted: 33 lectures
Student strength: 9

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022- 23
BO.353: Spermatophyta and Palaeobotany
(Semester– V; Paper – III)

Sr. No	Month	Topics
1	August	**Introduction to Gymnosperms** General characters
2	September	**Introduction to Gymnosperms (cont.)** Economic importance and classification according to Chamberlain (1934). **Study of life cycle of *Pinus*** with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed structure and alternation of generations. **Revision and Assignment**
3	October	**Study of life cycle of *Gnetum*** with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed Structure and alternation of enerations. **Fossil-** Definition, process of fossil formation, types of fossils.-Impression, Compression, Petrifaction, Pith cast and Coal ball. **Classification:** Outline, Merit and Demerits of Cronquist's System **Revision and Assignment**
4	November	**Classification** (cont.) APG IV system of classification. Study of following families with reference to systematic position (As per Bentham & Hooker), Diagnostic characters, floral formula, floral diagram and any five examples with their economic importance – Nymphaeaceae, Oleaceae, Amaranthaceae, Cannaceae **Origin of angiosperms:** with reference to time, place and ancestry- 1) Pseudanthial theory 2) Transitional-Combinational Theory **Revision and Assignment** **Theory Internal Exam**
5	December	**Herbaria and Botanical Gardens** Functions of Herbarium, Important herbaria (World: Kew herbarium; India: Central National Herbarium, Kolkata). Botanic gardens of the world (Royal Botanic Garden, Kew) and India **Speciation & Endemism** Species concept (Biological, Taxonomic & Phylogenetic Species Concept), Speciation (Allopatric, Sympatric &Parapatric), Endemism and its types (Palaeoendemism, Holoendemism and Neoendemism) **Practical Internal Exam** **Revision, Question paper discussion**

Total lectures conducted: 32 lectures
Student strength: 09

Dr. Sangeetha J. S.

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23
BO.354: Plant Ecology
(Semester– V; Paper – IV)

Sr. No	Month	Topics
1	August	**Introduction**, interrelationship between the living world and the environment, levels of organization, components and dynamism of ecosystem, homeostasis, niche concept, concept of limiting factors
2	September	**Population ecology:** Definition, characteristics, population growth form, r and k selection **Community ecology**: Introduction and Definition, community structure, physiognomy, Raunkiaer's life form classification, keystone species, edge and ecotone **Revision & Assignment**
3	October	**Biogeochemical cycles:** The carbon cycle, Nitrogen cycle, Phosphorus cycle, and Hydrologic cycle
4	November	**Ecological Impact Assessment** (**EIA**) Introduction, Historical Review of EIA, Objectives of EIA, Stages of EIA process: Screening; Scoping; Baseline study; Impact prediction and assessment; Mitigation; Producing Environmental Impact Statement (EIS); EIS review; Decision making; Monitoring, Compliance and Enforcement; Benefits of EIA. **Remote Sensing** Definition, basic principles, process of ecological data acquisition and interpretation, global positioning system, application of remote sensing in ecology. **Ecological management:** Concepts, sustainable development, sustainability indicators **Theory Internal Exam**
5	December	**Environmental Audit** Meaning and concept, need, objectives, benefits, types, audit protocol, process, certification, personnel environmental audit **Biogeography**: Floristic realms, speciation and its types, biogeographic regions of India, Plant indicators **Revision, Seminars and Question paper discussion** **Practical Internal Exam**

Total lectures conducted:30 lectures
Student's strength: 9

Prof. P. D. Kad.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.355: Cell and Molecular Biology

(Semester– V; Paper – V)

Sr. No	Month	Topics
1	October	**Introduction to Cell Biology** : Definition, Brief history of Cell Biology, Units of measurement for cell, Interdisciplinary nature of Cell Biology **Cell organelles**: Ultrastructure, components and functions of Cell wall and cell membranes, mitochondria and Chloroplast, endoplasmic Reticulum, Golgi apparatus, Lysosomes, Vacuoles
2	November	**Nucleus**: Morphology and ultrastructure of nucleus, nucleolus and nucleolar organizer Nuclear envelope – structure of nuclear pore complex, transport of molecules across nuclear envelope. **Revision and Assignment** **Chromosomes**: Euchromatin and heterochromatin Histones, Packing of DNA into chromosomes in eukaryotes, Karyotype and ideogram, Polytene chromosomes and lampbrush chromosomes. **Genetic material DNA**: historical perspective from 1953 to 2020, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment. **Revision and Assignment** **Theory Internal Exam**

Total lectures conducted: 16 lectures
Student's strength: 9

Prof. R.V. Mechkar.

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23
BO.356: Genetics
(Semester– V; Paper – VI)

Sr. No	Month	Topics
1	August	**Introduction to Genetics.** History, Definition, Concept, branches and applications of Genetics.
2	September	**Mendelism** Genetical terminology, Monohybrid cross, Law of dominance, Incomplete dominance, Law of segregation, Dihybrid cross, Dihybrid ratio, Law of independent assortment, Back cross and Test cross. **Neo Mendelism (Gene Interaction)** Genetic interaction, Epistatic interactions –supplementary gene (recessive epistasis 9:3:4), Inhibitory genes (13:3), Masking genes (12:3:1), Non- Epistatic inter-allelic genetic interactions-Complementary genes (9:7), Duplicate genes (15:1)
3	October	**Multiple alleles** Definition, Concept, Characters of multiple alleles, Examples of multiple alleles – Blood group in human and self-incompatibility in Nicotiana **Linkage, Recombination and Crossing Over** Linkage- Definition and Types, Crossing over: Definition and Types, Construction of a linkage map by two point test cross and three point testcross, Recombination: Concept, definition and types **Revision & Assignment**
4	November	**Mutation:** Concept, definition and types **Numerical alterations of chromosomes.:** Euploidy, Aneuploidy-Concept and Types, Aneuploidy in Plants and Human, Polyploidy in Plants & Animals, Induced Polyploidy, applications of Polyploidy **Structural alterations of chromosomes.:** Types, cytology and genetic effects of Deletion, Duplication Inversion and Translocation with examples. **Cytoplasmic & Quantitative Inheritance:** Concept of quantitative inheritance, Inheritance of quantitative trait in Maize (Cob length), **Theory Internal exam**
5	December	Cytoplasmic inheritance Definition and concept, Chloroplast- Varigation in Four O'clock plants, Mitochondria- Petite mutants in yeast. **Sex Linked Inheritance:** Concept of Sex chromosomes and autosomes, Inheritance of X-linked genes –Inheritance of colour blindness in humans, Inheritance of Y-linked (Holandric genes) in humans, Sex influenced genes, Sex-limited genes. **Revision, Seminars and Question paper discussion** **Practical Internal Exam**

Total lectures conducted: 36 lectures

Student's strength: 9

Prof. P.D.Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

Skill Enhancement course

BO.3510: Medicinal Botany

(Semester– V; Paper – X)

Sr. No	Month	Topics
1	October	**Medicinal Plants**: History, Scope and Importance 01 2 Indigenous Medicinal Sciences; Definition and Scope **Ayurveda**: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2	November	**Siddha**: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations. **Revision and Assignment** **Theory Internal Exam**

Total lectures conducted: 10 lectures
Student's strength: 09

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

Skill Enhancement course

BO.3511: Plant Diversity and Human Health

(Semester– V; Paper – XI)

Sr. No	Month	Topics
1	October	**Plant diversity and its scope**- Genetic diversity, Species diversity, Plant diversity at the ecosystem level. **Agrobiodiversity** and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.
2	November	**Loss of Biodiversity**: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss. **Management of Plant Biodiversity:** Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations. **Conservation of Biodiversity**: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ **Theory Internal Exam**
3.	December	**Conservation of Biodiversity** :Ex situ conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development. **Role of plants in relation to Human Welfare** a) Importance of forestry their utilization and commercial aspects b) Avenue trees c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses. **Practical Internal Exam** **Revision, Question paper discussion**

Total lectures conducted: 7 lectures
Student's strength: 9

Prof. S.S.Katkar

DEPARTMENT OF BOTANY

All the practicals of F.Y. B.Sc., S.Y. B.Sc. and T.Y. B.Sc., Term-I were completed on time as per the guidelines of Savitribai Phule Pune University.

Faculties:

1. Dr. K.M. Nitnaware

2. Dr. Sangeetha J.S.

3. Dr. S.M. Jagtap

4. Prof. P.D. Kad

5. Prof. R.V. Mechkar

6. Prof. S.S. Katkar

Dr. K.M. Nitnaware
Head,
Dept. of Botany

Syllabus Completion Report
F.Y.B.Sc. Botany CBCS Pattern
(Semester II, Paper I) 2022-23
BO-121: PLANT LIFE AND UTILIZATION II

Sr. No.	Month	Topic Covered
1	March	**Credit I** 1. INTRODUCTION: Introduction to plant diversity- Pteridophytes, Gymnosperms and Angiosperms with reference to vascular plants.
2	April	2. PTERIDOPHYTES: General characters, Outline classification according to Sporne (1976) up to classes with reasons. Life cycle of Nephrolepis w.r.t. Habit, habitat, distribution, morphology, anatomy of stem and leaf, Reproduction – vegetative and sexual. 3.Utilization and economic importance of Pteridophytes
3	May	**Credit II** 1. GYMNOSPERMS: General characters, Outline classification according to Sporne (1977) up to classes with reasons. Life cycle of Cycas w.r.t. Habit, Habitat, Distribution, Morphology and Anatomy of Stem, leaf and reproductive organs- Male cone, Microsporophyll, microspores and megasporophyll, megaspore; structure of seed; Utilization and economic importance of gymnosperms. 2. ANGIOSPERMS: General characters, Outline of classification of Bentham and Hooker's system up to series, comparative account of monocotyledons and dicotyledons. 3. Utilization and economic importance of Angiosperms: In food, fodder, fibers, horticulture and medicines. **Theory Internal Examination** **Practical Internal Examination** **Practical External Examination** **Revision & Assignment**

Dr. K. M Nitnaware

Syllabus Completion Report
F. Y. B. Sc. [Botany]: 2022-23
CBCS

BO-122; Principles of Plant Sciences
(Semester II, Paper II)

Sr. No	Month	Topics
1	February	**Credit - I** Introduction to Plant Physiology Diffusion
2	March	Osmosis Plasmolysis Growth – Definition, **Revision & Assignment**
3	April	Growth (Cont.) - Factors affecting growth, plant growth regulators Structure of Prokaryotic & Eukaryotic plant cell Plant Cell wall Ultra structure of Chloroplast Cell Cycle in Plants- Mitosis, Meiosis Plasma Membrane **Revision & Assignment**
4	May	Introduction to Molecular Biology Structure of DNA Watson & Crick model of DNA Types of Chromosomes Structure and types of RNA DNA replication **Theory Internal Examination** **Practical Internal Examination** **Practical External Examination**

Dr. Sangeetha J.S.

Month	Topics
March	**Credit – I; Plant anatomy** **Introduction –** Definition and scope of plant anatomy **Epidermal tissue system** Structure, types and function of epidermis, Structure, types and function of stomata, Epidermal outgrowths - glandular and non-glandular.Motor cells **Mechanical tissue system** Principles involved in distribution of mechanical tissues with one example each – inflexibility, incompressibility, inextensibility and shearing stress **Revision & Assignment**
April	**Mechanical tissue system** (cont.) Vascular tissue system - Structure and function of xylem, phloem and cambium Structure and function of cambium **Normal secondary growth** Introduction, Normal secondary Growth in Dicotyledonous stem Development of annual rings, periderm, bark, tyloses and lenticels. **Anomalous secondary growth** Introduction, Causes, anomalous secondary growth Anomalous secondary growth in: Dicot stem (*Bignonia*), Dicot root (*Raphanus*) and monocot stem (*Dracaena*) **Introduction to plant embryology** Definition and scope of plant embryology **Microsporangium and male gametophyte** Structure of tetrasporangiate anther, Types of tapetum , Sporogenous tissue, Microsporogenesis: process and its types, Types of microspore tetrad, Male gametophyte: structure and development of male gametophyte. **Megasporangium and female gametophyte** Structure and Types of ovules, Types of megaspore tetrads
May	**Megasporangium and female gametophyte (cont.)** Female gametophyte: structure of typical embryo sac ; Types of embryo sacs – monosporic, bisporic and tetrasporic **Pollination and Fertilization** Introduction and definition; Types of pollination; Germination of pollen grain Entry of pollen tube- porogamy, mesogamy and chalazogamy; Double fertilization and its significance. **Endosperm and embryo** Endosperm: Types – nuclear, helobial and cellular; Structure of Dicotyledonous and Monocotyledonous embryo **Revision & Assignment** **Theory Internal Examination** **Practical Internal Examination** **Practical External Examination**

Dr. Sangeetha J.S.

Syllabus Completion Report
S.Y.B.Sc. Botany (CBCS): 2022-23
BO 242: Plant Biotechnology
(Semester IV, Paper II)

Sr. No.	Month	Topics
1	March	**Chapter 1 Introduction to Plant Biotechnology** History and definition, Scope and importance of plant biotechnology, Current status of biotechnology in India.
2	April	**Chapter 2 Plant Tissue Culture** Concept of plant tissue culture and cellular totipotency; Basic techniques: Types of culture, Media preparation, sterilization, inoculation, incubation, hardening;Applications with reference to: Micropropagation, Somaclonal variation, Haploid production, Protoplast fusion & Somatic hybrids, Embryo rescue, Production of secondary metabolites; Commercial Plant Tissue culture laboratories in Maharashtra and India. **Chapter 3 Single Cell Protein** (SCP) Concept and definition ; Importance of proteins in diet ; Production of SCP from *Spirulina* and Yeast; Importance & acceptability of SCP **Revision & Assignment**
5	May	**Chapter 4 Plant Genetic Engineering** Introduction, concept ; Tools of genetic engineering (restriction enzymes, ligases, plasmid vectors); Gene cloning Technique; Applications of plant genetic engineering: insect pest resistance, abiotic stress tolerance, herbicide resistance **Chapter 5 Genomics, Proteomics and Bioinformatics** Genomics- concept, types, methods used for whole genome sequencing; Proteomics-concept, types, methods used in proteome analysis; Bioinformatics-concept, database and its classification, data retrieval tools. **Chapter 6 Bioremediation** Introduction and concept; Microbial remediation ; Phytoremediation **Chapter 7 Biofuel technology** Definition, Concept and types of Renewable and nonrenewable energy sources Definition and concept of Biogas, Bioethanol, Biobutanol, Biodiesel & Biohydrogen **Revision & Assignment** **Theory Internal Examination** **Practical Internal Examination** **Practical External Examination**

Dr. K.M. Nitnaware

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23

BO. 341: PLANT PHYSIOLOGY AND METABOLISM
(Semester– VI; Paper – I)

Month	Topics
Ferbruary	**Mineral nutrition:** Classification of mineral elements, macro and micronutrients; Role of essential elements; Transport of ions across cell membrane, Ionophores , Carriers and Channels
March	**Photosynthesis**: Mechanism of photosynthesis- Electromagnetic spectrum, Organization of Light-Absorbing Antenna Systems, Structure of chloroplast, Light Reaction: (Cyclic and Non-cyclic photophosphorylation) Dark Reaction: Calvin–Benson Cycle, Photorespiration, C4 cycle and CAM pathway. **Respiration:** Types of respiration (Aerobic and anaerobic), Mechanism of aerobic respiration (Glycolysis, TCA cycle, Terminal oxidation and phosphorylation in respiratory chain); Pentose Phosphate Pathway. **Translocation in phloem**: Composition of phloem sap, girdling experiment; Pressure flow model. **Plant growth regulators**: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. **Revision & Assignment**
April	**Stomatal Biology:** Light-dependent Stomatal Opening, Mediation of Bluelight Photoreception in Guard Cells by Zeaxanthin, Reversal of Blue Light–Stimulated Opening by Green Light, The Resolving Power of Photophysiology (Overview). **Photomorphogenesis**: Red and far red light responses on photomorphogenesis; Phytochrome (discovery and mode of action). **Revision & Assignment** **Class test**
May	**Theory Internal Examination** **Practical Internal Examination** **Practical External Examination**

Dr. Sangeetha J.S.

February	**Water: The solvent of life:** Physical properties of water, structure of water molecule, polarity of water molecule, weak interactions in aqueous solutions. **Amino acids and proteins:** Structure, classification, properties and functions of amino acids. Structure (primary, secondary, tertiary and quaternary), properties and functions of proteins Biological disorders of amino acid metabolism. Commercial applications.
March	**Enzymes:** Definition, nature of enzymes and co-factors, classification and properties of enzymes, active site. Mechanism of enzyme action: free energy, activation energy, binding energy, transition state, lock and key hypothesis, induced fit theory. Factors affecting enzyme activity: pH, temperature, substrate concentration, enzyme concentration. Enzyme inhibition: Competitive, uncompetitive, non-competitive.Reversible and irreversible inhibition, feedback inhibition.
April	**Carbohydrates:** Definition, classification of carbohydrates- Monosaccharides: aldoses and ketoses, configurations, linear to ring structure; Oligosaccharides: glycosidic bond, reducing and non-reducing sugars; Polysaccharides: homopolysaccharides, heteropolysaccharides, examples, their structures, locations and role. Properties and functions of carbohydrates. Commercial applications. **Lipids:** Definition, classification of lipids: simple, conjugate and derived lipids, properties and functions of lipids. Biological disorders of lipid metabolism. Commercial applications. **Vitamins:** Definition, classification of vitamins. source and functions of vitamins. **Revision, assignment**
May	**Foundation of Biochemistry:** From molecules to the first cell (origin of a cell), Miller and Urey experiment. Biomolecules of a cell, functional groups in biomolecules, conformations and configurations of biomolecules. **Theory internal and practical external examination**

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23
BO.363: Plant Pathology
(Semester– VI; Paper – III)

February	**Fundamentals of Plant Pathology**: Introduction, Important terminology-Incitants, Host, Symptoms, Parasite, Pathogen, Inoculum, Penetration, Infection, Incubation, Disease. Economic importance of plant diseases, History of plant pathology, Introduction to Indian Agriculture Research Institute (IARI),International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Contribution of Anton De Bary and Prof. B.B. Mundkur
March	**Disease Development:** Concept of disease cycle, Inoculation, Prepenetration, Penetration, Infection, Dissemination. Epidemics-Forms, Decline, Exponential model. **Defense Mechanisms**: Concept and Definition, Types-Preexisting- Structural and chemical, Induced- Structural and Biochemical. **Methods of Studying Plant Diseases.** Macroscopic study, Microscopic study, Koch"s postulates. Types of culture Media, Pure culture methods- Streak plate, Pour plate, Spread plate. **Fungal Plant Diseases** Introduction to fungi as plant pathogens. Study of Diseases- Downy mildew of Grapes, Head smut of Jowar, Tikka diseases of Groundnut with reference to causal organism, symptoms and disease management.
April & May	**Bacterial Plant Diseases.** Introduction to bacteria as plant pathogens, Study of Diseases- Citrus Canker, Black arm of Cotton with reference to causal organism, symptoms and disease management. **Mycoplasma Plant Diseases:** Introduction to Mycoplasma as plant pathogens, Study of Diseases- Grassy shoot disease of sugarcane, Little leaf of brinjal with reference to causal organism,symptoms and disease management. **Viral Plant Diseases**: Introduction of Virus as plant pathogens. Study of Diseases-Papaya Mosaic Disease, Bunchy top of Banana with reference to causal organism, symptoms and causal organism **Nematodal Plant Diseases:** Introduction to Nematodes as plant pathogens. Study of Diseases- Root knot diseases of vegetables, Soyabean cyst Nematodes with reference to causal organism,symptoms, Integrated management of Nematodal diseases. **Non-Parasitic Diseases.** The impact and abiotic causes- Temperature, Soil moisture and relative humidity, Poor oxygen, Poor light, Air pollutants, mineral deficiencies. Herbicidal injury, Study of Mango necrosis, Black Heart of Potato. **Principles of plant diseases control:** General account, Quarantine, Eradication, cultural control practices, Biological control. Curative measures, chemical control, Use of Effective Microorganism solution (EMS), Microbial Pesticides. **Revision, assignment** **Theory internal and practical external examination**

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.364: Evolution and population genetics

(Semester– VI; Paper – IV)

February	**Organic Evolution**: Distinction between Origin of life and Organic Evolution, Historical account of Origin of life, Origin of Earth Vs Origin of life: Gaia Hypothesis, Earliest Fossils, Prebiotic Evolution, Abiotic synthesis of organic matter, Primordial soup, origin of membranes, Oparin's Coacervate model, Theory of Panspermia, Early life and RNA and Origin of genetic code **Organic Evolution:** The concept of organic evolution, Theories of Evolution, Pre-Darwinian period, Theory of Inheritance of acquired characters (Lamark's), Darwinism- Theory of Natural Selection, Post-Darwinian period- Modern synthetic theory
March	**Evidences of Evolution** Direct evidences and conclusions from fossil records, Indirect evidences, Evidences from Genetics, Evidences from bio-geographical relations **Evolution Through Ages**: Fossils and Geological Time scale: Fossils and Fossilization, Conditions of fossilization, Dating of fossils: Uranium Lead method, Radio-carbon method, U-series and ESR method, Geological Time scale: Eras, Periods, epochs, and duration in millions of years and plant life. **Population Genetics and Evolution**: Concept of Mendelian population, Gene Pool and its models, Hardy-Weinberg law of gene frequencies, Factors affecting allelic frequency, Genetic polymorphism
April	**Speciation and Isolating Mechanisms:** Introduction, Morphological Criteria for Species and Races, Allopatric and Sympatric Populations, Isolating Mechanisms: Pre zygotic Isolation mechanisms: Concept, Spatial & Ecological;, Seasonal Isolation, Ethological Isolation, Mechanical Isolation, Post zygotic Isolation mechanisms: Concept, Hybrid in viability, Hybrid sterility & Hybrid breakdown. **Revision, assignment**

Prof. R.V.Mechkar

Syllabus completion report

T. Y. B. Sc. - Botany: 2022-23

BO: 365 Advanced Plant Biotechnology

(Semester– VI; Paper – V)

Sr. No	Month	Topics
1	February	**Biotechnology:** Introduction, Traditional and modern Biotechnology. Impact of Biotechnology on Health care, Agriculture, and Environment **Plant Tissue Culture:** Concepts of Cell theory & Cellular totipotency, Landmarks in plant tissue culture. Pluripotency, Differentiation, dedifferentiation, redifferentiation, Hormones used in PTC, 'Explant' for plant tissue culture and Response of explants in vitro– callus formation,
2	March	Organogenesis (direct and indirect) and embryogenesis (direct and indirect)**.** Micro propagation of Banana (in detail from Selection of explant to hardening and marketing) **Techniques of Genetic Engineering and Methods of gene transfer in Plants- Cryopreservation and Germplasm Conservation** Definition and concept, techniques of cryopreservation, cold storage, long term and short term storage, applications. Germplasm Conservation: Preservation of Cell, tissue, organ, whole organism. Concept of Gene Bank, DNA Bank, Seed Bank, Pollen Bank etc
3	April	**Nano- biotechnology** : Definition and concept, Applications of nanotechnology in agriculture (Fertilizers and pesticides) **Biotechnology and Society**: Biotechnology- Benefits, GM foods and its safety, Recombinant foods and religious beliefs, Recombinant therapeutic product for human health care. Patenting of biotechnological inventions and Intellectual property rights.
4	May	**Microbial Biotechnology**: Biochemistry of fermentation, Microorganism used in fermentation, fermentable substrate, Ethanol fermentation methods, Distilleries producing alcohols. Commercial production: Alcoholic beverages, organic acids, citric acids. Advantages of fermentation. Transgenic Plants as Bioreactors: Metabolic engineering of starch, cyclodextrins, fructans, Bioplastics, Genetically engineered plants as protein factories, Production of therapeutic proteins from plants. **Theory Internal Examination** **Practical Internal Examination** **Practical External Examination**

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO 3610: Nursery and Gardening Management

(Semester– VI; Paper – X)

March	**Nursery:** definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. **Seed:** Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion –Seed production technology - seed testing and certification.
April	**Vegetative propagation**: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants– greenhouse - mist chamber, shed root, shade house and glass house.
May	**Gardening:** definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design -computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. **Sowing/raising of seeds and seedlings -** Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes,and carrots - Storage and marketing procedures. **Revision, assignment** **Theory internal and practical external examination**

Prof. S. S. Katkar

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23

BO 3611: BIOFERTILIZERS
(Semester– VI; Paper – XI)

February	
	Introduction: Introduction, Scope and importance of Biofertilizers. General account of the microbes used as Biofertilizers **Bacterial Biofertilizers** Isolation of Rhizobium, Identification, Mass multiplication, Carrier based inoculants.
March	**Bacterial Biofertilizers** Azospirillum isolation and mass multiplication, carrier based inoculants and associative effect of different organisms. Azotobacter, classification and characteristics. Crop response to Azotobacter inoculums, Mass multiplication of Azotobacter. Applications of Azospirillum. Phosphate solubilizing Bacteria.
April	**Algal Biofertilizers** Cyanobacteria (Blue Green Algae): Isolation of Anabaena from Azolla, Mass Multiplication of Anabaena. Azolla - Anabaena relationship. Biological Nitrogen fixation. Blue Green algae in a rice cultivation. Applications of BGA **Fungal Biofertilizers** Introduction, Occurrence and Distribution of Mycorrhizal association. Types of Mycorrhizal association, growth and yield – colonization of VAM - Vesicular Arbuscular Mycorrhiza. Mycorrhizal applications in agriculture. **Compost and Manure** Organic Farming, green manuring, organic manures and their uses. Recycling by composting method of biodegradable, municipal, agricultural and industrial wastes.
May	**Compost and Manure** Biocompost making methods, Types and methods of vermicomposting. Benefits of vermicompost, field applications. **Revision, Assignment** **Theory internal and practical external examination**

Prof. S. S. Katkar

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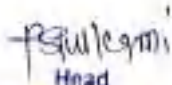
Syllabus Completion Report 2022-23   Class: F. Y. B. Sc. Chemistry, Sem.-II

Name of Paper: Analytical Chemistry

No. of Lectures allotted per week: 03 **Name of Teacher** : Prof. Dongare N.D.

Sr.No.	Month	Name of Chapter	Topic Covered
1.	Mar-23	Introduction to Analytical Chemistry	What is analytical Chemistry, the analytical perspectives, Common analytical problems.
2	Apr-23	Calculations used in Analytical Chemistry	Some important units of measurements-SI units, distinction between mass and weight, mole, millimole and Calculations, significant figures. Solution and their concentrations- Molar concentrations, Molar analytical Concentrations, Molar equilibrium concentration, percent Concentration, part per million, part per billion, part per thousand, Solution –dilatant volume ration, functions , density and specific gravity of solutions, problems. Chemical Stoichiometry – Empirical and Molecular Formulas, Stoichiometric Calculations, Problems.
3.	Apr-23 May-23	Qualitative Analysis of Organic Compounds	Types of organic compounds, characteristic tests and classifications, reactions of different functional groups, analysis of binary mixtures. Analysis – Detection of nitrogen, sulfur, halogen and phosphorous by Lassiagen's test. Purification of organic compounds- Introduction, recrystallization, distillation, sublimation
4.	May-23	pH meter	Introduction, pH meter, Glass pH electrode, combination of pH electrode-Complete Cell, Standard Buffer –reference for pH measurement, Accuracy of pH measurement, Using pH meter –How does it works? Applications of pH meter.
5.	May-23	Chromatographic Techniques –Paper and Thin Layer Chromatography	Introduction- Introduction to chromatography, IUPAC definition of chromatography. History of Chromatography- paper chromatography, Thin Layer Chromatography, Ion exchange Chromatography, Gas permeation Chromatography, affinity chromatography, Gas chromatography, Supercritical fluid chromatography, High

			Performance Liquid Chromatography, Capillary electrophoresis, Classification of chromatographic methods – according to separation methods, according to development procedures. Thin Layer Chromatography: Theory and principles, outline of the method, surface adsorption and spot shape, Comparison of TLC with other forms of chromatography, adsorbents, preparation of plates, application of samples, development. Paper Chromatography- Origin, overview of technique, sample preparation, types of paper, solvents, equilibrium, development, sample application and detection, Identification, Quantitative methods, applications of paper chromatography

Class: F Y. B. Sc. CH-201   Term-II
Name of Paper: Inorganic Chemistry
No. of Lectures allotted per week: 03
Name of Teacher: Prof. Kolekar S.S.

Sr. No.	Month	Name of Chapter	Topic Covered
1.	April 2023	Chemical Bonding	Attainment of stable electronic configurations, Types of Chemical bonds: Ionic, covalent, coordinate and metallic bonds Ionic Bond: General characteristics of ionic bonding, Types of ions, Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy,
	May 2023	Chemical Bonding	Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. Covalent bond: Valence Bond Approach,
2	March 2023	Periodicity of Element	Explain rules for filling electrons in various orbitals Aufbau's principle, Pauli exclusion principle, Hund's rule of maximum multiplicity, electronic configuration of an atom and anomalous electronic configurations. stability of half-filled and completely filled orbitals. Concept of exchange energy and relative energies of atomic orbitals The long form of periodic table. Block, group, modern periodic law and periodicity. Classification of elements as main group, transition and inner transition elements, name, symbol, electronic configuration, trends and properties. Periodicity in the following properties in details. a. Effective nuclear charge, shielding or screening effect; some numerical problems. b. Atomic and ionic size. c. Crystal and covalent radii d. Ionization energies e. Electronegativity- definition, trend, Pauling electronegativity scale. f. Oxidation state of elements
3	April 2023	Atomic Structure	Origin of Quantum Mechanics and theory Energy quantization- i) Black body radiation ii) The photoelectric effect iii) Wave particle duality-a) The particle character of electromagnetic radiation b) the wave character of particle, iv) diffraction by double slit v) atomic spectra, Review of-Bohr's theory and its limitations, Heisenberg Uncertainty principle. Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it, Significance of ψ and ψ Schrödinger equation for hydrogen atom. Radial and angular parts of the hydogenic wavefunctions (atomic orbitals) and their variations

	Atomic Str 2023	Atomic Structure	for 1s, 2s, 2p, 3s, 3p and 3d orbitals Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms).

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Department of Ch
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Rajgurunag

RAJGURU NAGAR
HUTATMA RAJGURU MAHAVIDYALAYA

Dr. Shirish S. Pingale
Principal
Hutatma Rajguru Mahavidyalay
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Rajgurunagar, Tal. Khed Dist. Pune
Syllabus Completion Report Year 2022-23
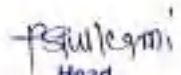**Class:** F. Y. B. Sc.,   **Sem.**-I
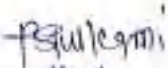
Name of Paper: Chemistry Practical
No. of Lectures allotted per week: 04   For (3 ½) Batches
Name of Teacher: Prof. Kolekar S.S

Sr. No.	Name of Practical
1	Introduction, Determination of heat capacity of calorimeter for different volumes.
2	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3	Determination of integral enthalpy of solution of salts (KNO3)
4	Measurement of the pH of buffer solutions and comparison of the values with theoretical values.
5	Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity
6	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)
7	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)
8	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)
9	Separation of constituents of mixtures by Paper Chromatography: Measure the Rf value in each case Amino acids
10	Identify and separate the sugars present in the given mixture by paper chromatography.
11	Repetition Physical Chemistry practical for late admitted students

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Class: F. Y. B. Sc. Chemistry,   **Sem.-II**

Name of Paper: **Chemistry Practical**

No. of Lectures allotted per week: 4 For (3 ½) Batches

Name of Teacher: Prof. Kolekar S.S

Sr. No.	Name of Practical
1	Synthesis of potash alum from aluminium metal (scrap Aluminium metal)
2	Synthesis of Mohr's Salt [(FeSO$_4$) (NH$_4$)$_2$SO$_4$] •6H$_2$O
3	Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture
4	Estimation of acid neutralizing capacity of antacids like Gelusil tablet/ Gellusil syrup etc.
5	Determination of Basicity of oxalic acid
6	Purification of organic compounds by crystallization (from water and alcohol)
7	To draw polar plots of s and p orbitals.
8	Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone
9	Semi carbazone derivatives of aldehydes and ketones

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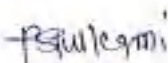**K.T.S.P Mandal's**

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Rajgurunagar, Tal. Khed Dist. Pune
Syllabus Completion Report Year 2022-23
Class: F. Y. B. Sc.,   **Sem.**-I

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Name of Paper: Chemistry Practical   **No. of Lectures allotted per week:** 04
Name of Teacher: Prof. N.D. Dongare   **Total No. of Lectures Taken:**44 (Lectures upto 24ᵗʰ November 2022)

Sr. No.	Name of Practical	Batch B3	Batch B4
1	Introduction, Determination of heat capacity of calorimeter for different volumes.	1/09/2022	7/09/2022
2	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.	08/09/2022	21/09/2022
3	Determination of integral enthalpy of solution of salts (KNO3)	22/09/2022	21/09/2022
4	Measurement of the pH of buffer solutions and comparison of the values with theoretical values.	22/09/2022	28/09/2022
5	Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity	29/09/2022	28/09/2022
6	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)	29/09/2022	12/10/2022
7	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)	06/10/2022	**Batch handover to other**
8	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)	06/10/2022	
9	Separation of constituents of mixtures by Paper Chromatography: Measure the Rf value in each case **Amino acids**	19/10/2022	
10	Identify and separate the **sugars** present in the given mixture by paper chromatography.	16/11/2022	
11	Repetition Physical Chemistry practical for late admitted students	24/11/2022	

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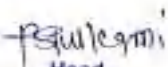
K.T.S.P Mandal's

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Syllabus Completion Report Year 2022-23
Class: F. Y. B. Sc.,   **Sem.**-I

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Name of Paper: Chemistry Practical CH-103   **No. of Lectures allotted per week:** 04
Name of Teacher: Dr. S. P. Jadhav

Sr. No.	Name of Practical	Batch A1	Batch A2	Batch B4	Batch B2
1	Introduction, Determination of heat capacity of calorimeter for different volumes.	29/08/22	30/08/22	27/08/22	25/08/2022
2	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.	12/09/22	30/08/22	27/08/22	15/09/22
3	Determination of integral enthalpy of solution of salts (KNO3)	12/09/22	13/09/22	14/09/22	Batch handover to other
4	Measurement of the pH of buffer solutions and comparison of the values with theoretical values	31/09/22	13/09/22	14/09/22	
5	Preparation of buffer solutions Sodium acetate-acetic acid and determine its buffer capacity	31/09/22	4/10/22	28/09/22	
6	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Thiourea)	10/10/22	4/10/22	28/09/22	
7	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Chloroform)	10/10/22	11/10/22	31/10/22	
8	To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (Aniline)	1/11/22	11/10/22	31/10/22	
9	Separation of constituents of mixtures by Paper Chromatography: Measure the Rf value in each case **Amino acids**	1/11/22	2/11/22	4/11/22	
10	Identify and separate the **sugars** present in the given mixture by paper chromatography.	1/11/22	2/11/22	4/11/22	
11	Repetition Physical Chemistry practical for late admitted students	5/11/22	5/11/22	5/11/22	

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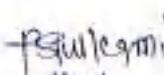**Name of Paper**: Organic Chemistry   **No. of Lectures allotted per week:** 03 T

Name of Teacher: Prof. N.D. Dongare   **Total No. of Lectures Taken:** 40 (Lectures upto 24th November 2022)

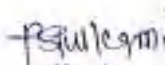| Sr. No.	Month	No. of Lect. Taken	Name of Chapter	Topic Covered
1.	Aug-22	08	1. Fundamentals of Organic Chemistry	Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.
2	Sept - 22	13	1. Fundamentals of Organic Chemistry	Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.
3.	Oct-22	08		Aromaticity: Benzenoids and Hückel's rule.
			2. Stereochemistry	Introduction, classification, Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations.
4.	Nov-22	11		Conformations with respect to ethane, butane and cyclohexane. Configuration: Geometrical - cis – trans, and E / Z Nomenclature (for upto two C=C systems). Optical isomerism Enantiomerism, Diastereomerism and Meso compounds). Concept of chirality (upto two carbon atoms). Threo and erythro; D and L; nomenclature;

Name of Paper: Organic Chemistry   **No. of Lectures allotted per week:** 03 T

Name of Teacher: Prof. N.D. Dongare   **Total No. of Lectures Taken:** 40 (Lectures upto 24th November 2022)

Sr. No.	Month	No. of Lect. Taken	Name of Chapter	Topic Covered
1.	Aug-22	08	1. Fundamentals of Organic Chemistry	Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.
2	Sept - 22	13	1. Fundamentals of Organic Chemistry	Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.
3.	Oct-22	08		Aromaticity: Benzenoids and Hückel's rule.
			2. Stereochemistry	Introduction, classification, Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations.
4.	Nov-22	11		Conformations with respect to ethane, butane and cyclohexane. Configuration: Geometrical - cis – trans, and E / Z Nomenclature (for upto two C=C systems). Optical isomerism Enantiomerism, Diastereomerism and Meso compounds). Concept of chirality (upto two carbon atoms). Threo and erythro; D and L; nomenclature;

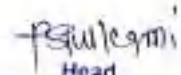**K.T.S.P.MANDAL'S**
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DEPARTMENT OF CHEMISTRY
Syllabus Completion Report 2022-2023
Name of Paper -Chemistry (S.Y. B.Sc. CH-302)
No. of Lectures allotted per week-03
Name of Teacher-Prof. Kolekar S.S.
SEMESTER – I

Month	Chapter	Topic	L
Nov 2022	**1. Molecular Orbital Theory of Covalent Bonding**	Introduction to Molecular Orbital Method (MOT) and postulates of MO theory, LCAO approximation, s-s combination of orbitals, s-p combination of orbitals, p-p combination of orbitals, p-d combination of orbitals, d-d combination of orbitals, nonbonding combination of orbitals, Rules for linear combination of atomic orbitals, example of molecular orbital treatment for homonuclear diatomic molecules: Explain following molecules with respect to MO energy level diagram, bond order and magnetism: H_2^+ molecule ion, H_2 molecule, He_2^+ molecule ion, He_2 molecule, Li_2 molecule, Be_2 molecule, B_2 molecule, C_2 molecule, N_2 molecule, O_2 molecule, O_2^- and O_2^{2-} ion, F_2 molecule, Heteronuclear diatomic molecules: NO, CO, HF.	14
Nov 2022	**2. Introduction to Coordination Compounds**	Double salt and coordination compound, basic definitions: coordinate bond, ligand, types of ligands, chelate, central metal ion, charge on complex ion, calculation of oxidation state of central metal ion, metal ligand ratio; Werner's work and theory, Effective atomic number, equilibrium constant	04
Sep 2022	**3.Aromatic Hydrocarbons**	Aromatic Hydrocarbons Introduction and IUPAC nomenclature, preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (up to 4 carbons on benzene). Side chain oxidation of alkyl benzenes (up to 4 carbons on benzene).	04

Dec 2022	4.Alkyl and Aryl Halidel	Introduction and IUPAC nomenclature, Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation. Williamson's ether synthesis: Elimination vs. substitution. Aryl Halides: Introduction and IUPAC nomenclature, Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer and Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides	08
Oct 2022	5. Alcohols, Phenols and Ethers	Introduction and IUPAC nomenclature, Preparation: Preparation of 1o, 2o and 3o alcohols: using Grignard reagent, ester hydrolysis, reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: with sodium, HX (Lucas test), esterification, oxidation (with PCC, alc. KMnO4, acidic dichromate, conc. HNO3). Oppeneauer oxidation Diols: (Up to 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement Phenols (Phenol case): Introduction and IUPAC nomenclature, Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann Reaction, Houben–Hoesch Condensation, Schotten–Baumann Reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI.	06

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Syllabus Completion Report Year 2022-23
Class:T. Y. B. Sc.,　　　**Sem.**-V

Name of Paper: **Inorganic Chemistry Practical**　　**No. of Lectures allotted per week:** 05
Name of Teacher: Prof. N.D. Dongare　　　**Total No. of Lectures Taken:**25 (Lectures upto 24th November 2022)

Sr. No.	Name of Practical	Batch D
1	Inorganic Qualitative Analysis Mixture-I	30/09/2022
2	Mixture-II	07/09/2022
3	Mixture-III	14/10/2022
4	Mixture-IV	04/11/2022
5	Mixture-V	18/11/2022

Head
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Rajgurunagar, Tal. Khed Dist. Pune
Syllabus Completion Report Year 2022-23
Class: T. Y. B. Sc.,   **Sem.**-V

Name of Paper: **Organic Chemistry Practical**   **No. of Lectures allotted per week:** 05
Name of Teacher: Prof. N.D. Dongare   **Total No. of Lectures Taken:**20 (Lectures upto 24th November 2022)

Sr. No.	Name of Practical	Batch D
1	Organic Qualitative Analysis Mixture-I	02/11/2022
2	Mixture-II	17/11/2022
3	Mixture-III	19/10/2022
4	Mixture-IV	24/11/2022

Subject Teacher
Prof. N.D. Dongare

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Rajgurunagar, Tal. Khed Dist. Pune

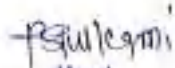**Syllabus Completion Report 2022-23   Class:** T. Y. B. Sc. Chemistry, **Sem.**-V

Name of Paper: Introduction of Medicinal Chemistry   **No. of Lectures allotted per week**: 03

Name of Teacher: Prof. P. S. Kulkarni

Sr. No.	Month	Name of Chapter	Topic Covered
1	Aug-22 Sep-22	An Introduction to Drugs, their Action and Immunobiologicals	Introduction, Need of new drugs, Historical background of drug discovery and design, Sources of drugs, Classification of drugs, Introduction to drug action B. Immunobiologicals: Vaccines: Introduction, Methods of vaccine production: Inactivated pathogens, Live/Attenuated Pathogens and Cellular Antigen from a pathogen, SARS-CoV-19
2	Sep-22 Oct-22	Bio-physicochemical Properties in Drug Action and Design	Introduction, Acidity/Basicity, Solubility, Ionization, Hydrophobic and hydrophilic properties, Lipinski Rule, Terminology in Medicinal Chemistry: Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, antimetabolites and therapeutic index. Importance of stereochemistry in drug action (Example: Ibuprofen), Concept of rational drug design: Structure activity relationship, Drug-receptor understanding
3.	Oct-22 Nov-22	Drugs for Infectious Diseases	ntroduction, Structures, Mode of Action and Applications: A. Antimicrobial Agents: Classification on i) Type of action: Bacteriostatic and Bactericidal ii) Source (Natural, Synthetic and Semisynthetic) iii) Spectrum of activity: Narrow and Broad Spectrum iv) Chemical structure: β-lactams (Penicillin), Macrolides (Azithromycin), Sulphonamides (Sulfadiazine), and Tetracyclins (Chlortetracycline) B. Anti-fungal and anti-viral agents: Example: Amphotericin-B, Acyclovir
4.	Dec-22	Drugs for Non-infectious diseases	Introduction, Structures, Mode of Action, and Applications: A. i) Anti-inflammatory and Analgesic Agents: Example: Aspirin, Paracetamol, and Ibuprofen, ii) Psychoactive Agents: Sedatives and Hypnotics: Example: Benzodiazepines, B. Metallodrugs as Chemotherapeutic Agents: Examples: Aluminium based antacids, Salvarsan, Cis Platin, and Transition Metal Complexes

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Syllabus Completion Report Year 2022-23
Class: T. Y. B. Sc.   **Sem.**-V

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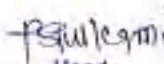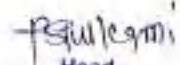**Name of Paper**: Inorganic Chemistry-I**No. of Lectures allotted per week:** 03 T
Name of Teacher: Prof. N.D. Dongare **Total No. of Lectures Taken:** 28 (Lectures upto 24th November 2022)

Sr. No.	Month	No. of Lect. Taken	Name of Chapter	Topic Covered
1.	Aug-22	05	1. Molecular Orbital Theory of Co-ordination compounds	Electroneutrality principle, multiple bonding($d\pi$-$p\pi$, $d\pi$-$d\pi$), Nephelauxetic effect and series.
2	Sept -22	07		M.O. energy level diagram, metal orbitals and their symmetry symbol, assumptions of MOT, Formation of $[CoF_6]^{2-}$, $[Co(CN)_6]^{2-}$ & $[Ni(NH_3)_6]^{2+}$ without π bonding, recapitulation of IUPAC nomenclature, effect of π –bonding on complex, charge transfer spectra, advantages of MOT.
3.	Oct-22	07	2. Inorganic reaction mechanism	Introduction, stability constant, thermodynamics of reaction, basic concept of stability & lability, ligand exchange reaction, factors affecting lability, chelate effect, str.of some imp. Ni-dentate ligand, classification of coordination compounds,substitution, dissociative,addition, oxidation-reduction, ligand substitution reaction, trans effect and trans effect series.
4.	Nov-22	09	3. Chemistry of transition element	Position in periodic table, electronic configuration, trends in properties w.r.t.(a) size of atoms and ions (b) reactivity (c) catalytic activity (d) oxidation state (e) complex formation ability (f) colour (g) magnetic properties (h) non-stoichiometry (i) density, melting & boiling points

			4. Chemistry of F-block elements	1. Lanthanides: Position in periodic table, Name and electronic configuration of lanthanides, O.S, atomic and ionic radii, Lanthanide contraction, its causes and consequences on chemistry of Lanthanides and post lanthanide elements, Occurrence and separation: Bulk separation, Individual separation by modern methods viz., Ion exchange and solvent extraction method, applications of lanthanides

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHP-110 Fundamentals of Physical Chemistry
Section-I

Teacher Name: Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Thermodynamics	State function, path function, exact differential and inexact differential, internal energy and enthalpy, temperature dependent internal energy and enthalpy, reversible and irreversible adiabatic expansion. The entropy of irreversible changes, the Helmholtz and Gibbs function, Entropy and entropy change in an ideal gas with temperature and pressure, Clausius inequality, chemical potential, chemical potential of a substance in a mixture.	06
2	Nov.22	Change of State	Partial molar quantities, methods for determination of molar quantities, ideal solutions, Raoult's and Henery's law, Thermodynamics of Gibbs function of mixing, colligative properties: Elevation in boiling point, depression in freezing point and osmosis.	05
3	Dec.22	Quantum Chemistry	Applications of quantum chemistry- blackbody radiation, photoelectric effect, de Broglie hypothesis and uncertainty principle and its experimental evidence. Schrödinger wave equation, particle in one dimensional box, Normalization and orthogonality of wave function, particle in three dimensional box, hydrogen like atoms (no derivation).Operators: algebra of operators, commutative property, linear operators, commutator operator, the operator ∇ and $\nabla 2$.	10
4	Jan.23	Chemical Bonding	Valence bond theory, hybrid orbitals, geometry and hybridization, molecular orbital theory for di and tri atomic molecule.	06
5	Feb.23	Chemical Bonding	linear variation method, approximations underlying Huckel theory, applications to simple π-systems.	04

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.22	Rate Laws	Recapitulations of basic concept, the temperature dependent reaction rates, reaction moving towards equilibrium, consecutive reaction, parallel reactions, pre-equilibria, unimolecular reactions.	06
2	Nov.22	Kinetics of Complex Reactions	Fast reactions: flash photolysis, flow technique, stopped flow technique, relaxation method, the steady state approximation, chain reactions - free radical polymerization reaction between H_2 and Br_2, explosive reaction.	06
3	Dec.22	Molecular Reaction Dynamics	Collision theory of bimolecular gas phase reactions, diffusion controlled and activation controlled reaction in solution, activated complex theory of reaction rate, Eyrings equation.	06
4	Jan.23	Enzyme Catalysis	Michaelis mechanism, effect of pH and temperature on enzyme catalyzed reactions, limiting rate, Lineweaverburk and Eadie equation and plots, inhibition of enzyme action, competitive inhibition and non- competitive inhibition.	06
5	Feb.23	Molecular Thermodynamics	Molecular energy levels, Boltzmann distribution law, partition functions and ensembles, translational, rotational and vibrational partition function of diatomic molecule, obtaining energy, heat capacity, entropy and equilibrium constants from partition functions, Maxwell- Boltzmann, Fermi-Dirac and Bose-Einstein statistics.	06

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-130 Molecular Symmetry
Section-I

Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Molecular Symmetry and Symmetry Groups	Symmetry elements and operations, Symmetry planes and reflections, the inversion centre, proper axes and proper rotations, improper axes and improper rotation, products of symmetry operations, equivalent symmetry elements and equivalent atoms, general relations among symmetry elements and symmetry operations, classes of symmetry operations, symmetry elements and optical isomerism, symmetry point groups, classification of molecular point groups. Defining properties of a group, group multiplication table, some examples of group, subgroups and classes.	08
2	Nov.-22	Representations of Groups	Matrix representation and matrix notation for geometric transformation, The Great Orthogonality Theorem and its consequence, character tables (No mathematical part),wave function as basis for irreducible representations.	04
3	Dec.-22	Symmetry Adapted Linear Combinations	Projection operators and their use of construct SALC (Construction of SALC for sigma bonding for molecules belonging point groups: D2h, D3h D4h, C4v, Td., Oh., normalization of SALC, transformation properties of atomic orbital, MO's for sigma bonding,ABn molecules, tetrahedral AB4 and Oh AB6 cases.	06
4	Jan.-23	Application of Group theory to Infrared Spectroscopy	Introduction, selection rules, polyatomic molecules, possible vibrations in a linear molecule, bending modes,.	06

5	Feb.-23	Application of Group theory to Infrared Spectroscopy	symmetry of vibrations and their IR activity, Group vibration concept and its limitations, IR spectra related to symmetry of some compounds, IR spectra	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-130 Molecular Symmetry
Section-II

Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Hydrogen and its compounds	Hydrides: Classification, electron deficient, electron precise and electron rich hydrides. PH_3, SbH_3, AsH_3, Selenides, Tellurides Solutions in non-aqueous Media,	08
2	Nov.-22	Alkali and Alkaline Earth Metals	Solutions innon - aqueous media, application of crown ether in extraction of alkali and alkaline earth metal	06
3	Dec.-22	Oxygen Group Halogen Group: Noble gases	Metal Selenides and Tellurides, oxy acids, and oxoanions of Sulphurand nitrogen. Ring, Cage and Cluster compounds of p-block elements Interhalogens, pseudohalagen, Synthesis, Properties and Applications, Structure, Oxyacid's and Oxyanions of Halogens. Occurrence, Compounds of Xenon-with fluorine and Oxygen and its uses	06
4	Jan.-23	Boron Group	Boron Hydrides, preparation, structure and Bonding with reference to LUMO,HOMO, interconversion of lower and higher boranes, Metalloboranes, Carboranes, Reactionof Organoboranes	06
5	Feb.-23	Carbon Group	Allotropes of Carbon, C60 and compounds (fullerenes), Intercalation compounds of Graphite, Carbon nanotubes,	04

			synthesis, properties, structure-single walled, multi walled, applications	

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-150 Molecular Symmetry
Section-I & II

Dr. Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Structure and Reactivity	Aromaticity: Benzenoid and non-benzenoid compounds, Huckel's rule, antiaromaticity, Application to carbocyclic and heterocyclic systems, annulenes, azulenes, current concepts of aromaticity.	04
2	Nov.-22	Heterocyclic Chemistry	Five and six membered heterocycles with one and two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocyclic compounds, Furan, Pyrrole, Thiophene, Pyrazole, Imidazole, Pyridine, Pyrimidine	08 S
3	Dec.-22	Stereochemistry	a) Sterochemical principles, enantiomeric relationship, distereomeric relationship, R and S, E and Z nomenclature in C, N, S, P containing compounds, Prochiral relationship, stereospecific andstereoselective reactions, optical activity in biphenyls, spiranes, allenes, Topicity. b) Conformational analysis of di, tri, tetra-substituted 5 -6 membered rings and decalins.	12

Section -II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	Jan.-23	Structure, Stability and Reactions of Reactive Intermediates	a) Carbocation, Carbanion, Free Radical, Carbenes and nitrenes b) NGP : Neighbouring group participation	06

2.	Jan.-23	Rearrangements	Beckmann, Hofmann, Curtius, Schmidt, Wolff, Lossen, Bayer-villiger, Sommelet, Favorskii, Pinacol-pinacolone, Benzil-benzilic acid, Fries, Tiffeneau Demjanov.	06
3.	Feb.-23	Ylides Oxidation and Reduction Reactions	Ph osphorus, Nitrogen and Sulphur ylides Oxidisingagents: CrO_3, PDC, PCC, $KMnO_4$, MnO_2, Swern, SeO_2, $Pb(OAc)_4$, Pd-C, RuO_4, OsO_4, m-CPBA, O_3,$NaIO_4$, HIO_4, TEMPO, IBX, CAN, Dess-Martin, DDQ, Ag_2O Reducing agents: Boranes and hydroboration reactions, MPV reduction and reduction with H_2/Pd-C, Raney-Ni, $NaBH_3CN$, Willkinsons catalyst, DIBAL and Wolff-Kishner reduction, Birch, Clemenson, Dissolving metal	12

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 General chemistry –Introduction to solid states of matter
Section-I

Prof. Gundal N.V.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Bonding in Solids and Electronic Properties	Recollect the concepts: Crystalline solids, unit cell, and types of unit cells Introduction, Bonding in Solids—Free Electron Theory, Electronic Conductivity, Bonding In Solids—Molecular Orbital Theory, Simple Metals, Semiconductors—Si And Ge, Photoconductivity, The P-N Junction—Field-Effect Transistors, Bands In Compounds—Gallium Arsenide, Bands In D-Block Compounds—Transition Metal Monoxides.	05
2	Nov.22	Defects and Non-Stoichiometry	Introduction, point defects—an introduction, defects and their concentration, intrinsic defects, extrinsic defects the concentration of defects, ionic conductivity in solids, solid electrolytes, fast-ion conductors: oxygen ion conductors, fast-ion conductors: sodium ion conductors, Applications: 1) fuel cells, 2) sensors, 3) electrochromic devices, nonstoichiometric compounds, introduction, non-stoichiometry in wustite, the titanium monoxide structure.	07
3	Dec.22	Superconductivity	Introduction, Discovery, The Magnetic Properties Of Superconductors, Josephson Effects, The Bcs Theory Of Superconductivity, High Temperature Superconductors, Theory Of High Tc Superconductors, Uses Of High Temperature	04

			Superconductors	
4	Jan.23	Synthesis of Solids	Introduction, Common Reactions Employed in Synthesis, Soft-Chemistry Routes, Ceramic Methods, Decomposition of Precursor Compounds, Combustion Synthesis, Mechano-chemical and Sono-chemical methods, Soft Chemistry Routes(Ion Exchange Reactions, Use of Fluxes, Sol–Gel Synthesis, Electrochemical Methods,	04
5	Feb.23	Synthesis of Solids	Hydrothermal, Solvothermal and Ionothermal Synthesis), Chemical Vapour Deposition and Atomic Layer Deposition, Procedures of synthesis of some nano-materials- Gold and Silver nanoparticles, CdS nanoparticles, ZnO, TiO2 and Fe2O3 nanoparticles and Porous Silica	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 Inorganic Chemistry material, analysis, Synthesis

Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	28/10/21	Determination of Silica and Manganese from pyrolusite ore	04
2	18/11/21	Determination of silica and iron from hematite ore.	04
3	20/12/21	Determination of tin and lead from solder alloy.	04
4	03/01/22	Determination of iron and chromium from stainless steel alloy	04
5	27/01/22	Synthesis of ZnO from zinc oxalate - precursor method and determine band gap by absorption spectroscopy	04
6	01/02/22	Synthesis of TiO2 TiCl4 or Ti-Isopropoxide by Sol-gel method and determine band gap by absorption spectroscopy	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-107Physical Chemistry Practical

Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of hours
1	17/11/22	Determination of an order of a reaction	04
2	23/11/22	Brönsted primary salt effect	04
3	29/11/22	Glycerol radius by viscosity	04
4	01/12/22	Partial Molar Volume (Polynometry) Determination of the densities of a series of solutions and to calculate the molar volumes of the components	04
5	07/12/21	Statistical treatment of experimental data (calculation of mean and standard deviation for given data and least square method for calibration curve method)	04
6	13/12/22	Simultaneous determination of Ni and Co by colorimetry	04
7	22/12/22	Estimation of Cu(II) by titration with Na2 EDTA by colorimetry	04
8	07/01/23	Kinetics of oxidation of ethanol by K2Cr2O7	04
9	02/02/23	Simulations determination of KMnO4 and K2Cr2O7 by colorimetry	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHP-210 Molecular Spectroscopy and Nuclear Chemistry)
Section-I

Prof. Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	March.23	Microwave Spectroscopy	Types of molecule on the basis of moment of inertia and rotational spectra of di- and polyatomic molecules	03
2	March.23	Infra-red Spectroscopy	The vibrating diatomic molecule, harmonic and Anharmonic oscillator, The diatomic vibrating rotator, breakdown of the Born-Oppenheimer approximation, The vibrations of polyatomic molecule, Fourier transform spectroscopy and its advantages, The carbon dioxide laser, Applications.	05
3	March.23	Raman Spectroscopy	Quantum and classical theory of Raman effect, pure rotational Raman spectra, vibrational Raman spectra, polarization of light and Raman effect, structure determination from Raman and Infra-red spectroscopy, applications	05
4	March.23	Electronic Spectroscopy of molecules	Electronic spectra of diatomic molecules - The Born-Oppenheimer approximation, Vibrational coarse structure, Frank- Condon principle, dissociation energy and dissociation product, Rotational fine structure of electronic-vibration transition, The fortrat diagram, Pre-dissociation, molecular photoelectron spectroscopy.	07

Sr. No.		Name of Chapter	Topic Covered	No. of Lect. taken
5	March.23	Mossbauer Spectroscopy	Principle, Instrumentation and Applications of Mossbauer Spectroscopy	04

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	April. 23	Radioactivity	Types of radioactive decay, general characteristics of radioactive decay, decay kinetics, general expression for the activity of a daughter nuclide, Geiger- Nuttalis law, α-decay: A problem in classical physics, Internal conversion and the Auger effect	04
2	April.23	Elements of Radiation	Chemistry: Interaction of radiation with matter, interaction of γ radiation with matter, units for measuring radiation absorption, Radiation dosimetry, Radiolysis of water, free radicals in water radiolysis, Radiolysis of some aqueous solutions.	06
3	April.23	Nuclear Fission	The discovery of nuclear fission, the process of nuclear fission, fission fragments and their mass distribution, charge distribution, Ionic charge of fission fragments, fission energy, M. Sc. [I] Chemistry Savitribai Phule Pune University 7 fission cross-section and threshold, fission neutrons, theory of nuclear fission, Neutron evaporation and spallation.	06
4	May.23	Applications of Radioactivity	Typical reaction involved in the preparation of radioisotopes, The Szillard- Chalmers reaction, Radiochemical principles in the use of tracers, Isotopes in elucidating reaction mechanism and structure determination, physic-chemical research - The solubility of a sparingly soluble substances, surface area of a powder or precipitate rates of diffusion, Analytical applications- Isotope dilution analysis,	08
5	May.23		Neutron activation analysis, Radiometric titrations, Medical applications-Thyroiditis, Assessing the volume of blood in a patient, Industrial applications thickness measurements and control, friction and wear out,	04

			gamma radiography.	

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Syllabus Completion Report

M.Sc. –I (Organic Chemistry) A.Y.-2022-2023

Subject-CHI-230-Coordination and Bioinorganic Chemistry

Section-I

Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	1. Concept& Scope of Ligand Fields:	Quantum numbers, Free ion Configuration, Term and States, Energy levels of transition metal ions, free ion terms, microstates, term wave functions, spin-orbits coupling.	02
2.	March-2023	2. Ligand Field Theory of Coordination Complexes	Effect of ligand field on energy levels of transition metal ions, weak cubic ligand field effect on Russell- Saunders terms, Orgel diagrams, strong field effect, correlation diagrams,Tanabe-SuganoDiagrams, Spin-Pairing energies.	05
3.	April-2023	3. Electronic spectra of Transition Metal Complexes	Introduction, band intensities, band energies, band width and shapes, transition metal spectra of 1st, $2^{nd}$and 3rd row ions and complexes, electronic spectra of Lanthanide and Actinide, spectrochemical and nephelauxetic series, charge transfer and luminescence spectra, calculations of Dq, B, β parameters, percentage of covalent character for metal complexes.	06

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
4.	May-2023	4. Magnetic Properties of Coordination Complexes	Origin magnetism ,types of magnetism, Curie law, Curie-Weiss Law, Magnetic properties of complexes-Para magnetism1st and 2nd Ordered Zeeman effect, quenching of orbital angular momentum by Ligand fields ,Magnetic properties of A, E and T ground term in complexes, spin free and spin paired equilibria, temperature dependence of magnetism.	06

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M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-230-Coordination and Bioinorganic Chemistry
Section-II

Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	April-2023	1. Overview of Bioinorganic Chemistry	Historical Background and current relevance, role of Cu, Fe, Mn and Mo in metalloprotein, and metalloenzymes.	02
2.	April-2023	2)Concepts of Inorganic Chemistry in Bioinorganic Chemistry	Thermodynamic aspects - HSAB concept, chelate effect and Irving-William series, pKa values of coordinated ligands, Tuning of redox potential, Biopolymer effects. Kinetic aspects- Electron transfer reaction, Electronic substitution reaction. Reactions of coordinated ligands and Template effect, concept of spontaneous self-assembly model compounds.	10
3.	May-2023	3) Functions and Transport of Alkali and Alkaline Earth Metal Ions	Importance of alkali and alkaline earth metals, Distribution of cationic and anionic electrolytes in blood plasma and intracellular fluid, Ionophores: Natural and Synthetic, Application of ionophores, Different mechanism involved in exchange of ions across cell wall,Na+/K+-ATPase ion pump for active transport of Na+ and K+.	06

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect.
4.	May-2023	4) Biochemistry of following Elements:	(a) Ca in Blood coagulation. (b) Magnesium in Photosystem I (c) Manganese in Photosystem II (d) Iron in Ferritin, Transferrin, Fe-S clusters, Porphyrin based system	06

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-250- Photochemistry and Pericyclic Reactions
Section-I

Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Photochemistry	Principles of Photochemistry, photochemistry of carbonyl compounds, alkenes, dienes, and aromatic compounds, photo rearrangements, Barton reaction	12
	March-2023	Pericyclic Reactions	Cycloaddition reactions, Analysis by correlation diagrams, FMO approach,	
3.	April-2023	Pericyclic Reactions	Electrocyclic, sigmatropic and ene reactions, 1,3-dipolar additions,	06

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect.

				taken
1.	March-2023	UV and IR Spectroscopy	UV: Recapitulation of UV spectroscopy, spectra of important functional groups 1.With and without conjugation, 2. Ring size effect 3. Effect of H-bonding, 4. Resonance effect,5. Inductive effect. 4. [04L] Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines Problems: Based on 2-3 fragments of above mentioned functional groups should be discussed. Combined problems: Problems based on UV, IR, MS, 1H-NMR, 13C-NMR should be solved.	04
	March-2023	1H-NMR	Understanding of basic principle, chemical and magnetic nonequivalence, Homotopism, Enantiotopism, diastereotopism, chemical shifts and factors influencing chemical shift: electronegativity, NMR solvent polarity, temperature, anisotropic effect, chemical shifts of acidic protons, D2O exchange, Multiplicity patterns and Coupling Constants: Pascal's triangle, understanding of tree diagram, complex splitting patterns in aromatic, vinylic, saturated monocyclic compounds, bicyclic compounds (fused and bridged rings), Integration: NMR of racemic mixture, relationship between integration and ee% in diasterotomers.	12
3.	April-2023	13C-NMR	Basic of 13C-NMR: Chemical shift and factors affecting chemical shifts in 13C NMR, off resoanance and proton decoupled spectra. Simpleproblems on 13C-NMR.	06
4.	April-2023	Mass spectrometry (MS)	Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines	04

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-290-Elective Option - B: Organometallic and Inorganic Reaction Mechanism

Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Organometalic Chemistry	Organic ligands and nomenclature, 18 electron rule: counting electrons, ligands having extended pi system, bonding between Metal Atoms and organic pi systems: linear pi system, cyclic pi system, spectral analysis and characterization of organometallic complexes: IR and NMR, examples.	08
2.	March-2023	Organometallic Reactions& Catalysis	Reactions involving gain and loss of ligands: ligand dissociation and substitution, oxidative addition, reductive elimination, nucleophelic displacement, reactions involving modification of ligands: insertion, carbonyl insertion, 1-2 insertion, hydride elimination, abstraction, organometallic catalysis: Hydroformylation, Monsanto acetic acid process, Wacker Process, Hydrognation by Willkinsons catalyst, Olefin metathesis, heterogeneous catalysis: Ziegler Natta Polymerization, Water gas reduction	08
3.	April-2023	Coordination Compounds: Reactions and Mechanism	History and principles, Substitution reactions: Inert and labile complexes, mechanism of substitution, Kinetics Consequences of reaction pathway: dissociation, interchange, association, Experimental evidences in Octahedral Substitution: dissociation, linear free energy	10

| | | | relationship, associative mechanism, the conjugate base mechanism, the kinetic chelate effect, Stereochemistry of reactions: substitution in trans complexes, substitution in cis complexes, isomerisation of chelate rings, substitution reactions in Sq. Pl. Complexes. | |

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-227: Practical Course-II: Semester -II Basic Practical Chemistry

Prof. Jasud J.S.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	07/03/23	Synthesis and Purity of [Mn(acac)3]	04
2	14/03/23	Synthesis and Purity Chloropentaamminecobalt(III) chloride.	04
3	21/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
4	03/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
5	28/03/23	Structural determination of metal complexes by conductometric measurement.	04
6	04/04/23	To study complex formation between Fe(III) with sulfosalicylic acid by conductometry .	04
7	11/04/23	To verify the Debye Huckel theory of ionic conductance for strong electrolytes KCl, BaCl2, K2SO4 and [K3Fe(CN)6]	04
8	18/04/23	Determination of equilibrium constant of M – L systems Fe(III)–Sulphosalicylic acid or Fe(III)–β–resorcilic acid by Job's continuous variation method.	04
9	25/04/23	Solution state preparation of [Ni(en)3]S2O3, [Ni(H2O)6]Cl2, [Ni(NH3)6]Cl2. Record absorption spectra in solution of all three complexes and calculate 10 Dq. Arrange three ligands according to	04

10	02/05/23	Synthesis and photochemistry of K3[Fe(C2O4)3].3H2O.	04
11	09/05/23	Kinetics of substitution reaction of [Fe(Phen)3] 2+	04

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Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	08/03/23	Base catalyzed aldol condensation using LiOH.H2O as a Catalyst.	04
2	15/03/23	Bromination of trans-stilbene using sodium bromide and sodium bromate	04
3	22/03/23	[4+2] cycloaddition reaction in aqueous medium at room temperature	04
4	29/03/23	BenzilBenzilic acid rearrangement under solvent free condition	04
5	05/03/23	Clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin	04
6	12/04/23	Ecofriendly nitration of phenols and its derivatives using Calcium nitrate	04
7	19/04/23	Bromination of acetanilide using ceric ammonium nitrate in aqueous medium	04
8	26/04/23	Green approach for preparation of benzopinacolone from bezopinacol using iodine catalyst	04
9	10/05/23	Preparation of 1, 1-bis-2-naphthol under grinding at room temperature	04
10	17/05/23	Solvent free aldol condensation between 3,4-dimethoxybenzaldehyde and 1-indanone	04

11	24/05/23	Preparation of azlactone from hippuric acid	04

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Syllabus Completion Report Year 2022-23

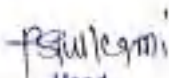**Class:** T. Y. B. Sc. Chemistry   **Sem.-**VI

Name of Paper: Chemistry of Soil and Agrochemicals   **No. of Lectures allotted per week:** 03

Name of Teacher: Dr. P. S. Kulkarni

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1.	**Feb 22**	Soil Chemistry	Role of agricultural chemistry Introduction to soil chemistry, definitions of soil, Soil components- Mineral component, organic matter or humus, soil atmosphere, soil water, soil microorganism Physical properties of soil- Soil texture, soil structure, soil colour, soil temperature, soil density, porosity of soil Surface soil and sub-soil, Functions of soil. Chemical properties of soil - Soil reactions, importance of soil reaction, factors controlling soil reactions, Buffer action, buffering capacity, importance of buffer reaction in agriculture, ion exchange and importance of ion exchange.	07
2.	**March 23**	Problematic Soil and Soil testing	Introduction to problematic soils. Acid soils- formation of acid soil, effect of soil acidity on plant, reclamation of acidic soil, application of lime in improving the acidity of soil, lime requirements. Alkali Soil- formation of alkali soil, reclamation of alkali soil. Classification of alkali soil- saline soil, alkali soil, saline alkali soil, non-saline alkali soil. Soil testing - Introduction, different methods of soil fertility evaluation. Objectives of soil testing.	06
3	**March 23**	Laboratory Methods of Soil Analysis	1. Determination of pH of soil 2. Determination of EC and TDS of soil 3. Determination of soil organic matter of soil. 4. Determination of available phosphorus from soil. 5. Determination of calcium and magnesium from soil by EDTA method. 6. Determination of carbonate and bicarbonates from soil.	**12 L Conducted in Laboratory in Afternoon**

| 4 | **April 23** | Fertilizers and Manures | Introduction, Classification of nitrogenous fertilizers, reaction of ammonium sulphate, urea as a fertilizer in soil. Nano fertilizers- Nano-Fertilizers for Sustainable Crop Production, Nano urea- preparation, forms and application of nano urea. Phosphatic fertilizers- Classification of phosphatic fertilizers, reactions of superphosphate as a fertilizer in soil. Potassic fertilizers - Classification of potassic fertilizers, reactions of potash fertilizer in soil.
 Complex fertilizers- Characteristics, advantages and disadvantages,
 Mixed fertilizers - Characteristics, advantages and disadvantages.
 Time and mode of applications of fertilizers in the solid and liquid form to plants. Factors affecting efficiency of fertilizers.
 Manures
 Introduction, Definition and classification of manures. Effect of bulky organic manures on soil. Farm yard manures (FYM), improved methods of handling FYM- Trench method for FYM, Factors affecting the composition of FYM, losses during the handling and storage of FYM, Gober gas-compost plant - construction and advantages.
 Biofertilizers - Definition, classification, role & advantages. Vermicompost - Preparation, effect of vermicompost on soil fertility. | **08** |
| 3. | **April 23** | Protection of Plants | Classification of pesticides.
 5.2 Insecticide- Definition, Classification on the basis of mode of action and chemical properties. Inorganic insecticides - plants or animal origin insecticides- nicotine, pyrethrum, rotenone. Synthetic organic insecticides – a) Organochlorine insecticides - DDT, BHC, Aldrin and dieldrin. b) Organophosphorus insecticides – Parathion, Malathion, c) Carbamate <br> insecticides – Carbaryl, Baygon.
 Fungicide – Definition and Classification of fungicides.
 Inorganic fungicide- Copper fungicides a) Bordeaux mixture, b) Copper oxychloride.
 Organic fungicides- Dithiocarbamate, Quinone | **06** |

			fungicides, Heterocyclic fungicides.Synthetic fungicides.Herbicides- Definition, Classification on the basis of mode of action-Selective and non-selective herbicides, classification based on their effect on weeds-contact, systemic herbicides. Classification on the basis of their chemical structures. 5.5 Nano pesticides: Its Scope and Utility in Pest Management	

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Syllabus Completion Report: 2022-2023 **Class: F. Y. B.Sc. Sem. I**

Name of Paper: Physical chemistry CH-101 **No. of Lectures allotted per week: 03**

Name of Teacher: Dr. S. P. Jadhav

Month	Chapter	Topic Name	No. of lectures
Aug.-Sept. 2022	Chemical Energetics	Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances, problems. **Assignment No. 1** **Unit Test - 1**	11 L
Sept.-Oct. 2022	Chemical Equilibrium	Introduction: Free Energy and equilibrium - Concept, Definition and significance The reaction Gibbs Energy, Exergonic and endergonic reaction. The perfect gas equilibrium, the general case of equilibrium, the relation between equilibrium constants, Molecular interpretation of equilibrium constant. The response of equilibria to conditions- response to pressure, response to temperature, Van't Haff equation, Value of K at different temperature, Problems **Assignment No. 2** **Unit Test - 2**	11 L
Oct. – Nov. 2022	Ionic Equilibria	Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis- calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts– applications of solubility product principle. **Assignment No.3** **Unit Test - 3** **Internal-1**	14 L

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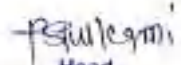Hutatma Rajguru Mahavidyalaya,
Rajgurunagar

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Principal
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K.T.S.P.MANDAL'S
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF CHEMISTRY
Syllabus Completion Report 2022-2023
Class: T. Y. B. Sc., term-1   Sem.-V
Name of Paper: CH-505: Industrial Chemistry - I
No. of Lectures allotted per week: 03
Name- Prof. Kolekar S.S,

Sr. No.	Month	No. of Lect. Taken	Nameof Chapter	Topic Covered
1	Aug 2022	03L	ModernApproach to Chemical Industry	Introduction, basic requirements of chemical industries, chemical production, unit process and unit operations
2	Sep. 2022	05 L	Modern Approach to Chemical Industry	Quality control and quality assurance, process control, research and development, human resource, safety measures, classification of chemical reactions, batch and continuous process, Conversion, selectivity and yield, copy-right act, patent act, trademarks.
	Sep. 2022	02 L	Manufacture of Basic Chemicals	Ammonia: Manufacture of ammonia by modified Haber-Bosch process, Physico-chemical principles involved and uses of ammonia.Nitric acid: Manufacture of nitric acid by Ostwald's process, Physico-chemical principles involved and uses of nitric acid.
3	Oct. 2022	05 L	Manufacture of Basic Chemicals	Manufacture of Sulphuric acid by contact process, Physico-chemical principles involved and uses of Sulphuric acid
		03L	Soap	Soap: Soap and Fatty Acids: Introduction, Chemistry, Manufacturing Technology, Raw Materials, Functional Properties of Soap, Manufacturing Processes, Saponification Reactor, Cooling, Soap Separator
4	Nov. 2022	8L	Dyes And Pigments	Dyes: Introduction, qualities of good dye, Colour constituents (Chromophore, auxochrome), classification of dyes according to their application, Synthesis and uses of following dyes: Nitroso dye-martius yellow, Azo dyes-Methyl orange and anilineyellow, Triphenylmethane dye-Crystal violet, Phthalein dye - Phenolphthalein, Xanthane-Fluorescein,

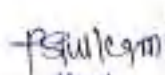|				
5	**Dec-2022**	**07**	Sugar and Fermentation Industry	Antha-quinnoeAlizarin and Indigo dyes - Indigo Introduction, classification and general properties of pigments. Inorganic pigments: i) Zinc oxide pigments (Fundamentals and properties, Raw materials, Direct process. Sugar: Introduction, manufacture of cane sugar, extraction of juice, purification of juice, sulfitation and carbonation, evaporation, crystallization, separations of crystals, drying refining, grades, recovery of sugar from molasses, by-product of sugar industry fermentation Industry: Introduction, importance, conditions favorable for fermentation, Characteristics of enzymes, short account of some fermentation processes, Alcohol beverages,

Syllabus Completion Report 2022-23   **Class:** T. Y. B. Sc. Chemistry, **Sem.**-VI

Name of Paper: Inorganic Chemistry-II   **No. of Lectures allotted per week**: 03

Name of Teacher: Prof. Dongare N.D.

Sr. No.	Month	Name of Chapter	Topic Covered
1	Feb-23 Mar-23	Organometallic Chemistry	Definition of Organometallic compounds and Organometallic chemistry, CO as a π-acid donor ligand, binary metal carbonyls, classification of metal carbonyls, synthesis of metal carbonyls; (a) Direct reaction (b) Reductive carbonylation (c) Photolysis and thermolysis. Hepticity, Molecular and electronic structures of binary metal carbonyls, Electron count in complexes (18 electron rule). Applications of organometallic compounds in industrial catalysis (list of examples). Chemistry of ferrocene; Introduction, synthesis and physical properties of ferrocene. Reactions of ferrocene such as Friedel-Craft Acylation, Friedel-Craft Alkylation, Mannich reaction, Nitration and Halogenation.
2	Mar-23, Apr-23	Homogeneous and Heterogeneous catalysis	Introduction to Catalysis, basic principles, activity and selectivity in catalysis, Types of catalysis, homogeneous vs. heterogeneous catalysis. **Homogeneous catalysis:** catalytic cycles for following reactions: a) Hydrogenation of olefins using Wilkinson complex, b) Hydroformylation of olefins using Cobalt and Rhodium complexes, c) Carbonylation reaction: methanol to acetic acid process i.e. Monsanto processes and d) C-C coupling reactions: Heck reaction. **Heterogeneous catalysis**: Classification of heterogeneous catalysts, supported metal catalyst, Role of support, Promoters and Poisons. Catalytic processes viz., a) Hydrogenation of olefins using Raney Nickel catalyst, b) Zeolites in catalysis: Catalytic cracking, c) Biodiesel synthesis using Heteropolyacids (HPAs) d) Automotive Exhaust catalysts: The catalytic converters.
3.	Apr-23	Inorganic Polymers	Introduction, Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicates, silicones, siloxanes, borazines, and phosphazenes.
4.	May-23	Inorganic solids/ionic liquids of technological importance	Inorganic solids, Preparation of inorganic solids: Conventional heat and beat methods, Coprecipitation method, Sol-gel method and Hydro-thermal method. Introduction to Solid electrolytes, inorganic liquid crystals and their examples. Ionic liquids, synthesis and application of imidazolium and phosphonium based ionic liquids.

5.	May-23	Bioinorganic Chemistry	Role of metals in bioinorganic chemistry, Classification as enzymatic and non-enzymatic metals, enzymatic redox metals such as Cu (SOD) and enzymatic non-redox metals such as Zn (Hydrolase). Role of metal ions in non-enzymatic processes-Na, K, Ca, Mg. Role of metals in enzymatic processes.II. Metalloproteins-Iron proteins. Introduction of Fe-S proteins, Electron transfer proteins (Fe-S, Fe2S2, Fe3S4, Fe4S4). Transport protein (transferrin) and Storage protein (ferritin) III. Bioinorganic Chemistry of Fe: Hemoglobin and myoglobin, its structure and functions and IV. Bioinorganic Chemistry of Co: Vitamin-B12, its structure and function.
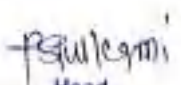
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HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
Syllabus Completion Report: 2022-2023   **Class: T. Y. B.Sc. Sem. V**

Name of Paper: Physical   chemistry CH-501   **No. of Lectures allotted per week: 03**

Month	Chapter	Topic Name	No. of lectures
Aug.- Sept. 2022	Quantum Chemistry	Introduction, de Broglie hypothesis, The Heisenberg's uncertainty principle, quantisation of energy, Operators. Schrodinger wave equation, well behaved function, Particle in a one-, two and three-dimensional box (no derivation), Physical interpretation of the ψ and $\psi2$, sketching of wave function and probability densities for 1D box, degeneracy, applications to conjugated systems, zero-point energy and quantum tunnelling, Numerical. **Assignment No. 1** **Unit Test - 1**	10L
Sept.- Oct. 2022	Investigation of Molecular structure	Molar refraction and molecular structure, Dipole moment and molecular structure, electromagnetic spectrum, energy of molecules, Types of molecular spectra. Microwave Spectroscopy, Infrared Spectroscopy, Raman Spectroscopy. **Assignment No. 2** **Unit Test - 2**	16L
Oct.- Nov. 2022	Photochemistry	Introduction, Difference between thermal and photochemical processes, Laws of photochemistry: i) Grothus - Draper law ii) Stark-Einstein law, Quantum yield, Reasons for high and low quantum yield., Factors affecting Quantum yield, Experimental method for the determination of quantum yield, types of photochemical reactions - photosynthesis, photolysis, photocatalysis, photosensitization, Jablonski diagram depicting various processes occurring in the excited state: Qualitative description of fluorescence and phosphorescence, Chemiluminescence, Problems. **Assignment No. 3** **Unit Test - 3**	10L

Name of Teacher: **Dr. S. P. Jadhav**

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Syllabus Completion Report Year 2022-23 Class: T. Y. B. Sc.,　　　**Sem.**-V
Name of Paper: Physical Chemistry Practical - I　　**No. of Lectures allotted per week:** 05
Name of Teacher: Dr. S. P. Jadhav
Name of Paper : Physical Chemistry Practical - I　　[Batch-D]

Month	No. of Lect. Taken	Name of Chapter	Topic Covered
Sept.-Oct. 2022	05L	Refractometry	1. To determine the specific refractivity's of the given liquids A and B and their mixture and hence determine the percentage composition their mixture C. 2. To determine the molecular refractivity of the given liquids A, B, C and D.
Oct. 2022	20L	Spectrophotometry and Colorimetry	1. To titrate Cu^{2+} ions with EDTA photometrically. 2. To determine the indicator constant of methyl red indicator 3. Simultaneous determination of Cu^{2+} and Ni^{2+} ions by colorimetry/spectrophotometry method
Oct. 2022	05L	Viscosity	1. Determine the radius of glycerol molecule from viscosity measurement.
Nov. 2022	20L	Conductometry	1. Titration of a mixture of weak acid and strong acid with strong alkali. 2. To determine the velocity constant of hydrolysis of ethyl acetate by NaOH solution by conduct metric method. 3. To determine the normality of citric acid in given fruit by titrating it against standard NaOH solution by conductometric method. 4. To determine $\lambda\infty$ of strong electrolyte (NaCl or KCl) and to verify Onsager equation.

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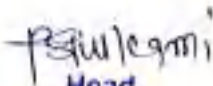## HutatmaRajguruMahavidyala
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Syllabus Completion Report Year 2022-23
Class: T.Y. B. Sc. Term-II
Name of Paper: DSEC-VI: CH-608: Organic Chemistry-III
No. of Lectures allotted per week: 03

Name of Teacher: Prof. Kolekar S.S.

Sr. No.	Month	Name of Chapter	Topic Covered
1.	March 2023	Reagents in Organic Synthesis	Reagents- Preparation and Applications of following reagents. ReducingReagents: Lithium aluminium hydride $LiAlH_4$, $NaBH_4$, DIBAL-H, $Li(tBuO)_3AlH$ & Raney Nickel., Oxidizing Reagents: DMSO either with DCC or Ac_2O, Dess Martin reagent, Osmium tetroxide, Selenium dioxide-(SeO_2), DDQ.
2.	Feb. 2023	Retrosynthetic Analysis and Applications	Introduction, Different terms used Disconnection, Synthons, Synthetic equivalence, FGI, TM. One group disconnection, Retrosynthesis and Synthesis of target molecules: Acetophenone, Crotonaldehyde, Cyclohexene, Benzyl benzoate, and Benzyl diethyl malonate.
3.	April 2023 and	Organic Reaction Mechanism and Synthetic Applications	Chemistry of reactive intermediates (carbocations, carbanions, free radicals, carbenes, nitrenes, benzynes etc Wolff rearrangement, Hofmann rearrangement.Simmons-Smith reaction, Michael reaction, Wittig reaction and McMurry reaction, Diels-Alder reaction Functional group interconversions and structural problems using chemical reactions
4.	May 2023	Natural Products	Terpenoids: Introduction, Isolation, Classification. Citra structure determination using chemical and spectral methods, Synthesis of Citral by Barbier and Bouveault Synthesis. Alkaloids: Introduction, extraction, Purification, Some examples of alkaloids and their natural resources. Ephedrine-structure determination using chemical methods. Synthesis of Ephedrine

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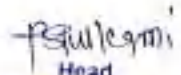**Syllabus Completion Report**
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Organic Reaction Mechanism and Biogenesis
Section-I
Teacher Name: Dr. Kulkarni P. S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Methods for determining Reaction Mechanisms	Kinetic and non-kinetic methods	04
2	Nov.21	Free Radicals	Generation, stability, reactivity, Free radical substitution, addition to multiple bonds, radicals in synthesis, Inter- and intra-molecular bond formation via mercury hydride, tin hydride, thiol donors,	08
3	Dec.21	Free Radicals	cleavage of C-X, C-Sn, C-S, O-O bonds, Oxidative coupling, C-C bond formation in aromatics, SNAr reactions, Free Radicals in Organic Synthesis.	04
4	Jan.22	Linear Free Energy Relationships	Hammet plots, Hammet equation, substituent constants, reaction constants, use of Hammet plots,	06
5	Feb.22	Linear Free Energy Relationships	calculation of k and K, Deviations from straight line plots, Taft equation, solvent	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Biogenesis
Section-II
Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Terpenoids	Mono-, Sesqui-, Di-, tri-terpenoids and cholesterol,	08
2	Nov.21	Alkaloids	Derived from ornithine, lysine, nicotinic acid, tyrosine and tryptophan.	06
3	Dec.21	The Shikimate pathway	Cinnamic acids, lignans and lignin, coumarins, flavonoids and stilbens.	08
4	Jan.22	The Shikimate pathway	isoflavanoids and terpenoidquinones.	08
5	Feb.22	A case study	Alkaloids isolated from the Roots of Piper nigrum	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper- CHO-351: Structure Determination of Organic Compounds by
Spectroscopic Methods
Section-I
Teacher Name: Dr. Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	NMR in Stereochemistry Determination	Homotopic, enatiotopic and distereotopic protons, Chemical and Magnetic equivalence; First and second order splitting, Complex multiplicity patterns and coupling constants in asymmetric compounds; Simplification of complex spectra, NOE, Diastereomerism, Atrop or axial chirality, % Enantiomeric excess, chiral NMR solvents etc in structure elucidation.	10
2	Nov.21	13C NMR spectroscopy	13C NMR spectroscopy- APT, DEPT and INEPT	06
3	Dec.21	15N, 19F and 31P NMR spectroscopy	Fundamentals and applications in structure elucidation of organic compounds, catalysts and biomolecules.	04
4	Jan.22	2D NMR spectroscopy	a) Homonuclear: COSY, TOCSY, 2DINADEQUATE, 2D- ADEQUATE, NOESY, ROESY	04
5	Feb.22	2D NMR spectroscopy	(b) Heteronuclear: HSQC, HMQC, HMBC [8 L]	04

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Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-351 Mass Spectrometry
Section-II
Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Mass Spectrometry	Principle, ionization methods like EI, CI, ES, MALDI and FAB Fragmentation of typical organic compounds, stability of fragments,	06
2	Nov.21	Mass Spectrometry	Rearrangements, factors affecting fragmentation, ion analysis, ion abundance, High-Resolution mass spectrometry in determination of molecular formula.	06
3	Dec.21	Applications of Mass Spectrometry	Determination of the elemental composition, Isotopic Abundance in structure establishment	04
4	Jan.22	Analysis of Biomolecules	Proteins and Peptides, Oligonucleotides and Oligosaccharides	08
5	Feb.22	Problems solving	Structure elucidation using UV, IR, 1D (1H and13C) NMR and 2D NMR (1H-1H, 13C- 1H COSY /HETCOR only), APT, DEPT and MS data as well as spectra.	12

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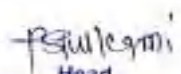Department of Chemistry
Hutatma Rajguru Mahavidyalaya,
Rajgurunagar

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Hutatma Rajguru Mahavidyalay
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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352(Organic Stereochemistry)
Section-I
Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.21	Actual Shape of six membered rings &it's relation to properties & reactivity.	Conformations of polysubstituted cyclohexane, six membered rings with SP2 carbon, heterocycles with N and O, anomeric effect, stereochemical principles involved in reactions of six membered rings and other than six membered rings, concept of I-Strain. Stereochemistry of a polymer chain – Types and examples of Tacticity Decalols, Decalones, Octahydronaphthalenes, decahydroquinolines	10
2	Nov.21	Stereochemistry of fused and bridged ring systems	Nomenclature, synthesis; stereochemical aspects of Perhydrophenanthrene, Perhydroanthracene, hydrindane, Steroids; Bridged system (bi, tri and polycyclo system) including heteroatoms, Bredt's Rule.	05
3	Dec.21	Conformations of following compounds with justification of each	cis and trans -1,3- and l,4-di-t-butyl-cyclohexanes; Cis-4-di-t-butylcis-2,5-dihydroxycyclohexane; Twistane; bicyclo- [2.2.2]octane; Trans-anti-trans Perhydro-anthracene and the lactone; cyclohexane-l,4-dione; 1,2,2,6,6-penta-methyl-4hydroxy-4-phenylpiperidine; ψ-tropine; 2-hydroxy-2-phenyl quinolizidine; 4-t-butyl-4methyl-l,3-dioxane; cis- and trans-2,5-di-t-butyl-l,3-dithianes;cis-2,5-di-t-butyl-l,3,2dioxaphosphorinan-2-one.	04
4	Jan.22	Determination of configuration by using Cram's model	Cram's rule, Cram's cycle model, Cram's dipolar model, Felkin-Anh Model.	05
5	Feb.22	Racemic Modification	Resolution and analysis of stereomers - formation of racemization and methods of resolution.	05

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352 Asymmetric Synthesis
Section-II
Teacher Name: Prof. Pawar R.Y

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-21	Introduction of Asymmetric Synthesis.	Asymmetric Synthesis, Defination of Chirol pool and Chiral auxillaries with examples. Simple derivatives of amino acids , chiron approach of asymmetric synthesis, Alkylation of enolates by using chiral auxillary , Diel's Alder Reaction ,	08
2	Nov.-21	Asymmetric Organocatalysis	Corey -Bakshi Shibata Catalyst , Asymmetric Epoxidation by using MnSalen complex , (DHQ)2PHAL , (DHQD)2PHAL ,	06
3	Dec.-21	Asymmetric Aldol Reaction,	Chiral Auxillary controlled Aldol reaction The Evans aldol reaction, Aldol reaction catalyzed by proline Enantioselective, diastereoselective and double diastereoselective Aldol reactions.	06
4	Jan.-21	Transition Metal-Catalyzed Homogeneous Asymmetric Hydroxylation and Epoxidation	Asymmetric Sharpless epoxidation, DIPT Synthesis of L-Menthol from R-citronellal , Synthesis of Chloramphenical , Asymmetric conjugate addition by using BINAP , Noyori Hydrogenation H_2Pd/c, OSO4	06
5	Feb.-22	Asymmetric Phase-Transfer and Ion Pair Catalysis	Asymmetric hydrogenation , Asymmetric catalyzed asymmetric hydrogenation of carboxylation	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO- 353 Designing Organic Synthesis & Heterocyclic Chemistry
Section-I & II
Teacher Name: Prof. Pawar R.Y

Section-I

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.-21	1. Concepts of Retro synthesis	Retrosynthetic analysis, disconnection approach, Synthons, multiple step synthesis, functional group intercoversion, , 1,5 related functional group disconnection.	04
03	Dec.-21	2. Application of Retrosynthetic Approach:	Umpolung, convergent synthesis, special methods for small rings, Heteroatom and Heterocyclic compounds, problems.	08
04	Jan.-22	2. Application of Retrosynthetic Approach:	Retrosynthesis and synthesis of following Molecules: Strychnine, Reserpine, Thienamycin, Asteltoxin, Indolizomycin, Erythronolide	06
05	Feb.-22	Application of Retrosynthetic Approach:	Retrosynthesis and synthesis of following Molecules Asteltoxin, Indolizomycin, ErythronolideS	04

SECTION-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.-21	Synthesis, reactions and structural effects of heterocyclic rings	Systematic nomenclature (Hantzch – Widmann system) for monocyclic fused , bridged heterocycles , Tautomerism , in aromatic hetrocycles , Strain bond angles , Toursional strain & their consequences in small ring heterocycles .	08
02		General chemical	Biological systems (Anthocyanins, Flavones,	

	Nov.-21	behaviour of heterocyclic compounds and their applications.	Neurotransmitters), Natural Products (Alkaloids: Nicotin, Quinine), Drugs and Medicines (Omeprazole, Amlodipine, Cilostazol)	12
03	Dec.-21	Five & six membered heterocycles Synthesis &Reactivity.	Common Methods in Ring Synthesis of Aromatic Heterocyclic Systems: Typical ring synthesis involving C – Heteroatom, C – C bond formations, Electrocyclic processes in heterocyclic Synthesis: 1,3 -dipolar cycloadditions producing five - membered heterocycles, Nitrenes in heterocyclic synthesis, Palladium catalysis in the synthesis of Benzo - Fused heterocycles, Fischer synthesis, Epoxidation, Use of Sulphur Ylides, Azides for small rings	10
04	Jan.-22	Three and four, Five-membered and benzo-fused five membered heterocycles Synthesis & Reactivity.	Aziridines, Oxiranes, Thirienes, Azetidines, Oxitanes and Thietanes ,Oxazole,Isoxazole, Thiazole, Pyrazole, Imidazole , Benzothiazole ,Benzimidazole , Indole , Benzofuran .	06
05	Feb.-22	Six membered and benzo-fused six membered heterocycles: Synthesis & Reactivity.	Six membered and benzo-fused six membered heterocycles: Pyrazine, Pyridazine, Pyrimidine, Quinazoline, Quinoxaline, Aziridines, Quinoline	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO- 354 Solvent Free Organic Synthesis
Teacher Name: Prof. Pawar R.Y & Prof. Walunj K.A.

Sr. No.	Month	Name of Experiment's	No. of hours
1	16/11/22	Solvent Free Carbon–Carbon Bond Formation by using Pechmann reaction	04
2	17/11/22	To Study C-C bond formation using Claisen condensation reaction reaction	04
3	18/11/22	To study phenol bromination using NBS	04
4	22/11/22	To Study C-C bond formation using Claisen condensation reaction reaction (Diethyl malonate)	04
5	23/11/22	To Study C-C bond formation using Biginelli reaction	04
6	23/11/22	To Study C-C bond formation using Biginelli reaction (KSF)	04
7	24/11/22	To Study C-C bond formation using Pinacol coupling reaction	04
8	29/11/22	To Study C-C bond formation using Knoevenagel reaction	04
9	13/12/22	To Study C-N bond formation using Beckmann rearrangement	04
10	14/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxide complex	04
11	15/12/22	To Study C-C bond formation using calix [4] resorcinarene	04
12	20/12/22	Alumina-supported permanganate oxidation	04
13	27/12/22	Pyrrocatechol protection using phenylboronic acid	04
14	28/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxide Complex	04
16	29/12/22	To Study C-C bond formation using Knoevenagel reaction	04
17	04/01/23	To Study C-C bond formation using Reformatsky reaction	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-450 Chemistry of Natural Products
Teacher Name: Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	1. Understanding & planning of total synthesis while maintaining the stereochemistry.	**SECTION-I** 1. A case study : Longifolene 2. Synthesis of Longifolene by J. E. McCurry & S. J. Isser 3. Synthesis of Longifolene by S.Karimi & P.Tavares 4. Synthesis of Longifolene by E.J. Corey , R.B.Mitra& P. A.Vatakencherry 5. Synthesis of Longifolene by R.A.Volkmann , G.C. Andrew's& W. S. Johnson 6. Synthesis of Longifolene by W. Oppolzer & T. Gödel 7. Synthesis of Longifolene by A.G. Schultz & S.Puig 8. Synthesis of Longifolene by B.Lei&A.G.Fallis	12
2.	April-2023	2.Total Synthesis	1. HirsutelloneB (Angew.Chem.Int.Ed.2009, 48,6870–6874.) Introduction , The Nicolaou synthesis (+) Hirsutellone B i) Synthesis of ring C ii) Synthesis of decahydro Fluorene skeleton iii) Synthesis of Intramolecular Diel's Alder reaction adduct iv) Synthesis of γ-siloxy nitrile	04
			2. Ribisins A and B:(J.Org.Chem. 2019,84,15165−15172) 1. Introduction 2. Structures of Ribisins A and B 3. Total synthesis of Ribisins A 4. Total synthesis of Ribisins B	04
			3. Subincanadine E:(J.Org.Chem.2017,82,11126-11133) 1. Introduction 2. Structures of Subincanadine E 3. Retrosynthetic analysis of Subincanadine E 4. Synthesis of Subincanadine E 5. Mechanism of coupling of Grignard reagent with maleimide & allylic rearrangement & pictet-spenger cyclization	04
3.	May-2023	3.Total Synthesis Pinnaic Acid	**SECTION-II** **A) Pinnaic acid** 1. Introduction 2. Structures 3. Retro synthesis of Pinnaic acid	06

			4. Total synthesis of Pinnaic acid Using 1-Pyrolidine ,1-cyclopentene 5. Synthesis of Piperidine derivative from carbamate 6. Synthesis of Die none derivative from Piperidine derivative References: 1. Angew. Chem.Int. Ed. 2001, 40 (23), 4450-4452. 2. Angew. Chem.Int.Ed. 2001, 40,(23), 4453-4456. 3. Angew. Chem.Int. Ed.2007, 46,5746–5	

4.	May-2023		**A)** Vannusals
			   1. Introduction
			   2. Structures
			   3. Retro synthesis of Pinnaic acid
			B) Total synthesis of Vannusals
				06

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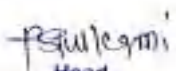Department of Chemistry
Hutatma Rajguru Mahavidyalaya,
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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Subject-CHo-451- Organometallic Reagents in Organic Synthesis

Teacher Name: Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1.	April-2023	2. C-C coupling reactions	**SECTION-I** Transition metal complexes in organic synthesis; Pd, Ni, Ru, Fe, Ir and Cu only (C-C, CN, C-O bond formation reactions with catalytic cycle, ligand and % mole concepts)	20 L
2.	May-2023	2. C=C formation reactions:	Wittig, Horner-Wordworth-Emmons, Shapiro, Bamford Stevens, McMurry, Julia-Lythgoe and Peterson olefination reactions	10L

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-452 Concepts & Applications of Medicinal Chemistry
Prof. Walunj K.A.

Sr.	Month	Name of	Topic Covered	No. of

No.		Chapter		Lect. taken
1.	March-2023	1.Introduction to Medicinal Chemistry	Introduction to Peptides and proteins P roteins as biological catalyst Nucleic acids, Metabolism, Chemistry of cofactors/coenzymes, Chemistry of TPP, , Folic Acid and other vitamins, Principle of drug design, Chemistry of diseases and Drug development ,Proton pump inhibitors and Problem solving.	06L
2.	April-2022	2. Peptides	Sequencing and applications in therapeutics, Solution phase and solid phase peptide synthesis and Modern techniques for biomolecules and disease diagnosis	04L
3.	April-2022	3. Introduction to medicinal Chemistry.	History, drug targets, Drug discovery, design and development, Case Study : Design of Oxamniquine.	04L
			Pharmacokinetics and Pharmacodynamics Of drug: Drug absorption, distribution, metabolism, elimination and toxicity, drug metabolism, biotransformation, Drug receptor interactions, Hansch Equation and significance of terms involved in it	04L
4	May-2022	**1.** Structure and activity Relationship	QSAR, Applications of SAR and QSAR in drugdesign, physio-chemical parameters lipophilicity, partition coefficient, electronic ionization constant, Case Study: Statins	09L
5	May-2022	4.Actual Study of Drug molecule	Introduction, Developments, SAR, Mode of action, limitations and adverse effect ofAnti-infective Agents, Beta lactam antibacterial agents (Penicillins, Cephalosporins),Tetracyclins,Macrolides,Chloramphenicol,P olyenes,Amphotrecin-B,Azoles,Amantadine,Acyclovir, Quinine,	02L
6	May-2022		Quinolines, Quinolones, Refamycine, Sulphonamides	06L

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**K. T. S.P. Mandal's
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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
CHO-453: Practical-III: Select ANY TWO Section I, II and III
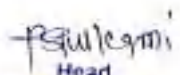Section-I: Ternary Mixture Separation**

Sr. No.	Month& Date	Name of Experiment's	
1	17/03/2022	a) Salicylic acid b) M-nitro aniline c) Acetanilide	04
2	31/03/2022	a) o-chlorobenzoic acid b) Thiourea c) m-dinitrobenzene	04
3	23/03/2022	a) Oxalic acid b) Salicylic acid c) P-nitrotoluene	04
4	01/04/2022	a) O-cresol b) Methyl acetate c)Nitrobenzene	04
5	24/03/2022	a) B –naphthol b) Urea c) Ethyl benzoate	04
6	31/03/2022	a) Urea b) Salicylic acid c) M-nitroaniline	04
7	30/03/2022	a) Cinnamic acid b) O-cholrophenol c) Aniline	04
8	25/03/2022	a) P- chlorophenol b) N,N-Dimethyl aniline c) Acetophenone	04
9	26/03/2022	a) Benzoic acid b) P-nitroaniline c) Acetanilide	04
10	23/03/2022	a) Phenyl acetic acid b) P-Chloroaniline c) Benzophenone	04
11	28/03/22	a) Salicylic acid b) M-dinitro benzene c) Choroform	04
12	29/03/22	a) Ethyl acetate b) M-Chloroaniline c) Ethyl benzoate	04

Section-II: Carbohydrates Synthesis and Isolation Natural Products

Sr. No.	Month & Date	Name of Experiment's	
1	09/05/22 10/05/22	UnitI:Carbohydrate Synthesis 1. Synthesis and structural determination of α-and β-D-glucose penta-acetate.	12

	11/05/022	2. Selective deacylation of α-and β-D-glucosepenta-acetate. 3. Benzoylation of D-glucose. To D-glucosepenta-benzoate.	

2	12/05/22	Unit II : Isolation of pigments from the natural products
		   1. Orange Marigold
		   2. Rose
		   3. Hibiscus
			12

3	13/05/22	Unit III: Isolation of essential oils from the natural products
		   1. Ginger
		   2. Lemongrass
		   3. Garlic
			12

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-23
CHO-454: Practical-II: Convergent and Divergent Organic Synthesis
Prof. Pawar R.Y. & Prof. Walunj K.A.

Sr. No.	Month & Date	Name of Experiment's	No. of Lect. Taken
		SET-IV: A). Convergent Synthesis2(Three Stage Synthesis)	
1	10/05/22	Stage II:4-Nitrochlorobenzene into 4-aminochlorobenzene (Reduction by using hydrazine)	04
2	10/05/22	Stage III: Quinoline synthesis by using acetophenone,4-amino chlorobenzene and styrene (One pot synthesis: [3 +2 +1] cycloaddition reaction)	04
		Divergent Synthesis-4(5Single Stage Synthesisf rom Acetophenone)	
3	10/05/22	1. Acetophenone to Ethylbenzene by Wolf Kishner reduction	04
4	30/03/22	2. Acetophenone to Chalcone using aromatic aldehyde	04
5	31/03/22	3. Acetophenoneinto Schiffbaseusingaromaticamine	04
6	10/05/22	4. Acetophenoneto m-Nitroacetophenone by nitration	04
		SET-II A). Convergent Synthesis 2(Three Stage Synthesis)	
7	05/04/22	1. Stage I: 4-Nitro toluene to 4-amino toluene (Reduction by using Sn/HCl)	04
8	26/04/22	2. Stage II: Phenol into2-hydroxy benzaldehyde (Reimer-Tiemann reaction)	04
9	23/04/22	3. Stage III: Synthesis of amidoalkyl-2-naphthols from β-Naphthol,4-aminotoluene and of 2-hydroxybenzaldehyde (One pot synthesis: MCR)	04
		B). Divergent Synthesis (5Single Stage Synthesis from β-Naphthol)	
10	27/04/22	1. β-Naphthol to Synthetic dye (By diazonium coupling)	04
11	29/04/22	2. β-Naphthol to β-Naphthyl methy lether (Methylation reaction)	04
12	09/05/22	3. β-Naphthol to (±) Binol then Resolution of Binol (Resolution technique)	04
		SET-III A). Convergent Synthesis-3(Three Stage Synthesis)	
13	11/05/22	1. o-Anisidineto2-methoxy-4-nitroaniline	04
		B). Divergent Synthesis-3(5Single Stage Synthesis from Salicyaldehyde)	
14	29/04/22	2. Salicylaldehyde to Salicylaldehyde phenyl hydrazine	04
15	09/05/22	3. Salicylaldehyde to o-Formyl phenoxyacetic acid	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Organic Reaction Mechanism and Biogenesis
Section-I

Teacher Name: Dr. Kulkarni P. S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Methods for determining Reaction Mechanisms	Kinetic and non-kinetic methods	04
2	Nov.21	Free Radicals	Generation, stability, reactivity, Free radical substitution, addition to multiple bonds, radicals in synthesis, Inter- and intra-molecular bond formation via mercury hydride, tin hydride, thiol donors,	08
3	Dec.21	Free Radicals	cleavage of C-X , C-Sn, C-S, O-O bonds, Oxidative coupling, C-C bond formation in aromatics, SNAr reactions, Free Radicals in Organic Synthesis.	04s
4	Jan.22	Linear Free Energy Relationships	Hammet plots, Hammet equation, substituent constants, reaction constants, use of Hammet plots,	06
5	Feb.22	Linear Free Energy Relationships	calculation of k and K, Deviations from straight line plots, Taft equation, solvent	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-350 Biogenesis
Section-II

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Terpenoids	Mono-, Sesqui-, Di-, tri-terpenoids and cholesterol,	08
2	Nov.21	Alkaloids	Derived from ornithine, lysine, nicotinic acid, tyrosine and tryptophan.	06
3	Dec.21	The Shikimate pathway	Cinnamic acids, lignans and lignin, coumarins, flavonoids and stilbens.	08
4	Jan.22	The Shikimate pathway	isoflavanoids and terpenoidquinones.	08
5	Feb.22	A case study	Alkaloids isolated from the Roots of Piper nigrum	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper- CHO-351: Structure Determination of Organic Compounds
by Spectroscopic Methods
Section-I

Teacher Name: Dr. Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	NMR in Stereochemistry Determination	Homotopic, enatiotopic and distereotopic protons, Chemical and Magnetic equivalence; First and second order splitting, Complex multiplicity patterns and coupling constants in asymmetric compounds; Simplification of complex spectra, NOE, Diastereomerism, Atrop or axial chirality, % Enantiomeric excess, chiral NMR solvents etc in structure elucidation.	10
2	Nov.21	13C NMR spectroscopy	13C NMR spectroscopy- APT, DEPT and INEPT	06
3	Dec.21	15N, 19F and 31P NMR spectroscopy	Fundamentals and applications in structure elucidation of organic compounds, catalysts and biomolecules.	04
4	Jan.22	2D NMR spectroscopy	a) Homonuclear: COSY, TOCSY, 2DINADEQUATE, 2D-ADEQUATE, NOESY, ROESY	04
5	Feb.22	2D NMR spectroscopy	(b) Heteronuclear: HSQC, HMQC, HMBC [8 L]	04

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-351 Mass Spectrometry
Section-II

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.21	Mass Spectrometry	Principle, ionization methods like EI, CI, ES, MALDI and FAB Fragmentation of typical organic compounds, stability of fragments,	06
2	Nov.21	Mass Spectrometry	Rearrangements, factors affecting fragmentation, ion analysis, ion abundance, High-Resolution mass spectrometry in determination of molecular formula.	06
3	Dec.21	Applications of Mass Spectrometry	Determination of the elemental composition, Isotopic Abundance in structure establishment	04
4	Jan.22	Analysis of Biomolecules	Proteins and Peptides, Oligonucleotides and Oligosaccharides	08
5	Feb.22	Problems solving	Structure elucidation using UV, IR, 1D (1H and13C) NMR and 2D NMR (1H-1H, 13C- 1H COSY /HETCOR only), APT, DEPT and MS data as well as spectra.	12

K. T. S. P. Mandal's

Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352(Organic Stereochemistry)
Section-I

Teacher Name: Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.21	Actual Shape of six membered rings &it's relation to properties & reactivity.	Conformations of polysubstituted cyclohexane, six membered rings with SP2 carbon, heterocycles with N and O, anomeric effect, stereochemical principles involved in reactions of six membered rings and other than six membered rings, concept of I-Strain. Stereochemistry of a polymer chain – Types and examples of Tacticity Decalols, Decalones, Octahydronaphthalenes, decahydroquinolines	10
2	Nov.21	Stereochemistry of fused and bridged ring systems	Nomenclature, synthesis; stereochemical aspects of Perhydrophenanthrene, Perhydroanthracene, hydrindane, Steroids; Bridged system (bi, tri and polycyclo system) including heteroatoms, Bredt's Rule.	05
3	Dec.21	Conformations of following compounds with justification of each	cis and trans -1,3- and l,4-di-t-butyl-cyclohexanes; Cis-4-di-t-butylcis-2,5-dihydroxycyclohexane; Twistane; bicyclo- [2.2.2]octane; Trans-anti-trans Perhydro-anthracene and the lactone; cyclohexane-l,4-dione; 1,2,2,6,6-penta-methyl-4hydroxy-4-phenylpiperidine; ψ-tropine; 2-hydroxy-2-phenyl quinolizidine; 4-t-butyl-4methyl-l,3-dioxane; cis- and trans-2,5-di-t-butyl-l,3-dithianes;cis-2,5-di-t-butyl-l,3,2dioxaphosphorinan-2-one.	04
4	Jan.22	Determination of configuration by using Cram's model	Cram's rule, Cram's cycle model, Cram's dipolar model, Felkin-Anh Model.	05
5	Feb.22	Racemic Modification	Resolution and analysis of stereomers - formation of racemization and methods of resolution.	05

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Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO-352 Asymmetric Synthesis
Section-II

Teacher Name: Prof. Pawar R.Y

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-21	Introduction of Asymmetric Synthesis.	Asymmetric Synthesis, Defination of Chirol pool and Chiral auxillaries with examples. Simple derivatives of amino acids , chiron approach of asymmetric synthesis, Alkylation of enolates by using chiral auxillary , Diel's Alder Reaction ,	08
2	Nov.-21	Asymmetric Organocatalysis	Corey -Bakshi Shibata Catalyst , Asymmetric Epoxidation by using MnSalen complex , (DHQ)2PHAL , (DHQD)2PHAL ,	06
3	Dec.-21	Asymmetric Aldol Reaction,	Chiral Auxillary controlled Aldol reaction The Evans aldol reaction, Aldol reaction catalyzed by proline Enantioselective, diastereoselective and double diastereoselective Aldol reactions.	06
4	Jan.-21	Transition Metal-Catalyzed Homogeneous Asymmetric Hydroxylation and Epoxidation	Asymmetric Sharpless epoxidation, DIPT Synthesis of L-Menthol from R-citronellal , Synthesis of Chloramphenical , Asymmetric conjugate addition by using BINAP , Noyori Hydrogenation H_2Pd/c, OSO4	06
5	Feb.-22	Asymmetric Phase-Transfer and Ion Pair Catalysis	Asymmetric hydrogenation , Asymmetric catalyzed asymmetric hydrogenation of carboxylation	04

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Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO- 353 Designing Organic Synthesis & Heterocyclic Chemistry
Section-I & II

Teacher Name: Prof. Pawar R.Y

Section-I

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.-21	1. Concepts of Retro synthesis	Retrosynthetic analysis, disconnection approach, Synthons, multiple step synthesis, functional group intercoversion, , 1,5 related functional group disconnection.	04
03	Dec.-21	2. Application of Retrosynthetic Approach:	Umpolung, convergent synthesis, special methods for small rings, Heteroatom and Heterocyclic compounds, problems.	08
04	Jan.-22	2. Application of Retrosynthetic Approach:	Retrosynthesis and synthesis of following Molecules: Strychnine, Reserpine, Thienamycin, Asteltoxin, Indolizomycin, Erythronolide	06
05	Feb.-22	Application of Retrosynthetic Approach:	Retrosynthesis and synthesis of following Molecules Asteltoxin, Indolizomycin, ErythronolideS	04

SECTION-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
01	Oct.-21	Synthesis, reactions and structural effects of heterocyclic rings	Systematic nomenclature (Hantzch –Widmann system) for monocyclic fused , bridged heterocycles , Tautomerism , in aromatic hetrocycles , Strain bond angles , Toursional strain & their consequences in small ring heterocycles .	08
02	Nov.-21	General chemical behaviour of heterocyclic compounds and their applications.	Biological systems (Anthocyanins, Flavones, Neurotransmitters), Natural Products (Alkaloids: Nicotin, Quinine), Drugs and Medicines (Omeprazole, Amlodipine, Cilostazol)	12
03	Dec.-21	Five & six membered heterocycles Synthesis &Reactivity.	Common Methods in Ring Synthesis of Aromatic Heterocyclic Systems: Typical ring synthesis involving C – Heteroatom, C – C bond formations, Electrocyclic processes in heterocyclic Synthesis: 1,3 -dipolar cycloadditions producing five - membered heterocycles, Nitrenes in heterocyclic synthesis, Palladium catalysis in the synthesis of Benzo - Fused heterocycles, Fischer synthesis, Epoxidation, Use of Sulphur Ylides, Azides for small rings	10
04	Jan.-22	Three and four, Five- membered and benzo- fused five membered heterocycles Synthesis & Reactivity.	Aziridines, Oxiranes, Thirienes, Azetidines, Oxitanes and Thietanes ,Oxazole,Isoxazole, Thiazole, Pyrazole, Imidazole , Benzothiazole ,Benzimidazole , Indole , Benzofuran .	06
05	Feb.-22	Six membered and benzo-fused six membered heterocycles: Synthesis & Reactivity.	Six membered and benzo-fused six membered heterocycles: Pyrazine, Pyridazine, Pyrimidine, Quinazoline, Quinoxaline, Aziridines, Quinoline	04

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHO- 354 Solvent Free Organic Synthesis
Teacher Name: Prof. Pawar R.Y & Prof. Walunj K.A.

Sr. No.	Month	Name of Experiment's	No. of hours
1	16/11/22	Solvent Free Carbon–Carbon Bond Formation by using Pechmann reaction	04
2	17/11/22	To Study C-C bond formation using Claisen condensation reaction reaction	04
3	18/11/22	To study phenol bromination using NBS	04
4	22/11/22	To Study C-C bond formation using Claisen condensation reaction reaction (Diethyl malonate)	04
5	23/11/22	To Study C-C bond formation using Biginelli reaction	04
6	23/11/22	To Study C-C bond formation using Biginelli reaction(KSF)	04
7	24/11/22	To Study C-C bond formation using Pinacol coupling reaction	04
8	29/11/22	To Study C-C bond formation using Knoevenagel reaction	04
9	13/12/22	To Study C-N bond formation using Beckmann rearrangement	04
10	14/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxide complex	04
11	15/12/22	To Study C-C bond formation using calix[4] resorcinarene	04
12	20/12/22	Alumina-supported permanganate oxidation	04
13	27/12/22	Pyrrocatechol protection using phenylboronic acid	04
14	28/12/22	2-Hydroxybenzaldehyde oxidation using urea-hydrogen peroxide Complex	04
16	29/12/22	To Study C-C bond formation using Knoevenagel reaction	04
17	04/01/23	To Study C-C bond formation using Reformatsky reaction	04

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M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-450 Chemistry of Natural Products
Teacher Name: Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	1. Understanding & planning of total synthesis while maintaining the stereochemistry.	**SECTION-I** 1. A case study : Longifolene 2. Synthesis of Longifolene by J. E. McCurry & S. J. Isser 3. Synthesis of Longifolene by S.Karimi & P.Tavares 4. Synthesis of Longifolene by E.J. Corey , R.B.Mitra& P. A.Vatakencherry 5. Synthesis of Longifolene by R.A.Volkmann , G.C. Andrew's& W. S. Johnson 6. Synthesis of Longifolene by W. Oppolzer & T. Gödel 7. Synthesis of Longifolene by A.G. Schultz & S.Puig 8. Synthesis of Longifolene by B.Lei&A.G.Fallis	12
2.	April-2023	2.Total Synthesis	1. HirsutelloneB (Angew.Chem.Int.Ed.2009, 48,6870–6874.) Introduction , The Nicolaou synthesis (+) Hirsutellone B i) Synthesis of ring C ii) Synthesis of decahydro Fluorene skeleton iii) Synthesis of Intramolecular Diel's Alder reaction adduct iv) Synthesis of γ-siloxy nitrile	04

			2. Ribisins A and B:(J.Org.Chem. 2019,84,15165−15172)
			  1. Introduction
			  2. Structures of Ribisins A and B
			  3. Total synthesis of Ribisins A
			  4. Total synthesis of Ribisins B
				04

			3. Subincanadine E:(J.Org.Chem.2017,82,11126-11133)
			  1. Introduction
			  2. Structures of Subincanadine E
			  3. Retrosynthetic analysis of Subincanadine E
			  4. Synthesis of Subincanadine E
			  5. Mechanism of coupling of Grignard reagent with maleimide & allylic rearrangement & pictet-spenger cyclization
				04

3.	May-2023	3.Total Synthesis Pinnaic Acid	**SECTION-II**
			 A) Pinnaic acid
			   1. Introduction
			   2. Structures
			   3. Retro synthesis of Pinnaic acid
			   4. Total synthesis of Pinnaic acid Using 1-Pyrolidine ,1-cyclopentene
			   5. Synthesis of Piperidine derivative from carbamate
			   6. Synthesis of Die none derivative from Piperidine derivative
			 References:
			 1. Angew. Chem.Int. Ed. 2001, 40 (23), 4450-4452.
			 2. Angew. Chem.Int.Ed. 2001, 40,(23), 4453-4456.
			 3. Angew. Chem.Int. Ed.2007, 46,5746–5
				06

4.	May-2023		**A)** Vannusals
			   1. Introduction
			   2. Structures
			   3. Retro synthesis of Pinnaic acid
			 B) Total synthesis of Vannusals
				06

Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-2023
Subject-CHo-451- Organometallic Reagents in Organic Synthesis

Teacher Name: Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1.	April-2023	2. C-C coupling reactions	**SECTION-I** Transition metal complexes in organic synthesis; Pd, Ni, Ru, Fe, Ir and Cu only (C-C, CN, C-O bond formation reactions with catalytic cycle, ligand and % mole concepts)	20 L
2.	May-2023	2. C=C formation reactions:	Wittig, Horner-Wordworth-Emmons, Shapiro, Bamford Stevens, McMurry, Julia-Lythgoe and Peterson olefination reactions	10L

K. T. S. P. Mandal's

Hutatma Rajguru Mahavidyala
Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-452 Concepts & Applications of Medicinal Chemistry
Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	1.Introduction to Medicinal Chemistry	Introduction to Peptides and proteins P roteins as biological catalyst Nucleic acids, Metabolism, Chemistry of cofactors/coenzymes, Chemistry of TPP, , Folic Acid and other vitamins, Principle of drug design, Chemistry of diseases and Drug development ,Proton pump inhibitors and Problem solving.	06L
2.	April-2022	2. Peptides	Sequencing and applications in therapeutics, Solution phase and solid phase peptide synthesis and Modern techniques for biomolecules and disease diagnosis	04L
3.	April-2022	3. Introduction to medicinal Chemistry.	History, drug targets, Drug discovery, design and development, Case Study : Design of Oxamniquine.	04L
			Pharmacokinetics and Pharmacodynamics Of drug: Drug absorption, distribution, metabolism, elimination and toxicity, drug metabolism, biotransformation, Drug receptor interactions, Hansch Equation and significance of terms involved in it	04L
4	May-2022	1. Structure and activity Relationship	QSAR, Applications of SAR and QSAR in drugdesign, physio-chemical parameters lipophilicity, partition coefficient, electronic ionization constant, Case Study: Statins	09L
5	May-2022	4.Actual Study of Drug molecule	Introduction, Developments, SAR, Mode of action, limitations and adverse effect ofAnti-infective Agents,	02L

			Beta lactam antibacterial agents (Penicillins, Cephalosporins),Tetracyclins,Macrolides,Chlorampheni col,Polyenes,Amphotrecin-B,Azoles,Amantadine,Acyclovir, Quinine,	
6	May-2022		Quinolines, Quinolones, Refamycine, Sulphonamides	06L

**K. T. S.P. Mandal's
Hutatma Rajguru Mahavidyala**

Prof. Pawar R.Y. & Prof. Walunj K.A.

Sr. No.	Month& Date	Name of Experiment's	
1	17/03/2022	a) Salicylic acid b) M-nitro aniline c) Acetanilide	04
2	31/03/2022	a) o-chlorobenzoic acid b) Thiourea c) m-dinitrobenzene	04
3	23/03/2022	a) Oxalic acid b) Salicylic acid c) P-nitrotoluene	04
4	01/04/2022	a) O-cresol b) Methyl acetate c)Nitrobenzene	04
5	24/03/2022	a) B –naphthol b) Urea c) Ethyl benzoate	04
6	31/03/2022	a) Urea b) Salicylic acid c) M-nitroaniline	04
7	30/03/2022	a) Cinnamic acid b) O-cholrophenol c) Aniline	04
8	25/03/2022	a) P- chlorophenol b) N,N-Dimethyl aniline c) Acetophenone	04
9	26/03/2022	a) Benzoic acid b) P-nitroaniline c) Acetanilide	04

10	23/03/2022	a) Phenyl acetic acid b) P-Chloroaniline c) Benzophenone	04
11	28/03/22	a) Salicylic acid b) M-dinitro benzene c) Choroform	04
12	29/03/22	a) Ethyl acetate b) M-Chloroaniline c) Ethyl benzoate	04

Section-II: Carbohydrates Synthesis and Isolation Natural Products

Sr. No.	Month & Date	Name of Experiment's	

1	09/05/22
	
	10/05/22
	
	11/05/022
		UnitI:Carbohydrate Synthesis
		    1. Synthesis and structural determination of α-and β-D-glucose penta-acetate.
		    2. Selective deacylation of α-and β-D-glucosepenta-acetate.
		    3. Benzoylation of D-glucose. To D-glucosepenta-benzoate.
			12

2	12/05/22	Unit II : Isolation of pigments from the natural products
		    1. Orange Marigold
		    2. Rose
		    3. Hibiscus
			12

3	13/05/22	Unit III: Isolation of essential oils from the natural products
		    1. Ginger
		    2. Lemongrass
		    3. Garlic
			12

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Rajgurunagar, Tal. Khed, Dist. Pune

Syllabus Completion Report
M.Sc. –II (Organic Chemistry) A.Y.-2022-23
CHO-454: Practical-II: Convergent and Divergent Organic Synthesis

Prof. Pawar R.Y. & Prof. Walunj K.A.

Sr. No.	Month & Date	Name of Experiment's	No. of Lect. Taken
		SET-IV **A).Convergent Synthesis2(Three Stage Synthesis)**	
1	10/05/22	Stage II:4-Nitrochlorobenzene into 4-aminochlorobenzene (Reduction by using hydrazine)	04
2	10/05/22	Stage III: Quinoline synthesis by using acetophenone,4-amino chlorobenzene and styrene (One pot synthesis:[3 +2 +1] cycloaddition reaction)	04
		Divergent Synthesis-4(5Single Stage Synthesisf rom Acetophenone)	
3	10/05/22	1. Acetophenone to Ethylbenzene by Wolf Kishner reduction	04
4	30/03/22	2. Acetophenone to Chalcone using aromatic aldehyde	04
5	31/03/22	3. Acetophenoneinto Schiffbaseusingaromaticamine	04
6	10/05/22	4. Acetophenoneto m-Nitroacetophenone by nitration	04
		SET-II **A).Convergent Synthesis 2(Three Stage Synthesis)**	
7	05/04/22	1. Stage I: 4-Nitro toluene to 4-amino toluene(Reduction by using Sn/HCl)	04
8	26/04/22	2. Stage II: Phenol into2-hydroxy benzaldehyde (Reimer-Tiemann reaction)	04
9	23/04/22	3. Stage III: Synthesis of amidoalkyl-2-naphthols from β-Naphthol,4-aminotoluene and of 2-hydroxybenzaldehyde (One pot synthesis: MCR)	04
		B). Divergent Synthesis (5Single Stage Synthesis from β-Naphthol)	
10	27/04/22	1. β-Naphthol to Synthetic dye (By diazonium coupling)	04

11	29/04/22	2. β-Naphthol to β-Naphthyl methy lether (Methylation reaction)	04
12	09/05/22	3. β-Naphthol to (±)Binol then Resolution of Binol (Resolution technique)	04
		SET-III **A).Convergent Synthesis-3(Three Stage Synthesis)**	
13	11/05/22	1. o-Anisidineto2-methoxy-4-nitroaniline	04
		B).Divergent Synthesis-3(5Single Stage Synthesis from Salicyaldehyde)	
14	29/04/22	2. Salicylaldehyde to Salicylaldehyde phenyl hydrazine	04
15	09/05/22	3. Salicylaldehyde to o-Formyl phenoxyacetic acid	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Name of Paper-CHP-110 Fundamentals of Physical Chemistry
Section-I

Teacher Name: Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Thermodynamics	State function, path function, exact differential and inexact differential, internal energy and enthalpy, temperature dependent internal energy and enthalpy, reversible and irreversible adiabatic expansion. The entropy of irreversible changes, the Helmholtz and Gibbs function, Entropy and entropy change in an ideal gas with temperature and pressure, Clausius inequality, chemical potential, chemical potential of a substance in a mixture.	06
2	Nov.22	Change of State	Partial molar quantities, methods for determination of molar quantities, ideal solutions, Raoult's and Henery's law, Thermodynamics of Gibbs function of mixing, colligative properties: Elevation in boiling point, depression in freezing point and osmosis.	05
3	Dec.22	Quantum Chemistry	Applications of quantum chemistry- blackbody radiation, photoelectric effect, de Broglie hypothesis and uncertainty principle and its experimental evidence. Schrödinger wave equation, particle in one dimensional box, Normalization and orthogonality of wave function, particle in three-dimensional box, hydrogen like atoms (no derivation). Operators: algebra of operators, commutative property, linear operators, commutator operator, the operator ∇ and $\nabla 2$.	10
4	Jan.23	Chemical Bonding	Valence bond theory, hybrid orbitals, geometry and hybridization, molecular orbital theory for di and tri atomic molecule.	06
5	Feb.23	Chemical Bonding	linear variation method, approximations underlying Huckel theory, applications to simple π-systems.	04

Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. Taken
1	Oct.22	Rate Laws	Recapitulations of basic concept, the temperature dependent reaction rates, reaction moving towards equilibrium, consecutive reaction, parallel reactions, pre-equilibria, unimolecular reactions.	06
2	Nov.22	Kinetics of Complex Reactions	Fast reactions: flash photolysis, flow technique, stopped flow technique, relaxation method, the steady state approximation, chain reactions - free radical polymerization reaction between H_2 and Br_2, explosive reaction.	06
3	Dec.22	Molecular Reaction Dynamics	Collision theory of bimolecular gas phase reactions, diffusion controlled and activation-controlled reaction in solution, activated complex theory of reaction rate, Eyrings equation.	06
4	Jan.23	Enzyme Catalysis	Michaelis mechanism, effect of pH and temperature on enzyme catalyzed reactions, limiting rate, Lineweaverburk and Eadie equation and plots, inhibition of enzyme action, competitive inhibition and non- competitive inhibition.	06
5	Feb.23	Molecular Thermodynamics	Molecular energy levels, Boltzmann distribution law, partition functions and ensembles, translational, rotational and vibrational partition function of diatomic molecule, obtaining energy, heat capacity, entropy and equilibrium constants from partition functions, Maxwell- Boltzmann, Fermi-Dirac and Bose-Einstein statistics.	06

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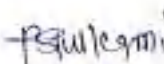Department of Chemistry
Hutatma Rajguru Mahavidyalaya,
Rajgurunagar

Dr. Shirish S. Pingale
Principal
Hutatma Rajguru Mahavidyalaya
Rajgurunagar,Tal.Khed,Dist.Pune

K. T. S. P. Mandal's
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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-130 Molecular Symmetry
Section-I
Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Molecular Symmetry and Symmetry Groups	Symmetry elements and operations, Symmetry planes and reflections, the inversion centre, proper axes and proper rotations, improper axes and improper rotation, products of symmetry operations, equivalent symmetry elements and equivalent atoms, general relations among symmetry elements and symmetry operations, classes of symmetry operations, symmetry elements and optical isomerism, symmetry point groups, classification of molecular point groups. Defining properties of a group, group multiplication table, some examples of group, subgroups and classes.	08
2	Nov.-22	Representations of Groups	Matrix representation and matrix notation for geometric transformation, The Great Orthogonality Theorem and its consequence, character tables (No mathematical part), wave function as basis for irreducible representations.	04
3	Dec.-22	Symmetry Adapted Linear Combinations	Projection operators and their use of construct SALC (Construction of SALC for sigma bonding for molecules belonging point groups: D2h, D3h D4h, C4v, Td., Oh., normalization of SALC, transformation properties of atomic orbital, MO's for sigma bonding,ABn molecules, tetrahedral AB4 and Oh AB6 cases.	06
4	Jan.-23	Application of Group theory to Infrared Spectroscopy	Introduction, selection rules, polyatomic molecules, possible vibrations in a linear molecule, bending modes,	06
5	Feb.-23	Application of Group theory to Infrared Spectroscopy	symmetry of vibrations and their IR activity, Group vibration concept and its limitations, IR spectra related to symmetry of some compounds, IR spectra	04

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Subject- CHI-130 Molecular Symmetry
Section-II

Prof. Walunj K.A.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Hydrogen and its compounds	Hydrides: Classification, electron deficient, electron precise and electron rich hydrides. PH3, SbH3, AsH3, Selenides, Tellurides Solutions in non-aqueous Media,	08
2	Nov.-22	Alkali and Alkaline Earth Metals	Solutions innon - aqueous media, application of crown ether in extraction of alkali and alkaline earth metal	06
3	Dec.-22	Oxygen Group Halogen Group: Noble gases	Metal Selenides and Tellurides, oxy acids, and oxoanions of Sulphurand nitrogen. Ring, Cage and Cluster compounds of p-block elements Interhalogens, pseudohalagen, Synthesis, Properties and Applications, Structure, Oxyacid's and Oxyanions of Halogens. Occurrence, Compounds of Xenon-with fluorine and Oxygen and its uses	06
4	Jan.-23	Boron Group	Boron Hydrides, preparation, structure and Bonding with reference to LUMO, HOMO, interconversion of lower and higher boranes, Metalloboranes, Carboranes, Reactionof Organoboranes	06
5	Feb.-23	Carbon Group	Allotropes of Carbon, C60 and compounds (fullerenes), Intercalation compounds of Graphite, Carbon nanotubes, synthesis, properties, structure-single walled, multi walled, applications	04

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Department of Chemistry
Hutatma Rajguru Mahavidyalaya,
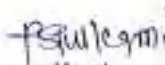Rajgurunagar

RAJGURU
NAGAR

Dr. Shirish S. Pingale
Principal
Hutatma Rajguru Mahavidyalay
Rajgurunagar,Tal.Khed,Dist.Pune

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K. T. S. P. Mandal's
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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject- CHI-150 Molecular Symmetry
Section-I & II

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Dr. Walunj Y.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.-22	Structure and Reactivity	Aromaticity: Benzenoid and non-benzenoid compounds, Huckel's rule, antiaromaticity, Application to carbocyclic and heterocyclic systems, annulenes, azulenes, current concepts of aromaticity.	04
2	Nov.-22	Heterocyclic Chemistry	Five and six membered heterocycles with one and two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocyclic compounds, Furan, Pyrrole, Thiophene, Pyrazole, Imidazole, Pyridine, Pyrimidine	08
3	Dec.-22	Stereochemistry	a) Sterochemical principles, enantiomeric relationship, distereomeric relationship, R and S, E and Z nomenclature in C, N, S, P containing compounds, Prochiral relationship, stereospecific andstereoselective reactions, optical activity in biphenyls, spiranes, allenes, Topicity. b) Conformational analysis of di, tri, tetra-substituted 5 -6 membered rings and decalins.	12

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Section -II

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Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	Jan.-23	Structure, Stability and Reactions of Reactive Intermediates	a) Carbocation, Carbanion, Free Radical, Carbenes and nitrenes b) NGP : Neighbouring group participation	06

2.	Jan.-23	Rearrangements	Beckmann, Hofmann, Curtius, Schmidt, Wolff, Lossen, Bayer-villiger, Sommelet, Favorskii, Pinacol-pinacolone, Benzil-benzilic acid, Fries, Tiffeneau Demjanov.	06
3.	Feb.-23	Ylides Oxidation and Reduction Reactions	Ph osphorus, Nitrogen and Sulphur ylides Oxidisingagents: CrO_3, PDC, PCC, $KMnO_4$, MnO_2, Swern, SeO_2, $Pb(OAc)_4$, Pd-C, RuO_4, OsO_4, m-CPBA, O_3,$NaIO_4$, HIO_4, TEMPO, IBX, CAN, Dess-Martin, DDQ, Ag_2O Reducing agents: Boranes and hydroboration reactions, MPV reduction and reduction with H_2/Pd-C, Raney-Ni, $NaBH_3CN$, Willkinsons catalyst, DIBAL and Wolff-Kishner reduction, Birch, Clemenson, Dissolving metal	12

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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 General chemistry –Introduction to solid states of matter
Section-I

Prof. Gundal N.V.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	Oct.22	Bonding in Solids and Electronic Properties	Recollect the concepts: Crystalline solids, unit cell, and types of unit cells Introduction, Bondingin Solids—Free Electron Theory, Electronic Conductivity, Bonding In Solids—Molecular Orbital Theory, Simple Metals, Semiconductors—Si And Ge, Photoconductivity, The P-N Junction—Field-Effect Transistors, Bands In Compounds—Gallium Arsenide, Bands In D-Block Compounds—Transition Metal Monoxides.	05
2	Nov.22	Defects and Non-Stoichiometry	Introduction, point defects—an introduction, defects and their concentration, intrinsic defects, extrinsic defects the concentration of defects, ionic conductivity in solids, solid electrolytes, fast-ion conductors: oxygen ion conductors, fast-ion conductors: sodium ion conductors, Applications: 1) fuel cells, 2) sensors, 3) electrochromic devices, nonstoichiometric compounds, introduction, non-stoichiometry in wustite, the titanium monoxide structure.	07
3	Dec.22	Superconductivity	Introduction, Discovery, The Magnetic Properties Of Superconductors, Josephson Effects, The Bcs Theory Of Superconductivity, High Temperature Superconductors, Theory Of High Tc Superconductors, Uses Of High Temperature Superconductors	04

4	Jan.23	Synthesis of Solids	Introduction, Common Reactions Employed in Synthesis, Soft-Chemistry Routes, Ceramic Methods, Decomposition of Precursor Compounds, Combustion Synthesis, Mechano-chemical and Sono-chemical methods, Soft Chemistry Routes(Ion Exchange Reactions, Use of Fluxes, Sol–Gel Synthesis, Electrochemical Methods,	04
5	Feb.23	Synthesis of Solids	Hydrothermal, Solvothermal and Ionothermal Synthesis), Chemical Vapour Deposition and Atomic Layer Deposition, Procedures of synthesis of some nano-materials- Gold and Silver nanoparticles, CdS nanoparticles, ZnO, TiO2 and Fe2O3 nanoparticles and Porous Silica	04

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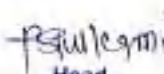Hutatma Rajguru Mahavidyalaya,
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Rajgurunagar, Tal. Khed, Dist. Pune
Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHG-190 Inorganic Chemistry material, analysis, Synthesis

Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	28/10/21	Determination of Silica and Manganese from pyrolusite ore	04
2	18/11/21	Determination of silica and iron from hematite ore.	04
3	20/12/21	Determination of tin and lead from solder alloy.	04
4	03/01/22	Determination of iron and chromium from stainless steel alloy	04
5	27/01/22	Synthesis of ZnO from zinc oxalate - precursor method and determine band gap by absorption spectroscopy	04
6	01/02/22	Synthesis of TiO2 TiCl4 or Ti-Isopropoxide by Sol-gel method and determine band gap by absorption spectroscopy	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-107Physical Chemistry Practical

Prof. Gundal N.V.

Sr. No.	Month	Name of Experiment's	No. of hours
1	17/11/22	Determination of an order of a reaction	04
2	23/11/22	Brönsted primary salt effect	04
3	29/11/22	Glycerol radius by viscosity	04
4	01/12/22	Partial Molar Volume (Polynometry) Determination of the densities of a series of solutions and to calculate the molar volumes of the components	04
5	07/12/21	Statistical treatment of experimental data (calculation of mean and standard deviation for given data and least square method for calibration curve method)	04
6	13/12/22	Simultaneous determination of Ni and Co by colorimetry	04
7	22/12/22	Estimation of Cu(II) by titration with Na2 EDTA by colorimetry	04
8	07/01/23	Kinetics of oxidation of ethanol by $K_2Cr_2O_7$	04
9	02/02/23	Simulations determination of $KMnO_4$ and $K_2Cr_2O_7$ by colorimetry	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHP-210 Molecular Spectroscopy and Nuclear Chemistry)
Section-I

Prof. Shirsagar K.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	March.23	Microwave Spectroscopy	Types of molecules on the basis of moment of inertia and rotational spectra of di- and polyatomic molecules	03
2	March.23	Infra-red Spectroscopy	The vibrating diatomic molecule, harmonic and Anharmonic oscillator, the diatomic vibrating rotator, breakdown of the Born-Oppenheimer approximation, the vibrations of polyatomic molecule, Fourier transform spectroscopy and its advantages, The carbon dioxide laser, Applications.	05
3	March.23	Raman Spectroscopy	Quantum and classical theory of Raman effect, pure rotational Raman spectra, vibrational Raman spectra, polarization of light and Raman effect, structure determination from Raman and Infra-red spectroscopy, applications	05
4	March.23	Electronic Spectroscopy of molecules	Electronic spectra of diatomic molecules - The Born- Oppenheimer approximation, Vibrational coarse structure, Frank- Condon principle, dissociation energy and dissociation product, Rotational fine structure of electronic-vibration transition, The fortrat diagram, Pre-dissociation, molecular photoelectron spectroscopy.	07
5	March.23	Mossbauer Spectroscopy	Principle, Instrumentation and Applications of Mossbauer Spectroscopy	04

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Section-II

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1	April. 23	Radioactivity	Types of radioactive decay, general characteristics of radioactive decay, decay kinetics, general expression for the activity of a daughter nuclide, Geiger- Nuttalis law, α-decay: A problem in classical physics, Internal conversion and the Auger effect	04
2	April.23	Elements of Radiation	Chemistry: Interaction of radiation with matter, interaction of γ radiation with matter, units for measuring radiation absorption, Radiation dosimetry, Radiolysis of water, free radicals in water radiolysis, Radiolysis of some aqueous solutions.	06
3	April.23	Nuclear Fission	The discovery of nuclear fission, the process of nuclear fission, fission fragments and their mass distribution, charge distribution, Ionic charge of fission fragments, fission energy, M. Sc. [I] Chemistry Savitribai Phule Pune University 7 fission cross-section and threshold, fission neutrons, theory of nuclear fission, Neutron evaporation and spallation.	06
4	May.23	Applications of Radioactivity	Typical reaction involved in the preparation of radioisotopes, The Szillard- Chalmers reaction, Radiochemical principles in the use of tracers, Isotopes in elucidating reaction mechanism and structure determination, physic-chemical research - The solubility of a sparingly soluble substances, surface area of a powder or precipitate rates of diffusion, Analytical applications- Isotope dilution analysis,	08
5	May.23		Neutron activation analysis, Radiometric titrations, Medical applications-Thyroiditis, Assessing the volume of blood in a patient, Industrial applications thickness measurements and control, friction and wear out, gamma radiography.	04

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Syllabus Completion Report

M.Sc. –I (Organic Chemistry) A.Y.-2022-2023

Subject-CHI-230-Coordination and Bioinorganic Chemistry

Section-I

Prof. Pawar R.Y.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Concept & Scope of Ligand Fields:	Quantum numbers, Free ion Configuration, Term and States, Energy levels of transition metal ions, free ion terms, microstates, term wave functions, spin-orbits coupling.	02
2.	March-2023	Ligand Field Theory of Coordination Complexes	Effect of ligand field on energy levels of transition metal ions, weak cubic ligand field effect on Russell- Saunders terms, Orgel diagrams, strong field effect, correlation diagrams,Tanabe-SuganoDiagrams, Spin-Pairing energies.	05
3.	April-2023	Electronic spectra of Transition Metal Complexes	Introduction, band intensities, band energies, band width and shapes, transition metal spectra of 1st, $2^{nd}$and 3rd row ions and complexes, electronic spectra of Lanthanide and Actinide, spectrochemical and nephelauxetic series, charge transfer and luminescence spectra, calculations of Dq, B, β parameters, percentage of covalent character for metal complexes.	06
4.	May-2023	Magnetic Properties of Coordination Complexes	Origin magnetism ,types of magnetism, Curie law, Curie-Weiss Law, Magnetic properties of complexes-Para magnetism1^{st} and 2nd Ordered Zeeman effect, quenching of orbital angular momentum by Ligand fields ,Magnetic properties of A, E and T ground term in complexes, spin free and spin paired equilibria, temperature dependence of magnetism.	06

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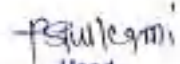# Hutatma Rajguru Mahavidyala
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M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-230-Coordination and Bioinorganic Chemistry
Section-II

Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	April-2023	1. Overview of Bioinorganic Chemistry	Historical Background and current relevance, role of Cu, Fe, Mn and Mo in metalloprotein, and metalloenzymes.	02
2.	April-2023	2)Concepts of Inorganic Chemistry in Bioinorganic Chemistry	Thermodynamic aspects - HSAB concept, chelate effect and Irving-William series, pKa values of coordinated ligands, Tuning of redox potential, Biopolymer effects. Kinetic aspects- Electron transfer reaction, Electronic substitution reaction. Reactions of coordinated ligands and Template effect, concept of spontaneous self-assembly model compounds.	10
3.	May-2023	3) Functions and Transport of Alkali and Alkaline Earth Metal Ions	Importance of alkali and alkaline earth metals, Distribution of cationic and anionic electrolytes in blood plasma and intracellular fluid, Ionophores: Natural and Synthetic, Application of ionophores, Different mechanism involved in exchange of ions across cell wall,Na+/K+-ATPase ion pump for active transport of Na+ and K+.	06
4.	May-2023	4) Biochemistry of following Elements:	(a) Ca in Blood coagulation. (b) Magnesium in Photosystem I (c) Manganese in Photosystem II (d) Iron in Ferritin, Transferrin, Fe-S clusters, Porphyrin based system	06

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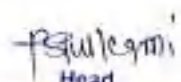Hutatma Rajguru Mahavidyalaya,
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M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHO-250- Photochemistry and Pericyclic Reactions
Section-I

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Prof. Walunj K.A.

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Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Photochemistry	Principles of Photochemistry, photochemistry of carbonyl compounds, alkenes, dienes, and aromatic compounds, photo rearrangements, Barton reaction	12
2	March-2023	Pericyclic Reactions	Cycloaddition reactions, Analysis by correlation diagrams, FMO approach,	
3.	April-2023	Pericyclic Reactions	Electrocyclic, sigmatropic and ene reactions, 1,3-dipolar additions,	06

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Section-II

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Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	UV and IR Spectroscopy	UV: Recapitulation of UV spectroscopy, spectra of important functional groups 1.With and without conjugation, 2. Ring size effect 3. Effect of H-bonding, 4. Resonance effect,5. Inductive effect. 4. [04L] Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines Problems: Based on 2-3 fragments of above mentioned functional groups should be discussed. Combined problems: Problems based on UV, IR, MS, 1H-NMR, 13C-NMR should be solved.	04
	March-2023	1H-NMR	Understanding of basic principle, chemical and magnetic nonequivalence, Homotopism, Enantiotopism, diastereotopism, chemical shifts and factors influencing chemical shift: electronegativity, NMR solvent polarity, temperature, anisotropic effect, chemical shifts of acidic protons, D2O exchange, Multiplicity patterns and Coupling Constants: Pascal's triangle, understanding of	12

			tree diagram, complex splitting patterns in aromatic, vinylic, saturated monocyclic compounds, bicyclic compounds (fused and bridged rings), Integration: NMR of racemic mixture, relationship between integration and ee% in diasterotomers.	
3.	April-2023	13C-NMR	Basic of 13C-NMR: Chemical shift and factors affecting chemical shifts in 13C NMR, off resoanance and proton decoupled spectra. Simpleproblems on 13C-NMR.	06
4.	April-2023	Mass spectrometry (MS)	Basic principle of MS, significance of M+ (m/z) in determination of molecular formula, Rule of 13. Genesis of m/z fragments: alkanes (cyclic and acyclic), alcohols, amines	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
Subject-CHI-290-Elective Option - B: Organometallic and Inorganic Reaction Mechanism

Prof. Jasud J.S.

Sr. No.	Month	Name of Chapter	Topic Covered	No. of Lect. taken
1.	March-2023	Organometalic Chemistry	Organic ligands and nomenclature, 18 electron rule: counting electrons, ligands having extended pi system, bonding between Metal Atoms and organic pi systems: linear pi system, cyclic pi system, spectral analysis and characterization of organometallic complexes: IR and NMR, examples.	08
2.	March-2023	Organometallic Reactions& Catalysis	Reactions involving gain and loss of ligands: ligand dissociation and substitution, oxidative addition, reductive elimination, nucleophelic displacement, reactions involving modification of ligands: insertion, carbonyl insertion, 1-2 insertion, hydride elimination, abstraction, organometallic catalysis: Hydroformylation, Monsanto acetic acid process, Wacker Process, Hydrognation by Willkinsons catalyst, Olefin metathesis, heterogeneous catalysis: Ziegler Natta Polymerization, Water gas reduction	08
3.	April-2023	Coordination Compounds: Reactions and Mechanism	History and principles, Substitution reactions: Inert and labile complexes, mechanism of substitution, Kinetics Consequences of reaction pathway: dissociation, interchange, association, Experimental evidences in Octahedral Substitution: dissociation, linear free energy relationship, associative mechanism, the conjugate base mechanism, the kinetic chelate effect, Stereochemistry of reactions: substitution in trans complexes, substitution in cis complexes, isomerisation of chelate rings, substitution reactions in Sq. Pl. Complexes.	10

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-227: Practical Course-II: Semester -II Basic Practical Chemistry

Prof. Jasud J.S.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	07/03/23	Synthesis and Purity of [Mn(acac)3]	04
2	14/03/23	Synthesis and Purity Chloropentaamminecobalt(III) chloride.	04
3	21/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
4	03/03/23	Synthesis and Purity Bis[TrisCu(I)thiourea]	04
5	28/03/23	Structural determination of metal complexes by conductometric measurement.	04
6	04/04/23	To study complex formation between Fe(III) with sulfosalicylic acid by conductometry .	04
7	11/04/23	To verify the Debye Huckel theory of ionic conductance for strong electrolytes KCl, BaCl2, K2SO4 and [K3Fe(CN)6]	04
8	18/04/23	Determination of equilibrium constant of M – L systems Fe(III)–Sulphosalicylic acid or Fe(III)–β–resorcilic acid by Job's continuous variation method.	04
9	25/04/23	Solution state preparation of [Ni(en)3]S2O3, [Ni(H2O)6]Cl2, [Ni(NH3)6]Cl2. Record absorption spectra in solution of all three complexes and calculate 10 Dq. Arrange three ligands according to their increasing strength depending on your observation	04
10	02/05/23	Synthesis and photochemistry of K3[Fe(C2O4)3].3H2O.	04
11	09/05/23	Kinetics of substitution reaction of [Fe(Phen)3] 2+	04

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Syllabus Completion Report
M.Sc. –I (Organic Chemistry) A.Y.-2022-2023
CHP-227: Practical Course-II: Semester -II Basic Practical Chemistry

Prof. Jasud J.S.

Sr. No.	Month	Name of Experiment's	No. of Lect. Taken
1	08/03/23	Base catalyzed aldol condensation using LiOH.H2O as a Catalyst.	04
2	15/03/23	Bromination of trans-stilbene using sodium bromide and sodium bromate	04
3	22/03/23	[4+2] cycloaddition reaction in aqueous medium at room temperature	04
4	29/03/23	BenzilBenzilic acid rearrangement under solvent free condition	04
5	05/03/23	Clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin	04
6	12/04/23	Ecofriendly nitration of phenols and its derivatives using Calcium nitrate	04
7	19/04/23	Bromination of acetanilide using ceric ammonium nitrate in aqueous medium	04
8	26/04/23	Green approach for preparation of benzopinacolone from bezopinacol using iodine catalyst	04
9	10/05/23	Preparation of 1, 1-bis-2-naphthol under grinding at room temperature	04
10	17/05/23	Solvent free aldol condensation between 3,4-dimethoxybenzaldehyde and 1-indanone	04
11	24/05/23	Preparation of azlactone from hippuric acid	04

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Syllabus Completion Report (Sem-V)

(2022-23)

T.Y.B.Sc. PH 335: Computational Physics

Sr. No.	Completed Topics	Dates
01	**1.Concepts of programming and Introduction to C Programming** Definition and Properties of algorithms, Algorithm development,	12/10/2022 13/10/2022 14/10/2022 15/10/2022
02	Algorithm development, Flow charts- symbols and simple flowcharts	17/10/2022 19/10/2022
03	Flow charts and Algorithms for Kinematic equations, Free fall, Equation of state, Factorial of a number.	20/10/2022 27/10/2022 28/10/2022 29/10/2022
04	Types of programming language: Lower, middle and higher level languages.	31/10/2022 1/11/2022
05	Structure of C program, Character set, key words,	2/11/2022 3/11/2022
06	Constants andvariables, Variable names,	5/11/2022
07	Data types and their declarations, Symbolic Constants.	7/11/2022 9/11/2011 10/11/2022
08	Input/output functions: scanf ( ), printf ( ), getchar ( ), putchar ( ), getch ( ), gets ( ), puts ( ).	11/11/2022 12/11/2022 13/11/2022
09	Operators and Expressions: Arithmetic Operators, Relational Operators, LogicalOperators,	
10	Assignment Operators, Conditional Operator. Formatted input/output	
11	Control statements: If, if else, while, do while for loop, nested control structures	

12	(Nested if, nested loops), break, continue, switch- case statement, goto statement.	
13	Use of Library functions: e.g. mathematical, trigonometric, graphics.	
14	**2. Arrays, Pointers and user defined functions** Arrays: 1-D, 2-D and String	14/11/2022 15/11/2022 16/11/2022 17/11/2022
15	Examples: Arranging numbers in descending and ascending order,	
16	Sum of matrices, multiplication of matrices.	
17	Concept of Pointers	
18	User defined functions: Definitions and declaration of function, function prototype.	
19	Passing arguments (Call by value, Call by reference).	
20	Storage Classes: Auto, External, Static, Register variables.	
21	**4. Computational Physics:** Iterative methods: Discussion of algorithm and flowcharts and writing C programs for finding	18/11/2022 19/11/2022 21/11/2022 22/11/2022 23/11/2022 24/11/2022
22	single root of equation using bi-section method, NewtonRaphson method.	
23	Discussion of algorithm and flowcharts and writing C program for trapezoidal rule and Simpson's 1/3rd rule	
24	**3. Graphics in C**: Some simple graphic commands	
25	- Line, Circle, Arc, Ellipse, Bar.,Problems	

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PH 333 Classical Mechanics

Sr. No.	Completed Topics	Dates
01	**1. Motion of system of a particles** Introduction –Newton's laws	12/09/2022 13/09/2022
02	Motion of a charged particle in constant electric, magnetic and electromagnetic field	14/09/2022 16/09/2022
03	General features of motion, equation of orbit, Deduction of Kepler's laws of planetary motion, Orbits of artificial satellite, Problems	17/09/2022 19/09/2022 20/09/2022 22/09/2022
04	System of particles, Centre of mass, Conservation of linear momentum, angular momentum, Energy of system of particles (statements only) Problems	23/09/2022
09	**2. Motion in Central Force Field** Central force, equivalent one body problem	24/09/2022 26/09/2022 27/09/2022
10	Motion in central force field	29/09/2022 30/09/2022
11	General features of motion, equation of orbit	1/10/2022 3/10/2022
12	Deduction of Kepler's laws of planetary motion Orbits of artificial satellite and Problems	4/10/2022 6/10/2022 7/10/2022 11/10/2022
13	**3. Scattering of particles** Elastic and inelastic scattering	25/11/2022 26/11/2022
14	Properties of Elastic and inelastic scattering	28/11/2022
15	Relation between lab and CM frame. Relation of angles between lab and CM frame.	29/11/2022 30/11/2022
16	Inelastic scattering, Differential cross section, Impact Parameter, Total differential cross section.	

17	Relation of scattering angles between lab and CM frame, Problems	
18	**4.Langrangian and Hamiltonian Formulation** Introduction	16/12/2022 19/12/2022
19	Newton's Laws, Constraints, Holonomic and nonholonomic constraints,Principle of virtual work , D' Alembert's principle.	20/12/2022 21/12/2022
20	Langrange's equation from D' Alembert's principle. Simple pendulum, Linear Harmonic Oscillator.	22/12/2022 23/12/2022 24/12/2022
21	Hamiltonian and Hamiltone's equation	26/12/2022
22	Problems of Hamiltonian	
23	Problems of Langrangian	
24	Problems	
25	Assignment and Tutorials	

1) T.Y.B.Sc.:-08 Practicals of two batches completed in Academic Year 2022-2023.

2) Projects of T.Y.B.Sc Students.:- Projects of one batch completed in academic Year 2022-2023.

3) F.Y.B.Sc.:-04 Practicals of one batch completed in Academic Year 2022-2023.

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Syllabus Completion Report (2022-23)

T.Y.B.Sc. (Sem-VI)

Thermodynamics and Statistical Physics (PH-363)

Sr. No.	Completed Topics	Dates
01	**Ch-1 - Kinetic Theory of gases** Mean Free Path Theory of gases	
02	Transport Phenomena, Viscosity	
03	Thermal conductivity and diffusion	14/02/2023
04	Thermodynamic functions	To
05	Enthalpy, Entropy, Internal Energy, Helmholtz Functions	15/03/2023
06	Maxwell's relations	
07	First and Second TdS equations Specific and Latent heat equqtions	
08	Joule – Thomson's effect, Problems	
09	**Ch-2- Elementary Concepts of Statistics** Probability ,Distributions functions,Problems	
10	Random Walk Problem and Bionomial distribution	16/03/2023
11	Simple Random Problem, Calculation of mean Values	To
12	Probability distribution for large N	25/03/2023
13	Gaussian Probability distribution and Problems	
14	**Ch-3- Statistical distribution of system of particles and Ensembles** State of Systems, Statistical Ensembles	27/03/2023
15	Basic Postulates, Probability Calculations	To
16	Behavior of density of states	11/04/2023
17	Thermal. Mechanical Interactions, Problems	
18	Micro canonical Ensembles, Canonical Ensembles	
19	Applications of Canonical Ensembles	

20	Molecules in ideal gas, Mean Values in Canonical Ensembles, Problems	
21	**Ch-4-Introduction to Quantum States** Quantum distribution function	08/03/2023 To 10/03/2023
22	Maxwell – Boltzman Statistics, Bose – Einstein Statistics	
23	Fermi – Dirac Statistics	
24	Comparisions of B-E,M-B,F-D Statisctics , Applications of Quantum Statstics	
25	Problems	
26	Internal Test	03/05/2023

Dr. V.D.Kulkarni

Syllabus Completion Report (2022-23)

T.Y.B.Sc. (Sem-VI)

LASERS (PH-366)

Sr. No.	Completed Topics	Dates
01	**Chapter 1: Introduction to Lasers:** Brief history of Lasers, Interaction of radiation with matter, Energy levels, Population density, Boltzmann distribution, Stimulated Absorption, Spontaneous Emission and Stimulated Emission, Einstein's Coefficients, Einstein's relations. Characteristics of Laser: Directionality, Mono-chromaticity, Coherence,	12/04/2023 To 18/04/2023
02	**Chapter 2: Laser Action**: Population inversion, Condition for light amplification, Gain coefficient, Active medium, metastable states. Pumping schemes: three level and four level	19/04/2023 To 23/04/2023

03	**Chapter 3: Laser Oscillator**: Optical feedback, round trip gain, critical population inversion, Optical resonator, condition for steady state oscillations, cavity resonance frequencies.	24/04/2023 To 25/04/2023
04	**Chapter 4: Laser Output**: Line-shape broadening: Lifetime broadening, Collision broadening	26/04/2023 to 27/04/2023
05	**Chapter 5: Types of Lasers:** Solid State Lasers – Ruby Laser, Diode Laser, Gas Lasers – HeNe Laser, CO2 Laser	28/04/2023 To 29/05/2023
06	**Chapter 6: Applications of Lasers**: Industrial: welding, cutting, drilling Nuclear Science: laser isotope separation, laser fusion, Medical: eye surgery	08/05/2023
07	Internal Test	04/05/2023

1) T.Y.B.Sc.:- Practicals of two batches of Semester - 2 completed in Academic Year 2022-2023.

2) Projects of T.Y.B.Sc Students.:- Projects of one batch of Semester 2 completed in Academic Year 2022-2023.

Dr. V.D.Kulkarni

<p style="text-align:center">Syllabus completion Report</p>

T.Y.B.Sc. Physics (Sem V)   **Year: 2022-2023**
PHY-351: Mathematical Methods in Physics-II   **Teacher: A.B.Kanawade**

Chapter No.	Month	Contents	Remarks
1	07/09/2022 to 21/09/2022	**1: Curvilinear Co-ordinates** Review of Cartesian, spherical and cylindrical co-ordinate, transformation equation, General Curvilinear co-ordinate system: Co-ordinate surface, co-ordinate lines, length, surfaces and volume elements in curvilinear co-ordinate system. Orthogonal curvilinear co-ordinate system, expressions for gradient, divergence, Laplacian, and curl, special case for gradient, divergence and curl in Cartesian, spherical polar and cylindrical co-ordinate system, Problems.	
2	14/10/2022 to 29/10/2022	**2: The Special Theory of Relativity** Introduction, Newtonian relativity, Galilean transformation equation, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Lorentz transformations, Kinematic effects of Lorentz transformation,	

		Length contraction, Proper time, Problems.	
3	22/09/2022 to 03/10/2022	**3: Partial Differential Equations** Introduction to Partial differential equations (PDE), General methods for solving second order PDE, Method of separation of variables in Cartesian, Spherical polar and cylindrical co-ordinate system (two dimensional Laplace's equation, one dimensional Wave equation), Singular points ($x = x_0$), Solution of differential equation-Statement of Fuch's theorem, Frobenius method of series solution.	
4	04/10/2022 to 13/10/2022	**4: Special Functions** Introduction, generating function for Legendre Polynomials: $P_n(x)$, Properties of Legendre Polynomials, Generating function for Hermite Polynomials: $H_n(x)$, Properties of Hermite Polynomials, Bessel function of first kind: $J_n(x)$, Bessel function of first kind: $J_n(x)$, Properties of Bessel function of first kind, Problems.	

Syllabus completion Report

T.Y.B.Sc. Physics (Sem V) **Year: 2022-2023**
PHY-3510 SEC (K): Smart Sensors & Transducer Technology, Teacher: A.B.Kanawade

Chapter No.	Month	Contents	Remarks
1	31/10/2022 to 04/11/2022	1) **Mechanical and Electromechanical sensor:** Definition, principle of sensing & transduction, classification. Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. LVDT: Construction, material, output input relationship, I/O curve, discussion.	
2	06/11/2022 to 14/ 11/2022	2) **Capacitive sensors:** Variable distance-parallel plate type, variable area-parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity. Stretched diaphragm type: microphone, response characteristics.	
3	15/11/2022 to 18/11/2022	3) **Thermal sensors**: Material expansion type: solid, liquid, gas & vapor Resistance change type: RTD materials, tip sensitive & stem sensitive type.	

4	19/11/2022 to 24/11/2022	Thermo emf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. 4) **Magnetic sensors:** Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR.	
	16/11/2022	**Activity:** **Based on chapter I** 1) Linear displacement measurement using LVDT.	
	17/11/2022	**Based on chapter II** 2) Displacement/pressure measurement using microphone.	
	23/11/2022	**Based on chapter III** 3) Measurement of temperature using Thermocouple transducer.	
	24/11/2022	4) Silicon diode as temperature sensor	

Syllabus completion Report

S.Y.B.Sc. (Physics) (Sem III)   **Year: 2022-2023**
PHY-232(A): Electronics-I   **Teacher: A.B.Kanawade**

Chapter No.	Month	Contents	Remarks
1	22/9/ 2022 to 6/10/2022	**1. Network Theorem:** 1.1 Krichhoff's Law 1.2 Voltage and current Divider Circuit 1.3 Thevenin's Theorem 1.4 Norton's Theorem 1.5 Superposition Theorem 1.6 Maximum Power transfer theorem (With proof) 1.7 Problems	
2	7/10/2022 to 4/11/ 2022	**2. Study of Transistor** **2.1 Bijunction Transistor** 1. Revision of bipolar Junction Transistor, Types, Symbol and basic action. 2. Configuration (Common Base, Common Emitter and Common Collector) 3. Current Gain Factors (α and β) and their relations 4. Input, Output and transfer Characteristic of CE Configuration 5. Biasing method and Voltage Divider 6. DC Load line (CE), Operating Point (Q-point) 7. Transistor as a switch 8. Problems **2.2 Uniunction Transistor:** 1. Symbol, Types, Construction, Working Principle, I-V characteristics, Specifications and parameters of Unijunction Transistor (UJT) 2. UJT as a relaxation Oscillator.	

| 3 | 13/11/ 2022 to 24/11/ 2022 | **3.Operational Amplifiers and Application**
3.1 Operational Amplifiers:
1. Introduction
2. Ideal and practical Characteristics
3. Operational Amplifier: IC741-Block Diagram and Pin diagram
4. Concept of Virtual Ground
5. Inverting and Non-inverting operational amplifiers with concept of gain
6. Operational amplifier as an adder and subtractor
7. Problems

3.2 Oscillators:
1. Concept of Positive and negative feed back

2. Barkhausein Criteria for an oscillator

3. Construction, working and application of phase shift oscillator using IC741

4. Problems | |
| 4 | 23/12/ 2022 to 17/01/ 2023 | **4. Number System and Logic Gates**
1. Number System: Binary, Binary coded Decimal (BCD), Octal, Hexadecimal

2. Addition and Subtraction of binary numbers and binary fractions using one's and two's complement

3. Basic Logic gates (OR, AND, NOT)

4. Derived gates: NOR, NAND, EXOR, EXNOR, with symbols and truth table

5. Boolean Algebra

6. De Morgan's theorem and its verification

7. Problems | |

Syllabus completion Report

T.Y.B.Sc. Physics (Sem VI)   **Year: 2022-2023**
PHY-361: Solid State Physics   **Teacher: A.B.Kanawade**

Chapter No.	Month	Contents	Remarks
1	15/02/2023 to 14/03/2023	**1: The Crystalline Structures (10 L)** Lattice, Basis, Translational Vectors, Primitive Unit Cell, Symmetry Operations, Different types of lattices: 2D and 3D (Bravais lattices) Miller indices, Inter Planer Distances, SC, BCC and FCC structures, Packing Fraction, Crystal structures NaCl, diamond, CsCl, ZnS, HCP, Concept of Reciprocal Lattice and its properties, Problems	
2	15/03/2023 to 27/03 2023	**2: X ray Diffraction and Experimental Methods (9 L)** Bragg's Diffraction, Bragg's Law, Experimental X-ray diffraction Methods: The Laue Method, Bragg's Spectrometer, The Powder Crystal Method, Analysis of cubic structure by Powder Method, Ewald's Construction, Bragg's Diffraction condition in direct and reciprocal lattice, Problems	
3	01/05/2023 to 14/05/2023	**3: Free Electron and Band Theory of Metals (9L)** Assumptions of Classical and Somerfield Free Electron model, Energy levels and Density of States (One and Three Dimensions), Nearly free electron model, Fermi energy, Fermi level, Hall Effect, Mobility, Hall Angle Band Theory of Solids: Origin of energy gap, Energy bands in Solids, Distinction between metal, semiconductor and insulator, Problems	
4	14/05/2023 to 19/05/2023	**4: Magnetism (8L)** Diamagnetism, Langevin theory of Diamagnetism, Paramagnetism, Langevin theory of Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferromagnetic Domains, Hysteresis, Curie temperature, Neel temperature, Superconductivity, Problems	

The syllabus of the course has been completed as per the schedule.

Syllabus completion Report

T.Y.B.Sc. Physics (Sem VI)   **Year: 2022-2023**
PHY-362: Quantum Mechanics   **Teacher: A.B.Kanawade**

Chapter No.	Month	Contents	Remarks
1	28/03/2023 to 10/04/2023	**Origin of Quantum Mechanics: (08 L)** 1. Historical Background: Review of Black body radiation, photoelectric effect 2. Matter waves - De Broglie hypothesis. Davisson and Germer experiment. 3. Wave particle duality 4. Concept of wave function, wave packet, phase velocity, group velocity and relation between them 5. Heisenberg's uncertainty principle with Electron diffraction experiment, different forms of uncertainty. Problems	
2	10/04/2023 to 23/04/2023	**The Schrodinger equation: (10 L)** 1. Physical interpretation of Wave function 2. Schrodinger time dependent equation. 3. Schrodinger time independent equation (Steady state equation). 4. Requirements of wave function. 5. Probability current density, equation of continuity and its physical significance. 6. An operator in Quantum mechanics. - Eigen function and Eigen values. 7. Expectation value – Ehrenfest's theorem(omly statements), Problems	
3	24/04/2023 to 10/05/2023	**Applications of Schrodinger Steady state equation: (14 L)** 1. Free particle. 2. Step Potential 3. Potential barrier(Qualitative discussion), 4. Barrier potential and tunneling effect. 5. Particle in infinitely deep potential well (one - dimension). 6. Schroedinger equation in spherical polar coordinate system 7. Rigid rotator (Free axis) 8. Problems	
5	16/05/2023 to 18/05/2023	**Operators in Quantum Mechanics: (04 L)** 1. Hermitian operator. 2. Position, Momentum operator, angular momentum operator, and total energy operator (Hamiltonian). 3. Commutator brackets- Simultaneous Eigen functions. 4. Commutator algebra. 5. Commutator brackets using position, momentum and angular momentum operator. 6. Concept of parity according to quantum mechanics, parity operator and its Eigen values. 7. Applications of operators in quantum mechanics 8. Problems	

The syllabus of the course has been completed as per the schedule.

Syllabus completion Report

S.Y.B.Sc. Physics (Sem IV)　　　　　　　　　　　**Year: 2022-2023**
PHY-242: Optics　　　　　　　　　　　　　　　　**Teacher: A.B.Kanawade**

Chapter No.	Month	Contents	Remarks
1	11/03/2023 to 29/03/2023	**1. Geometrical optics: (08L)** 1.1 Introduction to lenses and sign conventions. 1.2 Thin lenses: Lens equation for convex lens 1.3 Lens maker equation 1.4 Concept of magnification, deviation and power of a thin lens 1.5 Equivalent focal length of two thin lenses 1.6 Concept of cardinal points 1.7 Problems	
2	31/03/2023 to 28/04/2023	**2. Lens Aberrations: (08L)** 2.1 Introduction 2.2 Types of aberrations: Monochromatic and Chromatic 2.3 Types of Monochromatic Aberrations and their Reductions 2.4 Types of Chromatic Aberrations 2.5 Achromatism: Lenses in Contact and Separated by a finite Distance 2.6 Problems	
3	06/05/2023 to 10/05/2023	**3. Optical Instruments: (06L)** 3.1 Introduction 3.2 Simple Microscope 3.3 Compound Microscope 3.4 Ramsden's eye piece 3.5 Huygens eye piece 3.6 Problems.	
4	11/05/2023 to 16/05/2023	**4. Interference and Diffraction: (08L)** 4.1 Introduction 4.2 Phase change on reflection (Stokes treatment) 4.3 Interference due to Wedge shaped thin film 4.4 Newton's ring 4.5 Diffraction Types:Fresnel's Diffraction and Fraunhoffer's Diffraction 4.6 Fraunhoffer's diffraction at a single slit 4.7 Plane Diffraction grating , Rayleigh criterion for resolution 4.8 Problems	
5	16/05/2023 to 19/05/2023	**4. Polarization: (6L)** 5.1 Introduction to polarization 5.2 Brewster's law 5.3 Law of Malus 5.4 Polarization by double refraction 5.5 Nicol Prism 5.6 Problems	

The syllabus of the course has been completed as per the schedule.

Deshmukh V.B.
Department of Physics
24/11/2022

To,

The principal,

Hutatma Rajguru Mahavidyalaya, Rajgurunagar

Subject- Academic work report of 1st semester in year 2022-23

1. Teaching report –UG (upto- 24-11-2022)

Sr. No.	Class	Subject
1	FYBSc	Physics principles and applications
2	FYBSc, SYBSc Pract. &TYBSc Project	Practicals Batch each one
3	TYBSc	Atomic and Molecular Physics
4	TYBSc	Physics workshop skill

2. FYBSc. Physics II (Physics principles and applications)-

Duration	Period	Chapter	Topic
18-8-2022 to 11-9-2022	8	**Physics of Atoms**	The concept of atom (Atomic Models: Thompson and Rutherford) Atomic Spectra Bohr Theory Hydrogen atom Spectra Frank Hertz experiment, Assignment II
12-9-2022 to 1-10-2022	7	**LASERS**	Absorption, Spontaneous Emission, and Stimulated Emission, Population Inversion and Laser Action, Applications of Lasers Assignment II
3-10-2022 to 01-11-2022	8	**Physics of Molecules**	Bonding Mechanisms: A Survey Ionic Bonds Covalent Bonds Van der Waals Bonds The Hydrogen Bond Metallic Bond, Variation of potential energy with inter-atomic distance, Concept of Rotational and vibration energy levels of diatomic molecule Assignment III
02-11-2022 to 21-11-2022	6	**Sources of Electromagnetic Waves**	Historical Perspective of Electromagnetic Waves Production of electromagnetic waves : Hertz experiment Planck hypothesis of photons (Concept only) Sources of electromagnetic waves: Radio waves, Microwaves, Infrared, Visible light, Ultraviolet, X-rays, Gamma rays. Assignment IV
22-11-2022 to 24-11-22	2	**Applications of Electromagnetic Waves**	Application of EM waves, Microwave oven RADAR

TYBSc Physics IV (Atomic and Molecular Physics)-

Duration	Period	Chapter	Topic
15-9-2022 to 30-9-2022	8	**Atomic structure**	Revision of various atomic models, Vector atom model, Pauli's Exclusion Principals and electron configurations, Quantum states, and Spectral notations of quantum states, Assignment I
1-10-2022 to 2-11-2022	12	**One and Two valence electron systems**	Spin-Orbit Interaction (Single valence electron atom), Energy levels of Na atom, selection rules, spectra of sodium atom, sodium Doublet. Spectral terms of two electron atoms, terms for equivalent electrons, L-S and JJ coupling schemes. Singlet-Triplet separation for interaction energy of L-S coupling. Lande Inteval rule, spectra of Helium atom, Assignment II
3-11-2022 to 19-11-2022	6	**Zeeman Effect**	Experimental arrangement Normal and anomalous Zeeman Effect, Stark effect(Qualitative Discussion), Applications of Zeeman Effects, Problems, Assignment III
21-11-2022 to 24-11-2022	2	**Molecular spectroscopy**	Introduction to Molecular Spectra and its types Rotational, Vibration spectra and Electronic spectra of molecules, Applications of UV-Vis spectroscopy

TYBSc Skill based course II (Physics Workshop skill)-

Duration	Period	Chapter	Topic
9-9-2022 to 4-11-2022	6	**Basic of Measurement**	Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. **Multimeter** Block diagram and working of a digital multimeter. Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance
5-11-2022 to 24-11-2022	6	**Electronic Voltmeter**	Principles of voltmeter, Construction (block diagram only). Specifications of an electronic Voltmeter and their significance. AC Voltmeterand its types, Block diagram ac Milli Voltmeter, Specifications and their significance
5-10-2022 to 24-11-2022	12	**Activity**	1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance. 2. To observe the limitations of a multimeter for measuring high frequency voltage and currents. 3. Measurement of voltage, frequency, time period and phase angle using CRO. 4. Measurement of rise, fall and delay times using a CRO

Mr. V. B. Deshmukh

Research paper published

Sr. No.	Article Title	Journal Name	ISBN/ISSN	UGC-Care listed	Year
1	Fabrication of acetylcholinesterase sensor based on polyaniline/$K_2Cr_2O_7$ composite film modified electrode for amperiometric detection of carbaryl	Journal of Advances in Applied Sciences and Technology	2393-8188	Yes	2022

3. Research paper presented in conference

Sr. No.	Article Title	Level	Seminar Name	Venue	Year
1	Electrochemical synthesis and characterization of Conducting polymer composite film for various dopants	International E-Conference	Advanced Materials in Innovative Technology" (ICAMIT-2022)	Milliya Arts, Science and Management Science College, Beed (MS) India	2022

Dr. V.B. Deshmukh
Department of Physics
HRM Rajgurunagar
10/05/2023

To,
The principal,
Hutatma Rajguru Mahavidyalaya
 Rajgurunagar

Subject- Teaching report of 1st semester in year 2022-23

1) S. Y. B. Sc. (PHY-241) Oscillations, Waves and Sound

Month	Topic	Period
9/3/2023 to 21/3/2023	**Undamped Free Oscillations** Equilibrium conditions, Equations of linear and angular SHM. Differential equation of linear SHM, Composition of two perpendicular linear SHM for frequency ratio 1:1 and 1:2, Lissajous figures and their demonstrations	7
22/3/203 to 3/4/2023	**Damped Oscillations** Differential equation of damped harmonic oscillator and its solution, different cases, Logarithmic decrement, Energy of damped harmonic oscillator, Quality factor, LCR series circuit	7
4/4/2023 to 17/4/2023	**Forced Oscillations** Equation of forced oscillations and its solution. Resonance, Velocity resonance, Amplitude resonance, Sharpness resonance and half width. Average energy of forced oscillator, Quality factor, LCR series circuit	8
18/4/2023 to 26/4/2023	**Wave Motion** Equation of longitudinal and transverse wave and its solution, energy density and intensity of a wave, Seismic wave and gravitational waves	6
27/4/2023 to 16/5/2023	**Sound and Doppler Effect** Characteristics of sound, Doppler effect in sound, Expression for apparent frequency in different cases, Symmetric and Asymmetric nature Doppler effect, Applications	8

PHY-243 Physics Laboratory-2B- eight (8) Practicals were completed on April to May 2023

2) T. Y. B. Sc. PHY-364 Nuclear Physics

Month	Topic	Period
14/2/2023 to 26/2/2023	**Nuclear Structure, Properties and Radioactivity** Composition of nucleus, Characteristics of nucleus, Mass defect and Binding energy, packing fraction. Classification of nuclei, stability of nuclei. Radioactive disintegration, properties of α, β, γ rays, Law of radioactive decay, half life, mean life, activity and specific activity, successive disintegration and equilibrium of radioisotopes, Application of radioactivity.	12
27/2/2023 to 6/3/2023	**Particle Accelerator and Radiation Detectors** Linear accelerator (LINAC), Cyclic accelerator (Cyclotron), Accelerators in India. Nuclear detectors, G. M. counter and solid state detector.	6
7/3/2023 to 23/3/2023	**Nuclear forces and Nuclear Models** Classification of nuclear forces, Meson theory, properties of nuclear forces, deuteron problem, Elementary particles, Quark models, Shell model, Liquid drop model, Semi-empirical B. E. formula.	9
24/3/2023 to 15/4/2023	**Nuclear Reactions and Reactor Theory** Nuclear reaction and conservation laws, Q value equation, Exothermic and endothermic reaction, compound nucleus, Nuclear fission and fusion reaction, stellar energy, chain reaction and critical mass. . Nuclear reactor in India.	6
2/5/2023 to 10/5/2023	Nuclear reactor and its basic components, homogeneous and heterogeneous reactors, power reactor	3

2) T.Y.B.Sc. 3611-SEC(AB) Instrumentation for Agricultural

Month	Topic	Period
24/3/2023 to 25/3/2023	**Introduction** Necessity of agricultural instrument, sensor used in agricultural	2
26/3/2023 to 31/3/2023	**Soil Properties & Sensing** Properties of soil, Permeability and seepage analysis, Mohr's circle of stress, active and passive earth pressures, stability and slopes. Sensors, sonic anemometers, hygrometers, thermocouples, open and close path gas analyzers.	4
1/4/2023 to 8/4/2023	**Instrumentation in Continuous & Batch process** Sugar plant, flow diagram, sensors and instrumentation setup, flow diagram of fermenter and control process, dairy industry flow chart and instrumentation set up for it. Juice extraction control process and instrumentation set up.	4
9/4/2023 to 21/4/2023	**Instrumentation in Irrigation** Auto drip and sprinkler irrigation system, Upstream and downstream control concept, SCADA for DAM parameters and control	4
22/4/2022-29/4/2022	**Greenhouse Parameters & Instrumentation** Concept and construction of green house effect, merits and demerits, ventilation, cooling and heating.wind speed, temperature and humidity, soil moisture, rain gauge, CO_2 control area and wetness, EM radiation, photosynthesis	4

18 periods were used for completion of activity.

K.T.S.P. Mandal's
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Tal-Khed, Dist-Pune 410 505
DEPARTMENT OF PHYSICS
Syllabus Completion Report
Academic Year-2022-2023
Sem- I

F.Y.B.Sc. CBCS Pattern

Name: Mr. Barne N.D.   PHY-111 Mechanics and Properties of Matter

Sr. No.	Months	Topics	Lectures
01	20 Aug. 2022 - 15 Sept. 2022	**1. Motion:** Introduction to motion, Types of motion, Displacement, Velocity, Acceleration, Inertia, Newton's laws of motion with their explanations, Various types of forces in nature, Frames of reference (Inertial and Non inertial), Laws of motion and it's real life applications, Problems	09
02	22 Sept. 2022 - 07 Oct. 2022	**2. Work and Energy:** Kinetic energy, Work Energy Theorem, Work done with constant force, Work done with varying force (spring force), Conservative and Non conservative forces, Potential energy, Law of energy conservation, Gravitational potential energy, Problems	07
03	13 Oct. 2022 – 03 Nov. 2022	**3. Fluid Mechanics:** Concept of viscous force and viscosity, Coefficient of viscosity, Steady and Turbulent flow, Reynolds number, Equation of continuity, Bernoulli's Principle, Applications of Bernoulli's Principle (Ventury Meter, PitotTube), Applications of viscous fluids, Problems.	08
04	04 Nov.2022 - 24 Nov. 2022	**4. Properties of Matter:** Surface tension, Angle of contact, Factors affecting surface tension, Jaeger's method for determination of surface tension, Applications of surface tension. Stress and Strain, Hook's law and Coefficient of elasticity, Young's modulus, Bulk modulus, Modulus of rigidity, Work done during longitudinal strain, Volume strain, Shearing strain.	12
	09 Nov. 2022	**Internal Exam**	

K.T.S.P. Mandal's
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
Tal-Khed, Dist-Pune 410 505
DEPARTMENT OF PHYSICS
Syllabus Completion Report
Academic Year-2022-2023
Sem- V

T.Y.B.Sc.

Name: Mr. Barne N.D.   **Subject: PH-352 Electrodynamics**

Months	Topics	Lectures
13 Sept. 2022-02 Nov. 2022	**1. Electrostatics:** 1.1. Coulomb's law, Gauss law, Electric field, Electrostatic Potential 1.2. Potential energy of system of charges. 1.3. Statement of Poisson's equation, Boundary Value problems in electrostatics-solution of Laplace equation in Cartesian system, 1.4. Method of image charges: Point charge near an infinite grounded conducting plane, Point charge near grounded conducting sphere. 1.5. Polarization P, Electric displacement D, Electric susceptibility and dielectric constant, bound volume and surface charge densities. 1.6. Electric field at an exterior and interior point of dielectric.	12
07 Nov. 2022-23 Nov. 2022	**2.Magnetostatics:** 2.1. Concepts of magnetic induction, magnetic flux and magnetic field 2.2. Magnetic induction due to straight current carrying conductor, Energy density in magnetic field, magnetization of matter. Relationship between B,H and M. 2.3 Biot-Savart's law, Ampere's law for force between two current carrying loops, Ampere's circuital law, 2.4Equation of continuity, Magnetic vector potential A. 2.5. Magnetic susceptibility and permeability, Hysteresis loss, B-H curve.	12
28 Nov. 2023 to 31 Dec.	**3. Electrodynamics:** 3.1.Concept of electromagnetic induction,Faradays law of induction, Lenz's law, displacement current,	12

2023	generalization of Amperes' law 3.2. Maxwell's equations (Differential and Integral form) and their physical significance 3.3. Polarization, reflection & refraction of electromagnetic waves through media 3.4. Wave equation and plane waves in free space. 3.5.Poynting theorem&Poynting vector, Polarizations of plane wave. 3.6. Microscopic form of ohm's law (J=σ.E)	

Mr. Barne N. D.

K.T.S.P. Mandal's
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
Tal-Khed, Dist-Pune 410 505
DEPARTMENT OF PHYSICS
Syllabus Completion Report
2022-2023

DEPARTMENT OF PHYSICS

SEM VI

T.Y.BSc.

Name: Mr. Barne N.D.   **PHY-365 (A): Electronics-II**

Months	Topic taken	Periods
13 Feb.2023 - 14 March 2023	**1: Semiconductor Devices:** a. LED and Photodiode, Optocoupler. (Working Principles) Problems. Ref. 1. b. BJT: Transistor amplifier classifications - Class A, B, C and AB (working only), Differential amplifier (transistorized), Problems. Ref. 1. c. Field Effect Transistor: JFET (Introduction, classification, principle, working and IV characteristics) MOSFETs (DE-MOSFET and E only MOSFET). Problems.	09
15 March 2023 - 5 March 2023	**2: Applications of Semiconductor Devices:** a. Three Pin Regulators: Block diagram of 3-pin IC regulator, study of IC-78XX, 79XX. Dual Power Supply using IC-78XX, 79XX. Ref. 1 b. Switching Regulators (SMPS): Introduction, Block diagram, Advantages and Disadvantages. Ref. 4 c. Modulation and Demodulation : Concept of Carrier Wave, Need of Modulation and Demodulation, Methods of Modulation like AM, FM, PM (Concepts Only), d. Concept of Modulation Index, Upper and Lower Side Band Frequencies in AM. Problems	09
10 Apr. 2023 - 18 Apr.2023	**3: Integrated Circuits:** a. Integrated Circuits: Introduction, Scale of Integration, Advantages and drawbacks of IC Ref.4 b. OP-AMP Applications as Integrator, Differentiator, Comparator. Ref. 1 c. Timer IC-555: Block diagram, Astable, monostable multivibrator	09

	(working and design). Problems	
04 May 2023	**INERNAL EXAM**	
19 Apr.2023 - 26 April 2023	**4: Combinational and Sequential Circuits:** a. Combinational Circuits: Introduction to SOP and POS equation. Concept of Standard SOP and POS equation. Concept of K-map and their use in reduction of Boolean expressions, design of half adder, full adder, half subtract, Study of binary to gray and gray to binary code conversion. Problems. Ref. 2 b. Sequential Circuits: RS flip flop using NAND/NOR, clocked RS, D, JK and T-flip flops. Application of flip flops in Sequential Circuits as Counters and Registers. Asynchronous and Synchronous Counters. (3-bit Counter), Shift Registers and their types of operation -SISO, SIPO, PISO, PIPO (Concepts only).	09

Mr. Barne N. D.

K.T.S.P. Mandal's
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
Tal-Khed, Dist-Pune 410 505
DEPARTMENT OF PHYSICS
Syllabus Completion Report
2022-2023

DEPARTMENT OF PHYSICS

SEM II

F.Y.B.Sc.

Name: Mr. Barne N.D.   **PHY-121 Heat and Thermodynamics**

Months	Topic taken	Periods
13 Apr. 2023 - 29 Apr. 2023	**1. Fundamentals of Thermodynamics** Concept of thermodynamic state, Equation of state, Van der Waal's equation of state, Thermal equilibrium, Zeroth law of thermodynamics, Thermodynamic processes: Adiabatic, Isothermal, Isobaric and Isochoric changes, Indicator diagram, Work done during isothermal change, Adiabatic relations, Work done during adiabatic change, Internal energy, Internal energy as state function, First law of thermodynamics, Reversible and Irreversible changes, Problems.	10
01 May 2023 – 04 May 2023	**2. Applied Thermodynamics** Conversion of heat into work and it's converse, Second law of thermodynamics, Concept of entropy, Temperature - entropy diagram, T-dS equations, Clausius - Clapeyron latent heat equations, Problems.	09
07 May 2023	**3. Heat Transfer Mechanisms** Carnot's cycle and Carnot's heat engine and its efficiency, Heat Engines: Otto cycle & its efficiency, Diesel cycle & its efficiency, Refrigerators: General principle and coefficient of performance of refrigerator, Simple structure of Vapor compression refrigerator, Air Conditioning: Principle and it's applications, Problems	09
02May 2023	**INERNAL EXAM**	

		08
23 March 2023 - 08 Apr. 2023	**4. Thermometry** Concept of heat & temperature, Principle of thermometry, Temperature scales & inter-conversions, Principle, Construction and Working: (Liquid thermometers, Liquid filled thermometers, Gas filled thermometers, Bimetallic thermometers, Platinum resistance thermometer, Thermocouple), Problems	

Mr. Barne N. D.

K.T.S.P.Mandal's

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF MATHEMATICS
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-23
Sem-II

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Analytical Geometry	Prof. Wayal R.M.
		Calculus-II	Prof. Rakshe A.R.
2	S.Y.B.Sc.	Linear Algebra	Prof. Wayal R.M.
		Vector Calculus	Prof. Wayal R.M.
3	F.Y.B.Cs.	Graph Theory	Prof. Rakshe A.R.
		Linear Algebra	Prof. Bhambure P.D.
4	S.Y.B.Cs.	Computational Geometry	Prof. Arude J.B.
		Operation Research	Prof. Rakshe A.R.
5	F.Y.B.Com	Business Mathematics & Statistics - II	Prof. Bhambure P.D.
6	F.Y.B.B.A.(C.A.)	Business Mathematics	Prof. Arude J.B.

Class - F.Y.B.Sc.

Subject:- Analytical Geometry

Name:-Prof. Wayal R. M.

No. of lectures per week - 03

Month	Topic
March	Change of axes Translation and Rotation. Conic Section: general equation of second degree in two variables. Centre of conic ,nature of conic.
April	Reduction of conic to standard form. Direction cosines and direction ratios, equation of plane , normal form ,transform to the normal form , plane passing through three non-linear points ,intercept form ,angle between two planes , Distance of a point from plane ,distance between parallel planes, system of planes, two sides of planes ,bisector of planes. Equation of a line in symmetric
May	Unsymmetrical forms, line passing through two points, angle between a line and a plane, perpendicular distance of a point from a plane, condition for two lines to be coplanar. Equation of a sphere in different forms, plane section of a sphere Equation of a circle, sphere through a given circle ,intersection of sphere and a line , equation of tangent plane to sphere

Class: S.Y.B.Sc

Subject: Linear Algebra

Name: Prof. Wayal R.M.

No. of lectures per week-03

Month	Topic
March	Row echelon form and reduced row echelon form of a matrix, consistency of homogeneous and non-homogeneous system of linear equations using rank, condition for consistency, Gauss ellimination and Gauss-Jordan method, Vector spaces, subspaces.

April	Linear dependence and independence, Dimension of a vector space, row, column and null space of a matrix.
May	Rank and nullity. Definition and example of a linear transformation, kernel and range of L. T., rank-nullity theorem, matrices and linear transformation, linear isomorphism.

Class: S.Y.B.Sc   **Subject: Vector Calculus**

Name: Prof. Wayal R.M.   **No. of lectures per week-03**

MONTH	TOPIC
March	Curves in Space, Limits and Continuity, Derivatives and Motion, Differentiation ,Rules for Vector Function, Vector Functions of Constant Length. Integrals of Vector Functions. Arc Length along a Space Curve, Speed on a Smooth Curve, Unit Tangent Vector. Curvature of a Plane Curve, Circle of Curvature for Plane Curves, Curvature and Normal Vectors for a Space Curve., Line Integral of Scalar Functions, Additivity, Line integral in the Plane.
April	Vector Fields, Gradient Fields, Line Integral of Vector Fields.Work done by a Force over a Curve in Space, Flow Integrals and Circulation for Velocity Fields, Flow across the Simple Closed Plane Curve. Path Independence, Conservative and Potential Functions. Divergence, Two forms for Green's Theorem, Green's Theorem in the Plane.
May	Parameterizations of Surfaces. Implicit surfaces, Surface integrals, Orientation of Surfaces. Surface Integrals of Vector Fields. The Curl Vector Field, Stokes' Theorem, Conservative Fields and Stokes' Theorem.

Class - F.Y.B.Sc.   Subject: Calculus -II

Name:-Prof. Rakshe A.R.   No. of lectures per week - 03

Month	Topic
March	The Derivatives, Definition of the derivative of a function at a point, every differentiable function is continuous, Rules of differentiation, Caratheodary's theorem(without proof), The chain rule, Derivative of inverse function (without proof , only examples). The Mean Value Theorems, Interior extremum theorem, Mean Value theorems and their Consequences, Intervals of increasing and decreasing of a function,first derivative test for extrema.
April	Derivative of inverse function (without proof , only examples). The Mean Value Theorems, Interior extremum theorem, Mean Value theorems and their Consequences, Intervals of increasing and decreasing of a function,first derivative test for extrema.L'Hospital Rule, Indeterminate forms, L'Hospital Rules(without proof),Taylor's theorem and Maclaurin'stheorem with Lagrange's form of remainder(Without proof), The nth derivative and Leibnitz theorem for successive differentiation Separable equations, Existence and Uniqueness of solutions of nonlinear equations
May	The nth derivative and Leibnitz theorem for successive differentiation Separable equations, Existence and Uniqueness of solutions of nonlinear equations Linear first order equations, Transformation of nonlinear equations to separable equations. Exact differential equations, Integrating factors.

Class - F.Y.B.Cs.

Subject:- Graph Theory

Name:-Prof. Rakshe A.R .

No. of lectures per week-03

Month	Topics
March	Definition, Elementary terminologies and results, Graphs as Models. Special types of graphs. Isomorphism Adjacency and Incidence Matrix of a Graph Subgraphs, induced subgraphs, Vertex delition, Edge delition. Complement of a graph and self-complementary graphs. Union, Intersection and Product of graphs. Fusion of vertices.
April	Connected Graphs Walk, Trail, Path, Cycle : Definitions and elementary properties. Connected Graphs : deflnition and properties. Distance between two vertices, eccentricity, center, radius and diameter of a graph. Isthmus, Cutvetex : Definition and properties. Cutset, edge-connectivity, vertex connectivity. Weighted Graph and Dijkstra's Algorithm Eulerian and Hamiltonian Graphs 05 Lectures Seven Bridge Problem, Eulerian Graph : Definition and Examples, Necessary and Sufficient condition. Fleury's Algorithm.
May	Hamiltonian Graphs : Definition and Examples, Necessary Condition. Introduction of Chinese Postman Problem and Travelling Salesman Problem.Definition, Properties of trees. Center of a tree. Binary Tree : Definition and properties. Tree Traversal : Ordered rooted Tree, Preorder traversal, inorder traversal and postorder traversal, Prefix Notation. Spanning Tree : Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm. Definition, Examples Elementary Terminologies and properties. Special Types of Digraphs. Connectedness of digraphs. Network and Flows : definition and examples.

Class - S.Y.B.Cs.

Subject:- Operational Research

Name:-Prof. Rakshe A.R .

No. of lectures per week-03

Month	Topic
March	Graphical method Two-Variable LP Model , Graphical LP Solution, Linear Programming Applications
April	LP Model in Equation Form , Transition from Graphical to Algebraic Solution ,The Simplex Method , Artificial Starting Solution , Special Cases in Simplex Method
May	Dual problem , Definition of the dual problem , Primal dual relationships ,Examples, Transportation problem ,Definition of the Transportation problem
June	The Transportation Algorithm ,The Assignment Model Optimal solution of two person zero sum games , Solution of mixed strategy games

Class - F.Y.B.Cs.

Subject:- Linear Algebra

Name:-Prof. Bhambure P. D.

No. of lectures per week - 03

Month	Topic
March	Vector Spaces: Vector spaces & subspaces, Null spaces column spaces & linear transformations, Linearly independent sets: Bases, Co-ordinate systems, The dimension of a vector space, Rank
April	Eigen Values: Eigen values & Eigen vectors, The characteristic equation, Diagonalization, eigen vectors & linear transformations Orthogonality & Symmetric matrices: Inner Product, length & orthogonality, Orthogonal sets

May	Orthogonal Projections diogonalization of Symmetric Matrices, Quadratic forms

Class - F.Y.B.Com. **Subject:- Business Mathematics and Statistics-II**

Name:-Prof. Bhambure P. D. No. of lectures per week:-04

Month	Topics
March	Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via Adjoint Matrix, Homogeneous System of Linear equations, Condition for Consistency of homogeneous system, Solution of Non-homogeneous System of Linear equations ,Applications in Business and Economics, Examples and Problems.
April	Concept of index number, price index number, price relatives. Problems in construction of index number, Construction of price index number: Weighted index Number, Laspeyre's, Paasche's and Fisher's method. Cost of living / Consumer price index number: Definition, problems in construction of index number, Methods of construction: Family budget and aggregate expenditure, Inflation, Uses of index numbers, commonly used index numbers. Examples and problems.
May	Definition and terms in a LPP, formulation of LPP, Solution by Graphical method, Examples and Problems , Concept and types of correlation, Scatter diagram, Interpretation with respect to magnitude and direction of relationship. Karl Pearson's coefficient of correlation for ungrouped data, Spearman's rank correlation coefficient, Concept of regression, Lines of regression for ungrouped data, predictions using lines of regression. Regression coefficients and their properties, Examples and problems.

Prof. P. D. Bhambure

Class - S.Y.B.Cs

Subject:- Computational Geometry

Name:-Prof. Arude J. B.

No. of lectures per week: 03

Month	Topics
March	Two dimensional transformations ,Introduction , Representation of points, ransformation of a unit square, Solid body transformations, Transformation and homogeneous coordinates. Translation , Rotation about an arbirary point, Reflection through an arbitrary line , Projection – a geometric interpretation of homogeneous coordinates, Overall Scaling , Point at Infinity
April	Three dimensional transformations , Introduction, Three dimensional – Scaling, shearing, rotation, reflection, translation. Multiple transformations , Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space, Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes , Affine and perspective transformations, Orthographic projections , Axonometric projections.
May	Oblique projections , Single point perspective transformations. Vanishing points , Plane Curves , Introduction, Curve representation ,Non – parametric curves , Parametric curves. Parametric representation of an ellipse and generation of ellipse.

Prof. Arude J.B

Class - F.Y.B.B.A.   Subject:- Business Mathematics

Name:-Prof. Arude J. B.   No. of lectures per week - 04

Month	Topic
March	Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via adjoint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non homogeneous System of Linear equations Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix .
April	Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct, Proportion , Inverse Proportion, Variation, Inverse Variation, Joint .Variation, Percentage- Meaning and Computations of Percentages , Simple Interest, Compound Interest (reducing balance & Flat interest rate of interest), Equated Monthly Installments(EMI), Problems
May	Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on Commission and brokerage Statement and meaning of T.P.methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems. Problems Meaning of LPP, Formulation of LPP, and solution by graphical methods.

Prof Arude J. B.

K.T.S.P.Mandal's
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF MATHEMATICS
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-23
Sem-I

Sr. No.	Class	Subject	Name of Teacher
1	F.Y.B.Sc.	Algebra	Prof. Wayal R.M.
		Calculus-I	Prof. Rakshe A.R.
2	S.Y.B.Sc.	Calculus of Several Variable	Prof. Wayal R.M.
		Numerical Analysis & its application	Prof. Wayal R.M.
3	F.Y.B.Cs.	Discrete Mathematics	Prof. Rakshe A.R.
		Matrix Algebra	Prof. Arude J. B.
4	S.Y.B.Cs.	Group and coding theory	Prof. Arude J. B.
		Numerical Techniques	Prof. Rakshe A.R.
5	F.Y.B.Com	Business Mathematics & Statistics	Prof. Bhambure P. D.
6	F.Y.B.B.A.(C.A.)	Business Statistics	Prof. Bhambure P. D.

Class: F.Y.B.Sc
Name: Prof. R. M. Wayal

Subject : Algebra
No. of Lectures:52

Month	Topic	No. of lecture
August	Sets, relation, equivalence relation, equivalence classes, Function.	11
September	Types of function, inverse of function, composition of function, Mathematical induction, division algorithm, greatest common divisor, Euclid's lemma.	12
October	The Euclidean algorithm, fundamental theorem of arithmetic, prime numbers, theory of congruence, properties of congruence.	8
November	Fermat's theorem, sums and products, basic algebraic properties, moduli, complex conjugates. Polar and exponential form of complex number, De-Moivers theorem	17
December	N^{th} root of unity	4

Class: S.Y.B.Sc
Name: Prof. R. M. Wayal

Subject : Calculus of Several Variables
No. of Lectures:41

Month	Topic	No. of lecture
Sept	Functions of two variables, Domain and Range, Graphs, Level Curves.	05
Oct	Functions of Three or More Variables, Limits by using definition, different paths, polar coordinates. Continuity, Definition and examples of partial derivative, Higher Derivatives, Clairaut's Theorem , higher order partial derivative,	13
Nov	Differential, Equations, Wave equation. Differentiable function, Differentials, Chain Rule, homogeneous Functions, Euler's theorem, Extreme values of functions of two variables. Necessary conditions for extreme values.Second Derivative Test, Lagrange Multipliers.	11
Dec	Iterated Integrals, Fubini's Theorem. Double integral over general regions	4
Jan	Change of order of integration for two variables. Double integral in Polar coordinates. Triple integrals, Evaluation of triple integrals, Triple integrals in spherical coordinates. Jacobians, Change of variables in multiple integrals	8

Class - S.Y.B.Sc.
Name:- Prof. R. M. Wayal

Subject:- Numerical Analysis &It's Application
Total No. of lectures - 38

Month	Topic	No. of lecture
September	Errors and their computations, Bisection method.	5
October	The method of False position,Newton- Raphson method, Finite Difference Operators and their relations (Forward, Backward difference and Shift operator). Differences of a polynomial, Newton's forward Interpolation Formula	12
November	Newton's Backward Interpolation Formulae, Lagrange's Interpolation Formula, Numerical Differentiation, A General Quadrature formula, The rapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule. . Taylor's series method, Picard's Method successive approximations.	16
December	Euler's & Modified Euler's Methods. Runge Kutta Method (Second and fourth order).	5

	Numerical Integration - A General Quadrature formula, The Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule. Method (First, Second,third and fourth order).	

Class - F.Y.B.Sc
Name:-Prof. Rakshe A. R.

Subject:- Calculus I
Total No. of lectures - 46

Month	Topic	No. of lecture
August	Algebraic properties of R, Order properties of R, Well-Ordering Property of N, Arithmetic mean-Geometric mean inequality, Bernoulli's inequality, Absolute value function and its properties, triangle inequality and its consequences.	7
September	Definitions of Upper bound, Lower bound, supremum, infimum of subsets of R, completeness property of R, Archimedean property and its consequences, The density theorem, sequences of real numbers	10
October	Definition of limit of sequence and uniqueness of limit, bounded sequence, Monotone sequences, Monotone convergence theorem, Definition of subsequence, Divergence criteria, Monotone Subsequence theorem, Bolzano -Wierstrass theorem, The Completeness Property of R.	12
November	Functions, domain and range, graphs of functions, Piecewise defined functions, increasing and decreasing functions, symmetry, common functions, limit of a function, divergence criteria, Squeeze theorem, one-sided limits, infinite limits, Definition of continuous function at a point , sequential criterion for continuity, Divergence criterion, combination of continuous functions. Properties of continuous functions on an interval, Boundedness theorem, The minimum -maximum theorem,	13
December	Location of root theorem, Bolzano's intermediate value theorem. Continuous function maps closed bounded interval to closed bounded interval.	4

Class - F.Y.B.Cs.(Comp. Sci)

Name:-Prof. Rakshe A.R.

Subject:- Discrete Mathematics

Total No. of lectures per week - 43

Month	Topic	No. of lecture
July 2022	Propositional Logic, Predicates and Quantifiers Rules of Inference, Poset, Hasse diagram. Lattices, Complemented lattice , Bounded lattice and Distributive lattice . Boolean Functions Boolean Function of degree n.	05
August 2022	Boolean identities, Definition of Boolean A lgebra .Representation of Minterm, Maxterm Disjunctive normal form, Conjunctive normal Form. Counting Principles Cardinality of a finite set.	11
September 2022	The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle. The Pigeonhole Principle: Statement, The Generalized Pigeonhole Principle, Its applications.	12
October 2022	Permutation and Combination with Repetitions, Permutations with Indistinguishable Objects, Distributing objects into box.	10
November (2022)	Recurrence Relations : Introduction, Formation. Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solutions. Total Solutions	05

Class - S.Y.B.Cs.(Comp Sci.)

Name:-Prof. Rakshe A.R.

Subject:- Numerical Techniques

Total No. of lectures - 36

Month	Topic	No. of lecture
Sep 2022	Solution of Algebraic and Transcendental Introduction, Error and their computation Bisection method - without derivation and convergence, The method of false position, Newton - Raphson Method - without derivation &convergence. Interpolation Introduction, Finite difference operators and their relation,	10
Oct 2022	Difference Operators - Forward , Backward , Shift (E), Relations between them. Forward & Backward Difference tables. Factorial notation Newton's Forward Difference & Backward Difference	08
Nov 2022	interpolation Formula (without proof) Lagrange's formula for interpolation with unequally, Divided Difference, Newton's Divided Difference formula. Numerical Integration Introduction. Numerical Differentiation.	18

Class - F.Y.B.Com
Name:- Prof. Bhambure P. D.

Month	Topic	No. of lecture
August	Role of statistics. In informatics business science ,Tabulation	06
September	Data condensations and tabulation, Data Condensation and graphical Methods :Raw data , attributes and variables , classification , frequency distribution ,cumulative frequency distributions. Graphs - Histogram, Frequency polygon. Diagrams - Multiple bar , Pie ,Subdivided bar.	11
October	Criteria for good measures of central tendency, Arithmetic mean, Median and Mode for grouped and ungrouped data, combined mean.	12
November	Concept of dispersion , Absolute and relative measure of dispersion, Range, Variance, Standard deviation, Coefficient of variation, Quartile Deviation , Coefficient of Quartile deviation	12
December	Concept of correlation, positive & negative correlation Karl Pearson's Coefficient of correlation, Meaning of regression, Two regression equations, regression coefficients and properties	8

Class - F.Y.B.Com.
Name:- Prof. Bhambure P. D.

Month	Topic	No. of lecture
August	**Interest & Annuity** Interest:-Concept of Present value and future value	04
September	simple interest ,compound interest, nominal and effective rate of interest, example and problems. Annuity:- Ordinary Annuity, Sinking Fund, Annuity due, present value and future value, equated monthly installment by interest of reducing balance and flat interest method, examples and problem	12
October	**Shares and Mutual Funds** Share :-Concept of share, face value, market value, dividend, brokerage, equity shares, preferential shares, examples and problem. Mutual Funds:- Concept of mutual funds, problems on calculation of net income ,Change in net asset value.	13
November	**Population and Sample**	12

December	Definition of Statistics, Scope of statistics in economics, Management Science and Industry. Concept population and sample, method of data collection: Census and sampling with illustration . method of random sampling -(SRSWR, SRSWOR, Stratified, Systematic)	
	Measures of Central Tendency and Measures of Dispersion Frequency distribution : Row data, attributes and variables, classification of data, frequency distribution, cumulative frequency distribution, Histogram and ogive curves. Requisites of ideal, Arithmetic mean, Median, Mode, Geometric mean,Harmonic mean	12
August	Standard Deviation (S.D),Coefficient of variation(C.V)	

Prof. P.D. Bhambure

K. T. S. P. Mandal's
Hutatma Rajguru Mahavidyalaya , Rajgurunagar
Department Of Statistics
Syllabus Completion Report
Academic Year 2022-23
Term- I

Sr.No	Class	Paper	Name of Teacher
1	F.Y.B.Sc	Descriptive Statistics I	Thorat S.R.
2	F.Y.B.Sc	Discrete Probability	Thorat S.R.
3	S.Y.B.Sc	Discrete Probability Distributions and Time series	Thorat S.R.
4	S.Y.B.Sc	Continuous Probability Distributions	Thorat S.R.

Paper : **Descriptive Statistics I.**   **Class: F.Y.B.Sc**

Month	Topic	Subtopic
Aug 2022	1. **Introduction to Statistics**	1.1 Meaning of Statistics as a Science. 1.2 Importance of Statistics. 1.3 Scope of Statistics: 1.4 Statistical organizations in India and their functions:
	2. **Population and Sample**	2.1 Types of characteristics: 2.2 Types of data: 2.3 Notion of a statistical population 2.4 Methods of sampling
	3.**Presentation**	3.1 Classification 3.2 Frequency Distribution

	of data	3.3 Methods of classification 3.4 Cumulative frequencies 3.5 Relative frequency 3.6 Guidelines for choice of classes 3.7 Graphical representation of statistical data 3.8 Stem and leaf chart 3.9 Data Analysis and interpretation
Aug 2022	**4. Measures of central tendency**	4.1 Introduction 4.2 Objectives of Measures of Central Tendency 4.3 Arithmetic Mean (A.M.) 4.4 Trimmed mean 4.5 Median
Sept 2022		4.7 Geometric mean 4.8 Mode Harmonic mean 4.9 Weighted means 4.9 Partition values 4.10 Box and whisker plot
	5. Measures of Dispersion	5.1 Introduction 5.2 Measures of Dispersion 5.3 Range and Coefficient of range 5.4 Quartile deviation
Oct 2022		5.5 Mean deviation and coefficient of mean deviation 5.6 Mean square deviation 5.7 Variance , standard deviation , coefficient of variation
Nov 2022	**6. Moments**	6.1 Raw moments (m'r) for ungrouped and grouped data 6.2 Central moments (mr) for ungrouped and grouped data 6.3 Relations between central moments and raw moments, upto 4-th order
		7.1 Concept of skewness of frequency distribution,

	7. Skewness and Kurtosis	positive skewness, negative skewness, symmetric frequency distribution. 7.2 Bowley's coefficient of skewness
Nov 2022		7.3 Karl Pearson's coefficient of skewness. 7.4 Measures of skewness based on moments (β_1, γ_1). 7.4 Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions. 7.5 Measures of kurtosis based on moments (β_2, γ_2).
Nov , Dec 2022	8. Theory of Attributes	8.1 Attributes: 8.2 Consistency of data upto 2 attributes. 8.3 Concepts of independence and association of two attributes. 8.4 Yule's coefficient of association (Q), $-1 \leq Q \leq 1$, interpretation.

Paper : Discrete Probability and probability Distributions I
Class: F.Y.B.Sc

Month	Topic	Subtopic
Sept/Oct 2022	**1. Basics of Probability**	1.1 Experiments/Models, Ideas of deterministic and non-deterministic models. Random Experiment, concept of statistical regularity. 1.2 Definitions of - (i) Sample space, (ii) Discrete sample space: finite and countably infinite, (iii) Event, (iv) Elementary event, (v) Complement of an event. (vi) Certain event (vii) Impossible event Concept of occurrence of an event. Algebra of events and its representation in set theory notation. Occurrence of following events. (i) at least one of the given events, (ii) none of the given events, (iii) all of the given events, (iv) mutually exclusive events, (v) mutually exhaustive events, (vi) exactly one event out of the given events. 1.3 Classical definition of probability and its limitations. Probability model, probability of an event, equiprobable and non-equiprobable sample space, 1.4 Axiomatic definition of probability. Theorems And results on probability with proofs based on axoomatic approach. Such as, $P(AUB) = P(A)+P(B) - P(A \cap B)$ Generalisation $P(AUBUC), 0 \le P(A) \le 1, P(A)+P(A')=1, P(\phi)=0, P(A) \le P(B)$ if A is subset of B, Boole's inequality 2.1 Definition of conditional probability of an event. Definition of independence of two events

	2.Conditional Probability and Baye's theorem	P(A ∩ B) = P(A) · P(B) Pairwise independence and mutual independence for three events Multiplication theorem P(A∩ B) = P(A) · P(B|A). Generalization to P(A ∩ B ∩ C). 2.2 Partition of the sample space Proof of Bayes' theorem. Applications of Bayes' theorem in real life True Positive, False positive and sensitivity of test as application of Baye's theorem.
Nov 2022	**3**. **Univariate Probability Distributions (Defined on Discrete Sample Space)**	3.1 Concept and definition of a discrete random variable. 3.2 Probability mass function (p.m.f.) and cumulative distribution function (c.d.f.), F(·) of discrete random variable, properties of c.d.f.. 3.3 Mode and median of a univariate discrete probability distribution
Nov , Dec 2022	**4. Mathematical Expectation (Univariate Random Variable)**	4.1 Definition of expectation (Mean) of a random variable, expectation of a function of a random variable, , m.g.f. and c.g.f. Properties of m.g.f and c.g.f. 4.2 Definitions of variance, standard deviation (s.d.) and Coefficient of variation (c.v.) of univariate probability distribution, effect of change of origin and scale on mean, variance and s.d. 4.3 Definition of raw, central and factorial raw moments of univariate probability Distributions and their interrelations (without proof). 4.4 Coefficients of skewness and kurtosis based on moments.
Dec 2022	**5. Some**	5.1 Degenerate distribution, mean and variance

	Standard Discrete Probability Distributions - I	5.2 Uniform discrete distribution, p.m.f., c.d.f., mean, variance, real life situations, comments on mode and median 5.3 Bernoulli Distribution: p.m.f., mean, variance 5.4 Binomial Distribution: p.m.f., mean, variance 5.5 Hypergeometric Distribution : p.m.f., Computation of probability, situations where this distribution is applicable, binomial approximation to hypergeometric probabilities, mean and variance of the distribution

Paper : Discrete Probability Distributions and Time series
Class: S.Y.B.Sc (Sem-III)

Month	Topic	Subtopic
Sept /Oct 2022	**1. Statndard Discrete Distributions**	**1.1 Negative Binomial Distribution:** Probability mass function (p. m. f.) Notation: $X \sim NB\ (k,\ p)$. Nature of p. m. f., negative binomial distribution as a waiting time distribution, M.G.F., C.G.F., mean, variance, skewness, kurtosis (recurrence relation between moments is not expected). Relation between geometric and negative binomial distribution. Poisson approximation to negative binomial distribution. Real life
Oct/Nov 2022		**1.2 Multinomial Distribution:** Probability Mass function, Notation use of MGF to obtain means, variances, covariances, total correlation coefficients, multiple and partial correlation coefficients for k= 3, univariate marginal distribution, distribution of $X_i + X_j$, conditional distribution of X_i given $X_i + X_j = r$, variance – covariance matrix, rank of variance – covariance matrix and its interpretation and real life situations and applications.

Nov 2022		**1.3 Truncated Distributions:** Concept of Truncated distribution, truncation to the right, left and on both sides. Binomial distribution B(n, p) left truncated at X=0 (value zero is discarded), its p.m.f., mean, variance . Poisson distribution P(m) left truncated at X=0 (value zero is discarded), its p.m.f. , mean, variance. Real life situations and applications.
Jan 2023	**2.Time Series:**	2.1 Meaning and utility of time series, Components of time series: trend, seasonal variations, cyclical variations, irregular (error) fluctuations or noise. 2.2 Exploratory data analysis: Time series plot to (i) check any trend, seasonality in the time series (ii) learn how to capture trend. 2.3 Methods of trend estimation and smoothing: (i) moving average, (ii) curve fitting by least square principle, (iii) exponential smoothing. 2.4 Measurement of seasonal variations : i) simple average method, ii) ratio to moving average method, iii) ratio to trend where trend is calculated by method of least squares. 2.5 Choosing parameters for smoothing and forecasting. 2.6 Forecasting based on exponential smoothing. 2.7 Double exponential smoothing i.e. Holt-Winters method 2.8 Fitting of autoregressive model AR (1), plotting of residuals. 2.9 Data Analysis of Real Life Time Series:

Paper : Continuous Probability Distributions-I Class: S.Y.B.Sc (Sem-III)

Month	Topic	Subtopic
Oct 2022	**1.Continuous Univariate Distributions:**	1.1 Continuous sample space: Definition, illustrations. Continuous random variable: Definition, probability density function (p.d.f.), cumulative distribution function (c.d.f.), properties of c.d.f. (without proof), probabilities of events related to random variable. 1.2 Expectation of continuous r.v., expectation of function of r.v. $E[g(X)]$, mean, variance, geometric mean, harmonic mean, raw and central moments, skewness, kurtosis. 1.3 Moment generating function(M.G.F.):Definition and properties,cumulant generating function (C. G. F.) : definition, properties. 1.4 Mode, median, quartiles. 1.5 Probability distribution of function of r. v.: $Y = g(X)$ using i) Jacobian of transformation for g(.) monotonic function and one-to-one, on to functions, ii) Distribution function for $Y = X^2$, $Y = |X|$ etc., iii) M.G.F. of g(X).
Oct / Nov 2022	**2.Continuous Bivariate Distributions:**	2.1 Continuous bivariate random vector or variable b(X, Y): Joint p. d. f. , joint c. d. f , properties (without proof), probabilities of events related to r.v. (events in terms of regions bounded by regular curves, circles, straight lines). Marginal and conditional distributions. 2.2 Expectation of r.v., expectation of function of r.v. $E[g(X, Y)]$, joint moments, Cov (X,Y), Corr (X, Y), conditional mean, conditional variance, $E[E(X|Y = y)] = E(X)$, regression as a conditional expectation. 2.3 Independence of r. v. (X, Y) and its extension to k dimensional r. v. Theorems on expectation: i) $E(X + Y) = E(X) + E(Y)$, (ii) $E(XY) = E(X) E(Y)$, if X and Y are independent, generalization to k variables. $E(aX + bY + c)$, Var $(aX + bY + c)$. 2.4 M.G.F. : $M_{X,Y}(t_1, t_2)$, properties, M.G.F. of marginal

		distribution of r. v.s., properties
		$M_{X,Y}(t_1, t_2) = M_X(t_1, 0) M_Y(0, t_2)$, if X and Y are independent r. v.s., $M_{X+Y}(t) = M_{X,Y}(t, t)$, $M_{X+Y}(t) = M_X(t) M_Y(t)$ if X and Y are independent r.v.s. 2.5 Probability distribution of transformation of bivariate $U = f_1(X,Y)$, $V = f_2(X,Y)$.
Nov 2022	3.Standard Univariate Continuous Distributions:	**3.1 Uniform or Rectangular Distribution:** Probability density function (p.d.f.) Notation : X ~ U[a, b] . p. d. f., sketch of p. d. f., c. d. f., mean, variance, symmetry. Distribution of i) $X-a$, ii) $b-X$, iii) Y = F(X), where F(X) is the c. d. f. of continuous r. v. X. Application of the result to model sampling. (Distributions of X + Y, X – Y, XY and X/Y are not expected.)
Dec. 2022		**3.2 Normal Distribution:** p. d. f. curve, identification of scale and location parameters, nature of probability curve, mean, variance, M.G.F., C.G.F., central moments, cumulants, b_1, b_2, g_1, g_2, median, mode, quartiles, mean deviation, additive property, computations of normal probabilities using normal probability integral tables, probability distribution of : i) $X-m$, ii) aX + b, iii) aX + bY + c, iv) X^2, where X and Y are independent normal variates. Probability distribution of X, the mean of n i. i. d. $N(m, s^2)$ r. v s. Normal probability plot, q-q plot to test normality. Model sampling from Normal distribution using (i) Distribution function method and (ii) Box-Muller transformation as an application of simulation. Statement and proof of central limit theorem (CLT) for i. i.

		d. r. v. s with finite positive variance.(Proof should be using M.G.F.) Its illustration for Poisson and Binomial distributions.
Jan 2023		**3.3 Exponential Distribution:** Probability density function (p. d. f.) Nature of p. d. f., density curve, interpretation of a as rate and $1/a$ as mean, mean, variance, M. G. F., C. G. F., c. d. f., graph of c. d. f., lack of memory property, median, quartiles. Distribution of min(X, Y) with X, Y i. i. d. exponential r. v. s.

K. T. S. P. Mandal's
Hutatma   Rajguru Mahavidyalaya , Rajgurunagar
Department Of Statistics
Syllabus Completion Report
Academic Year 2022-23
Term II

Sr.No	Class	Paper	Name of Teacher
1	F.Y.B.Sc	Descriptive Statistics II	Thorat S.R.
2	F.Y.B.Sc	Discrete Probability Distributions	Thorat S.R.
3	S.Y.B.Sc	Test of Significance and Statistical Methods	Thorat S.R.
4	S.Y.B.Sc	Sampling Distributions and Exact Test	Thorat S.R.

Paper : Descriptive Statistics II.   **Class: F.Y.B.Sc**

Month	Topic	Subtopic
April 2023	1. Correlation	1.1 Bivariate data, Scatter diagram and interpretation. 1.2 Concept of correlation between two variables 1.3 Covariance between two variables (m11) : 1.4 Karl Pearson's coefficient of correlation (r) 1.5 Spearman's rank correlation coefficient: compute Karl Pearson's correlation coefficient between ranks.
May 2023	2. Fitting of Curve (Regression Line)	2.1 Concept of dependent and independent variables. 2.2 Identification of response and predictor variables and relation between them. 2.3 Simple linear regression model: $Y = a + b X + \varepsilon$ 2.4 Concept of residual, plot of residual, coefficient of determination

May 2023	3. Curve fitting	3.1 Necessity and importance of drawing second degree curve. 3.2 Fitting of second degree curve 3.3 Fitting of exponential Curve of the type $Y=ab^x$ and $Y=aX^b$
May 2023	4. Index Number	4.1 Introduction. 4.2 Definition and Meaning. 4.3 Problems/considerations in the construction of index numbers. 4.4 Simple and weighted price index 4.5 Simple and weighted price index 4.6 Laspeyre's, Paasche's and Fisher's Index numbers. 4.7 Consumer price index number (i) family budget method (ii) aggregate expenditure method. 4.3 Shifting of base, splicing, deflating, purchasing power. 4.4 Description of the BSE sensitivity and similar index numbers.

Paper : Discrete probability Distributions   Class:F.Y.B.Sc

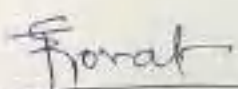| Month	Topic	Subtopic
April/ May 2023	**1. Some Standard Discrete Probability Distributions**	**1.1 Poisson distribution:** m.g.f. and c.g.f. Moments, mean, variance, skewness and kurtosis, Additive Property for Poisson distribution Conditional distribution of X given (X+Y) for Poisson distribution. **1.2 Geometric distribution:** Mean, variance, m.g.f. and c.g.f. Lack of memory Property.
May 2023	**2. Bivariate Discrete Probability Distribution**	2.1 Definition of two-dimensional discrete random variable, its joint p.m.f. and its distribution function and their properties 2.2 Concept of identically distributed random variables. 2.3 Computation of probabilities of events in bivariate probability distribution. 2.4 Concepts of marginal and conditional probability distributions. 2.5 Independence of two discrete random variables based on joint and marginal p.m.f.s
May 2023	**3.Mathematical Expectation (Bivariate Random Variable)**	3.1 Definition of raw and central moments, m.g.f, c.g.f. 3.2 Theorems on expectations .3.3 Conditional expectation. 3.4 Definitions of conditional mean and conditional variance. 3.5 Definition of covariance, coefficient of correlation, independence and uncorrelatedness of two variables. 3.6 Variance of linear combination of variables Var(aX + bY).Correlation coefficient

Paper : Test of Significance and Statistical Methods
Class: S.Y.B.Sc (Sem-IV)

Month	Topic	Subtopic
March 2023	**I) Tests of Hypothesis**	Statistics and parameters, statistical inference : problem of estimation and testing of hypothesis. Estimator and estimate. Unbiased estimator (definition and illustrations only). Statistical hypothesis, null and alternative hypothesis, Simple and composite hypothesis, one sided and two sided alternative hypothesis, critical region, type I error, type II error, power of the test, level of significance, p-value. Two sided confidence interval, finding probabilities of type I error and type II error when critical regions are specified . i) Test for population mean equal to specified value ii) Test of equality of two population mean iii) Test for population proportion equal to specified value. iv) Test for equality of two population proportions.
March/April 2023	**II) Multiple Linear Regression Model:**	Definition of multiple correlation coefficient $R_{Y.XX}$. Derivation of the expression for the multiple correlation coefficient. Properties of multiple correlation coefficient Interpretation of coefficient of multiple determination $_{12}$ Definition of partial correlation coefficient Fitting of regression plane of Y on X_1 and X_2 by the method of least squares; obtaining normal equations, solutions of normal equations Residuals : Definition, order, derivation of variance, properties. Definition and interpretation of partial regression coefficient**s** Properties of partial correlation coefficient:
May 2023	**III) Dempgraphy**	Vital events, vital statistics, methods of obtaining vital statistics, rates of vital events, sex ratios, dependency ratio. Death/Mortality rates: Crude death rate, specific (age,

		sex etc.) death rate, standardized death rate (direct and indirect), infant mortality rate. Fertility/Birth rate: Crude birth rate, general fertility rate, specific (age, sex etc.) fertility rates, total fertility rate. Growth/Reproduction rates : Gross reproduction rate, net reproduction rate. Interpretations of different rates, uses and applications. Trends in vital rates as revealed in the latest census.
April 2023	**IV) Queuing Model**	M/M/1: FIFO as an application of exponential distribution, Poisson distribution and geometric distribution : Inter arrival rate , service rate (μ), traffic intensity ,queue discipline probability distribution of number of customers in queue, average queue length, average waiting time in: i) queue, ii) system.

Paper : Sampling Distributions and Exact Test   **Class: S.Y.B.Sc (Sem-IV)**

Month	Topic	Subtopic
April 2023	**1. Gamma Distribution**	P.D.F , Nature of Probability curve , M.G.G,C.G.F, moments,Cumulants,Skewness,Kurtosis,Mode, Additive Property, Distribution of sum of i.i.d exponential variables.
April / May 2023	**2.Chi-square Distribution**	Definition of Chi-squarer. v. as sum of squares of i. i. d. standard $\overset{n}{}$normal variables Derivation of p. d. f. of with n degrees of freedom (d. f.) using M. G. F., nature of p. d. f. curve, computations of probabilities using tables of distribution. mean, variance, M. G. F., C. G. F., central moments, mode, additive property.
	3.Student's t-distribution	χ_n Definition of T r. v. with n d. f. Derivation of p. d. f., nature of probability curve, mean, variance, moments, mode, use of tables of t-distribution for calculation of probabilities, statement of normal approximation.
May 2023	**4.Snedecore's F-distribution:**	Definition of F r. v. with n_1 and n_2 d. f. Derivation of p. d. f., nature of probability curve, mean, variance, moments, mode. Distribution of 1/F use of tables of F-distribution for calculation of probabilities. Interrelations between Chi-Square , T and F distribution. Tests based on chi-square distribution: Test for independence of two attributes arranged in 2 X2 contingency table. (With Yates' correction)$_2$

	5.Test of Hypothesis:	Test for independence of two attributes arranged in r X s contingency table, McNemar's test
		Test for 'Goodness of Fit'. (Without rounding-off the expected frequencies).
		d) Test for population variance equal to specified value. when i) mean is known , ii) mean is unknown. Tests based on t-distribution:
		t-tests for population means : i) one sample and two sample tests for one sided and two sided alternatives. Confidence interval. Paired t-test for one-sided and two-sided alternatives.
		Test based on F-distribution: Test for equality of two population variance. when i) means are known, ii) means are unknown.

Prof. Thorat S.R.

F. Y. B. Sc. Zoology
Course Title: Animal Diversity –I
Course Code: ZO – 111

Sr.No	Month	Topics	Teacher
			DNB
1	Sept & Oct	**Principles of Classification:** Taxonomy & Systematics 1.1 **Taxonomy:** Basic terminology and Introduction •Alpha, Beta and Gamma levels of taxonomy, Micro-taxonomy •Macro taxonomy: Phenetics (numerical taxonomy, Cladistics (Phylogenetic systematics), Evolutionary taxonomy (evolutionary systematics) •Classical taxonomy and experimental or neo taxonomy (biochemical taxonomy and Cytotaxonomy) •Significance of Taxonomy 1.2 Systematics: definition introduction 1.3 Linnaean system of classification (Six level classification: Phyium, class, order, family, genus, species) 1.4 Concept of Species: Biological & Evolutionary 1.5 Introduction to Binomial Nomenclature. 1.6 Introduction to Five kingdom system	
			DNB
2	Oct	**General Features of kingdom Animalia:** 2.1 General characters of Kingdom Animalia, Grades of organization 2.2 Symmetry.	
			DNB
3	Nov	**Kingdom Protista (Phylum: Protozoa)** 3.1 Introduction to Phylum Protozoa 3.2 Salient features of Phylum Protozoa 3.3 Classification of Phylum Protozoa up to classes with two examples of each class (names only). Class Rhizopoda (e.g :Entamoebahistolytica, Arcella). Class Mastigophora (e.g: Euglena viridis, Trypanosomagambiense). Class Ciliata (e.gParamoeciumcaudatum, Opalinaranarum). Class Sporozoa (e.gPlasmodium vivax, Toxoplasmagondii) 3.4 Locomotion in Protozoa: Amoeboid, Ciliary and Flagellar with suitable examples 3.5 Type Study: Paramecium caudatum: Classification, Habit and Habitat, External morphology, Feeding and digestion, Excretion, Reproduction (binary fission and Conjugation) 3.6. Economic importance of Protozoa (three harmful and one useful protozoan) 3.6.1-Harmful Protozoa: Plasmodium vivax (malaria parasite), Entamoeba histolytica (Amoebic dysentery), Trypanoso magambiense (Gambian sleeping sickness). 3.6.2- Useful Protozoa: Trichonympha	
			DNB
4	Dec	**Origin of Metazoa :** 4.1 Introduction Origin and importance of Metazoa	

			DNB
5	Dec	Phylum :Porifera 5.1. Introduction to Phylum Porifera 5.2 Classification of Phylum Porifera up to classes with two examples of each class (names only, no description of specimens). Class Calcarea (e.g.: Leucosolenia, Sycon (Scypha) Class Hexactinellida (e.g: Euplectella (venus flower basket). Hyalonema (glass sponge)) Class Demospongiae (e.g: Chalina (Mermaid's gloves, Spongilla (fresh water sponge)) 5.3 Canal system in sponges: Ascon, Leucon and Rhagon type. 5.4 Skeleton in sponges: Spicules, its types: Microscleres&Megascleres, Monoaxon – monactinal, diactinal, Amphidiscs, Triaxon, Polyaxon, Spongin fibres. 5.5 Regeneration in sponges. 5.6 Economic importance of Phylum Porifera.	
6	Jan	Phylum: Cnidaria 6.1 Introduction to Phylum Cnidaria 6.2 Salient features of Phylum Cnidaria 6.3 Classification of Phylum Cnidaria up to class level with given examples each class (names of examples only) Class Hydrozoa e.g.: Hydra, Physalia (Portuguese man of war) Class Scyphozoae.g: Aurelia (Jelly fish), Leuchernaria (trumpet shaped Jellyfish) Class Anthozoa: e.g; Metridium (Common sea anemone0 6.4 Polymorphism in Hydrozoa: Polyps & Medusa (polyp types: gastrozooids, dactylozooids, gonozooids) and functions 6.5 Economic importance of Cnidarians with reference to Corals and Coral reefs.	DNB
7	Feb	Phylum :Platyhelminthes 7.1 Introduction to Phylum Platyhelminthes 7.2 Salient features of Phylum Platyhelminthes 7.3 Classification of Phylum Platyhelminthes up to classes with two examples each class (names of examples only). Class: Turbellaria (e.g: Dugesia, Bipallium) Class: Trematoda (e.g: Fasciola hepatica, sohistosomahaematobium) Class Cestoda: (Taeniasolium (pork tape worm),Echinococcusgranulosus (dog tapeworm) 7.4 Parasitic adaptations in Platyhelminthes: structural and physiological. 7.5 Economic importance of Platyhelminthes	DNB

As per above mention theory syllabus of Semester I completed successfully.

Prof. D. N.Birhade

F. Y. B. Sc. Zoology
Course Title: Animal Ecology
Course Code: ZO – 112

Sr.No	Month	Topics	Teacher
1	Sep	**Introduction to Ecology** 1.1 Concepts of Ecology, Environment, Population, Community, Ecosystem, Biosphere, Autecology and synecology.	PPS
2	Sep & Oct	**Ecosystem** 2.1 Types of ecosystems: Aquatic (Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert) 2.2 Structure and Composition of Ecosystem (Abiotic components and biotic components. 2.3 Food chain: Detritus and grazing food chains, Food web, Energy flow through the ecosystem, Ecological pyramids: Number, Biomass, and Energy. 2.4 concept of Eutrophication in lakes and rivers.	PPS
3	Oct	**Population** 3.1 Characteristic of population: Density, Natality, Mortality, Fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion. 3.2 Exponential and logistic growth, 3.3 Population regulation – density-dependent and independent factors. Population interactions, Gause's Principle with laboratory and field interactions, 3.4 Quadrate, line and belt transect methods.	PPS
4	Nov	**Community** 4.1 Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Eco tone and edge effect; Ecological succession with one example.	PPS
5	Nov	**Animal interactions** 5.1 Introduction to Animal interactions 5.2 Types of Animal interactions with at least to suitable examples of each 5.2.1-Competition: Interspecific and intraspecific 5.2.2- Beneficial Associations: Commensalism (remora fish on shark, Cattle egrets on livestock), Mutualism (Termite and Trichonympha, bees and flowers, cleaning symbiosis in fish by prawns. 5.3 Antagonistic associations: Parasitism (Ascaris and man, lice and humans), Prey predation (Lion and deer).	PPS

As per above mention 95% theory syllabus of Semester I completed and remaining will be complete in last week of November.

Prof.P.P. Shindekar

<center>

K.T. S. P. Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar.

Department of Zoology

Syllabus Completion Report

A.Y.-2022-2023(Semester II)

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F. Y. B. Sc.

Course Code: ZO-121

Animal Diversity II

Month	Title	Teacher Name
April	**Phylum Aschelminthes** 1.1 Introduction to phylum Aschelminthes 1.2 Salient features of Phylum Aschelminthes 1.3 Classification of Phylum Aschelminthes (Class Nematoda only with two examples – *Ascaris lumbricoides* (common round worm), *Wuchereria bancrofti* (Elephantiasis)). 1.4 Economic importance of class Nematoda.	DNB
April	**Phylum Annelida** 2.1 Introduction to Phylum Annelida 2.2 Salient features of Phylum Annelida. 2.3 Classification of Phylum Annelida up to classes with examples of following classes (names of examples only). Class Polychaeta (e.g: *Nereis pelagica* (neries/ sand worm, *Aphrodita aculeata* (=Aphrodite/ seamouse) Class Oligochaeta (e.g.: *Pheritima posthuma* (earthworm), Class Hirudinea (e.g: *Hirudinaria granulosa* common cattle leech) 2.4 Economic importance of Annelida with reference to earthworms as friends of farmers and in their role in vermicomposting.	DNB
April & May	**Phylum Arthropoda** 3.1 Introduction to Phylum Arthropoda 3.2 Salient features of Phylum Arthropoda 3.3 Classification of Phylum Arthropoda with specific classes and mentioned examples (names only) Class:Crustacea:*Palaemon palaemon* (Prawn) *Brachyura* spp. crabs) Class: Chilopoda: *Scolopendra* sp. (centipede) Class: Diplopoda: *Julus* sp. (millipede) Class Insecta: *Periplaneta omericana* (American Cockroach), *Anopheles stephensii* (mosquito).	DNB

	Class: Arachnida- Spiders, *Buthus sp* (scorpion) 3.4 mouth parts in insects: Mandibulate (cockroach), Piercing and sucking (female Anopheles mosquito). chewing and lapping type (honey bee) 3.5 Economic importance of Arthropoda Useful Insects: Honey bee, Lac insect, Silkworm. Harmful insects: Female Anopheles mosquito, Red cotton bug, Rice weevil	DNB
May	**Phylum Mollusca** 4.1 Introduction to Phylum Mollusca 4.2 Salient features of Phylum Mollusca 4.3 Classification of Phylum Mollusca with specific classes and mentioned examples (names only) Class Gastropoda e.g *Pila globosa* (apple snail) Class Pelecypoda e.g *Lamellidens marginalis*(Bivalve) Class Polyplacophora e.g *Chiton* Class: Cephalopodae.g: *Octopus vulgaris* (common octopus), *Sepia officinalis* (common Cuttle fish) 4.4 Economic importance of Mollusca.	DNB
May	**Study of Phylum Echinodermata** 5.1 Introduction to Phylum Echinodermata 5.2 Salient features of Phylum Echinodermata. 5.3 Classification of Phylum Echinodermata with specific classes and mentioned examples (names only) • Class Asteroidea (*Asterias rubens* sea stars or starfish) • Class: Holothuroidea. *Holothuria sp.* sea cucumbers) • Class: Echinoidea *(Echinus esculentis* common sea urchins) • Class: Crinoidea (sea lilies or feather stars) 5.4 Type study: *Asteriasruhens* (Sea Star): Classification, Habit Habitat, External Morphology, Digestive system, Water vascular System and autotomy and regeneration 5.5 Pedicillaria in Echinodermata: straight, crossed, valvate, tridactylous, globigerous. 5.6 Economic importance of Echinidermata.	

As per mention above 80% Syllabus is completed. Remaining Syllabus will be complete in Last week of May.

K.T. S. P. Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar.

Department of Zoology

Syllabus Completion Report

A.Y.2022-2023(Semester II)

Course Title: Cell biology
Course Code: ZO-122
Semester II

Month	Title	Teacher Name
March	**Introduction:** 1.1 Introduction cell biology, 1.2 Cell as basic unit of life. 1.3 Importance of Cell Biology and its applications in industry. **Overview of Cells** 1.3 Introduction to Prokaryotic and Eukaryotic cells. 1.4 Structure and function of Prokaryotic *(E. coli)* 1.5 Structure and function of Eukaryotic cells (Animal and Plant Cell)	PPS
April	**Techniques in Cell Biology:** 3.1 Introduction 3.2 Microscopy: Basic Principle, Simple, Compound and applications of Electron Microscope. 3.3 Stains and dyes: Types of Stain: Acidic, basic and neutral. Dye (Preparation and chemistry of dyes not expected) 3.4 Micrometry.	PPS
April	**Plasma Membrane:** 4.1Introduction 4.2 Structure of plasma membrane: Fluid mosaic model. 4.3Transport across membranes: Active and Passive transport, Facilitated transport, exocytosis, endocytosis, phagocytosis – vesicles and their importance in transport. 4.4 Other functions of Cell membrane in brief Protection, cell recognition, shape, storage, cell signalling. 4.5 Cell Junctions: Tight junctions, gap junctions, Desmosomes.	PPS

April & May	**Nucleus: Structure and function** 5.1 Introduction to Nucleus 5.2 Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleoplasm, Nucleolus 5.3 Chromatin: Eu-chromatin and Hetro-chromatin, nature and differences. 5.4 Functions of nucleus apparatus, Lysosomes and vacuoles.	PPS
May	**Endomembrane System** 6.1 Introduction 6.2 Structure, location and Functions: Endoplasmic Reticulum, Golgi **Mitochondria and Peroxisomes** 7.1 Introduction 7.2 Mitochondria: ultrastructure and function of mitochondrion.	PPS
May	7.3 Peroxisomes **Cell Division** 7.1 Introduction 7.2 Cell cycle (G1, S, G2, M phases), 7.3 Mitosis. 7.4 Meiosis.	PPS

As per mention above 70% Syllabus is completed. Remaining Syllabus will be complete up to Last week of May.

Syllabus completion Report (A.Y.2022 – 2023)

S.Y. B. Sc. (Zoology)
Course Title: Animal Diversity - III
Course Code: ZO – 231

Sr.No	Month	Topics	Teacher
1	Sep	**1. Introduction to Phylum Chordata –** 1.1 Origin & Ancestry of Chordates. 1.2 Comparative account of fundamental characters of Chordates with Non Chordates. 1.3 Salient features of Phylum Chordata. 1.4 Classification of Phylum Chordata upto classes – Pisces, Amphibia, Reptilia, Aves, Mammalia.	DNB
2	Sep	**2. Introduction to Group – Protochordata.** 2.1 Salient features of Protochordata. 2.2 Salient features of subphylumswith two example each - Names only. Hemichordata – *Balanoglossus* and *Rhabdopleura*, Urochordata - *Herdmania* and *Salpa*, Cephalochordata – *Branchiostoma* (Amphioxus) and *Asymmetron*.	DNB
3	Oct	**3. Introduction to subphylum – Vertebrata** 3.1 Salient features of Vertebrata. 3.2 Introduction and General characters of sections with two examples - Names only. Agnatha–*Petromyzon* & *Myxine*&Gnathostomata–Frog & *Labeo*	DNB
4	Oct	**4. Introduction to Class – Pisces** 4.1 Salient features of Class – Pisces. 4.2 Introductaionand Salient features of sections with two examples - Names only. Class – Chondrichthyes–*Scoliodon*and *Chimaera* & Osteichthyes – *Labeo* and *Catla* 4.3 Types of Scales in Fishes. 4.4 Types of Fins in Fishes.	DNB

5	Nov	**5. Introduction to Class – Amphibia** 5.1 Salient features of Class – Amphibia. 5.2 Introduction to order – Apoda–*Ichthyophis*, Urodela–*Salamandra*(Salamander) & Annura - *Rana*. 5.3 Parental care in Amphibia.	DNB
6	Nov	**6. Study of *Scoliodon*** *Scoliodon* – 6.1 - Systematic position, Geographical distribution, Habit, Habitat 6.2 - External characters 6.3 - Digestive System, Food and feeding mechanism. 6.4 - Respiratory System – Structure of Holobranch only. 6.5- External & Internal Structure of heart, Working of heart. 6.6 - Nervous System – Brain only. 03 6.7 - Male urinogenital system & Female reproductive System. 6.8- Yolk sac placenta.	DNB

As per above mention 95% theory syllabus of Semester I completed and remaining will be complete in last week of November.

Prof. D. N. Birhade

S. Y. B. Sc.

Course Title: Animal Diversity - IV

Course Code: ZO – 241

Month	Title	Teacher Name
March & April	**Introduction to class –Reptilia** 1.1 Salient features of class Reptilia with one example (name only) – *Chelone, Calotes.* 1.2 Venomous and Non-venomous snakes – Cobra, Russell's viper, Rat snake, Grass snake. 1.3 Snake venom, symptoms, effect and cure of snake bite. first aid treatment of snakebite. 1.4 Desert adaptations in reptiles in brief.	DNB
April	**Introduction to class –Aves** 2.1 Salient features of class Aves with two examples (names only) – Sparrow, Parrot. 2.2 Flight adaptations in birds. 2.3 Types of Beaks and feet in birds. 2.4 Migration in birds – Altitudinal, Latitudinal	DNB
May	**3. Introduction to class - Mammalia.** 3.1 Salient features of class Mammalia with two examples (names only) – Rat, Rabbit. 3.2 Egg laying mammals. 3.3 Aquatic adaptations in mammals. 3.4 Flying adaptations in mammals. 3.5 Cursorial and fossorial adaptation in mammals	DNB
May	**4. Study of Rat** 4.1 Systematic position, habit and habitat. 4.2 External characters. 4.3 Digestive system, food and feeding. 4.4 Respiratory system. 4.5 Blood vascular system – Structure of Heart. 4.6 Nervous system – Central Nervous system only. 4.7 Sense organs – Structure and functions of Eye & Ear. 4.8 Reproductive system	DNB

As per mention above 80% Syllabus is completed. Remaining Syllabus will be complete in Last week of May.

Course Title - Applied Zoology II
Course Code - ZO-242

Month	Title	Teacher Name
March & April	**Apiculture:** 1.1 An introduction to Apiculture, Systematic position, Study of habit, habitat and nesting behaviour of *Apisdorsata*, *Apisindica*, *Apis florae* and *Apismellifera*. 1.2 Life cycle, Colony organization and Division of labour. 1.3 Bee behaviour and communication (Round Dance and Wag-Tail Dance). 1.4 Bee keeping equipments : a) Bee box (Langstroth type), b) Honey extractor, c) Smoker, d) Bee-veil, e) Gloves, f) Hive tool, g) Bee Brush, h) Queen excluder	SVT
April	1.5 Bee keeping and seasonal management. 1.6 Bee products (composition and uses) : a) Honey, b) Wax, c) Bee Venom, d) Propolis, e) Royal jelly, f) Pollen. 1.7 Diseases and enemies of Bees : a) Bee diseases - Protozoan (Nosema), Bacterial (American foul brood), Viral (Sac brood), Fungal (Chalk brood). b) Bee pests - Wax moth (Greater and Lesser), Wax beetle. c) Bee predators - GreenBee eater, King crow, Wasp, Lizard. 1.8 Bee pollination and management of bee colonies for pollination.	SVT
May	**2. Fisheries :** 2.2 An introduction to fisheries and its types (in brief) : Freshwater fisheries, Marine fisheries, Brackish water fisheries. 2.3 Habit, habitat and culture methods of following freshwater forms : a) Rohu (*Labeo rohita*) , b) Catla (*Catla catla*) ,	SVT

Syllabus completion Report (A.Y.2022 – 2023)

T. Y. B. Sc. Zoology

Course Code: ZO – 353

Course Title: Biological chemistry

Sr. no.	Month	Topics	Teacher
1.	Sep	**Introduction of Biochemistry:** Importance of Biochemistry in Life Sciences.	PPS
2.	Sep	**pH and Buffers:** 2.1 Concept of pH. 2.2 Concept of pH scale, biological significance of p H 2.3 Concept of acid and base, Ionization of acids and bases. 2.4 Derivation of Henderson-Hassel Balch equation & its applications. 2.5 Buffer - Definition, Concept, Functions, Types of buffer and Buffering Capacity.	PPS
3.	Oct	**Carbohydrates:** 3.1 Definition, Classification & Biological importance of Carbohydrates. 3.2 Isomerism in carbohydrates - Structural and Stereoisomerism. 3.4 Significance of Gluconeogenesis, Glycogenolysis and Glycogenesis. 3.3 Clinical Significance - Hypoglycemia and Hyperglycemia.	PPS
4.	Oct	**Amino acids and Proteins:** 4.1 General Structure of amino acids and Peptide bond. 4.2 Essential and non-essential amino acids. 4.3 Types of proteins, protein structures (primary, secondary, tertiary and quaternary structures with suitable example). Forces responsible for their stability. 4.4 Biological importance of proteins – Biocatalysts, Carrier proteins Contractile proteins, Hormonal role of proteins.	PPS
5.	Nov	**Enzymes:** 5.1 Nomenclature, Types and properties of enzymes. 5.2 Regulatory and non-regulatory enzymes. 5.3 Enzyme inhibition. 5.4 Factors influencing enzyme activity (pH, temperature, substrate concentration). 5.5 Introduction of isoenzymes and cofactor. 5.6 Clinical significance of enzymes - PKU and AKU.	PPS
6.	Nov	**Lipids:** 6.1 Introduction.	PPS

| | | 6.2. Fatty acids - Types and nomenclature (saturated and unsaturated). 6.3 Clinical significance (obesity, atherosclerosis, myocardial infarction). 6.4 Biological importance of lipids. | |

As per above mention 95% theory syllabus of Semester I completed and remainning will be complete in last week of November.

Prof. P. P. Shindekar

T. Y. B. Sc. (Zoology)

Course Title: Genetics
Course code: ZO 354

Sr.No	Month	Topics	Teacher
1	Oct	**1. Introduction to genetics:** 1.1 Classical and Modern concept of Gene, Cistron, Muton, Recon. 1.2 Mendel's laws of Inheritance.	DNB
2	Oct	**2 Exceptions to Mendelian Inheritance:** 2.1 Incomplete dominance. 2.2 Co-dominance. 2.3 Multiple alleles: Concept, characteristics and importance of multiple. alleles, ABO & Rh - blood group system and its medico legal importance. 2.4 Lethal alleles.	DNB
3	Oct & Nov	**3. Gene Mutation:** 3.1 Definition. 3.2 Types of mutations: spontaneous, induced, somatic, gametic, forward, reverse. Types of point mutation - deletion, insertion, substitution, transversion, transition. 3.3 Mutagenic agents a) UV radiation and ionising radiation. b) Base analogs, alkylating and intercalating agents.	DNB
4	Nov	**4. Sex-determination:** 4.1 Introduction. 4.2 Types of sex determination: -XX-XY, ZZ-ZW, XX-XO and Parthenogenesis, Hypodiploidy. 4.3 Gynandromorphism.	DNB
5	Nov	**5. Population Genetics:** 5.1 Basic Concepts in population genetics: Mendelian population, gene pool, gene / allele, Frequency, chance mating (Panmictic mating). 5.2 Hardy Weinberg law and its equilibrium.	DNB
7	Nov	**7. Sex linked inheritance in human:** 7.1 Colour – blindness. 7.2 Haemophilia. 7.3 Hypertrichosis.	DNB

8	Nov	8. Application of genetics: 8.1 Genetic counselling. 8.2 Diagnostics & breeding technology.	DNB

As per above mention 95% theory syllabus of Semester I completed and remaining will be complete in last week of November.

Prof. D. N. Birhade

T.Y. B. Sc. (Zoology)
Course Title: Developmental Biology
Course code: ZO 355

Sr. No	Month	Topics	Teacher
1	Oct	**1. Fundamentals of Developmental Biology:** 1.1 Definition and scope. 1.2 Concepts in Developmental Biology: Growth. Differentiation, Dedifferentiation, Cell determination, Cell communication, Morphogenesis, Induction and Regeneration.	DRB
2	Nov	**2. Theories of Developmental Biology:** 2.1 Preformation. 2.2 Pangenesis. 2.3 Epigenesis. 2.4 Axial gradient. 2.5 Germplasm.	DRB
3	Nov	**3. Gametogenesis:** 3.1 Spermatogenesis & Structure of sperm with respect to human. 3.2 Oogenesis & Structure of ovum with respect to human. 3.3 Types of eggs.	DRB
4	Dec	**4. Fertilization:** 4.1 Concept and types. 4.2 Chemotaxis. 4.3 Sperm penetration: Acrosome reaction, Capacitation & Decapacitation. 4.4 Activation of ovum: Fertilization cone. 4.5 Prevention of polyspermy: Fast block & Slow block. 4.6 Significance of fertilization.	DRB
5	Dec	**5. Cleavage and Blastula:** 5.1 Planes and symmetry of cleavage. 5.2 Types of cleavage. 5.3 Significance of cleavage. 5.4 Definition and types of Blastula.	DRB
6	Jan	**6. Gastrulation:** 6.1 Definition and Concept. 6.2 Basic cell movements in gastrulation: Epiboly, Emboly, Convergence, Invagination, Ingression & Involution with reference to frog. 6.3 Concept of Organizer : Primary, Secondary and Tertiary.	DRB

7	Jan & Feb	7. Chick Embryology: 7.1 Structure of Hen's egg. 7.2 Fertilization and cleavage in Chick. 7.3 Formation of primitive endoderm. 7.4 Primitive streak development. 7.5 Head process and regression of Primitive streak.	DRB

As per above mention theory syllabus of Semester I completed successfully.

Prof. D.R. Borhade

Syllabus completion Report (A.Y.2022 – 2023)

T. Y. B. Sc. Zoology
Course Code: ZO – 356
Course Title: Parasitology

Sr. No.	Month	Topic	Teacher
1.	Oct	**1. Introduction, Scope and Branches of Parasitology:** 1.1. Definition: host, parasite, vector, commensalisms, mutualism and parasitism. 1.2. Branches of parasitology	PPS
2.	Oct	**2. Types of Parasites and Hosts:** 2.1 Ectoparasites 2.2 Endoparasites and its subtypes. 2.3 Types of hosts - Intermediate, definitive, paratenic and reservoir.	PPS
3.	Oct	**3. Host - Parasite relationship:** 3.1 Host specificity. 3.2 Types of host specificity: structural specificity, physiological specificity and ecological specificity. 3.3 Effects of parasite on host.	PPS
4.	Oct & Nov	**4. Study of Parasitic Protists:** 4.1 Entamoeba histolytica - Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment. 4.2 Plasmodium vivax - Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment.	PPS
5.	Dec & Feb	**5. Study of Parasitic worms:** 5.1 Ascaris lumbricoides - Study of Morphology, Life Cycle, and Prevalence. 5.2 Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment. 5.3 Taenia solium (Tapeworm) - Study of Morphology. Life Cycle, Prevalence, Epidemiology, Pathogenicity. Diagnosis, Prophylaxis and Treatment.	PPS

6.	Jan	6. **Study of Parasitic Arthropoda:** Morphology, pathogenicity and control measures of – 6.1 Soft tick. 6.2 Head louse. 6.3 Rat flea. 6.4 Bed bug.	PPS

As per above mention theory syllabus of Semester I completed successfully.

Prof. P. P. shindekar

T. Y. B. Sc.

Course Title: Molecular Biology

Course Code: ZO-363:

Month	Title	Teacher Name
Feb 2023	1. Nucleic Acids and Chromatin: 1.1 Structure of RNA & DNA. 1.2 Types of RNA. 1.3 DNA as genetic material - evidences (Griffith's, Avery et al., Hershey and Chase experiment), RNA as genetic material - TMV 4. 1.4 Structure of Chromatin, packaging of DNA, Heterochromatin, Euchromatin..	PPS
March 2023	2. Central Dogma of Molecular Biology: 2.1 DNA Replication - Semiconservative (Messelson and Stahl experiment), Basic mechanism of replication in prokaryotes and eukaryotes. 2.2 Transcription - 2.2.1 Basic mechanism of transcription in prokaryotes and eukaryotes, RNA polymerase enzyme in prokaryotes. 2.2.2 RNA modifications and processing (splicing - mRNA, modifications at 3'and 5' end). 2.3 Translation - Genetic code, properties of genetic code, Basic mechanism of Translation in E. coli and eukaryotic cells.	PPS
April	3. Lac operon:	PPS
May	4. DNA repair mechanism: Photo repair, dark repair, base excision repair.	PPS
May	5. Recombinant DNA Technology: Introduction, restriction enzymes, cloning vector, PCR (polymerase chain reaction), DNA finger printing.	PPS

As per mention above 80% syllabus is completed and remaining will be complete in last week of May.

Prof. Shndekar P. P.

T.Y.B.Sc

Course Title: Techniques in Biology

Course Code: ZO 365

Semester: VI

Month	Title	Teacher Name
Feb	**1. Microscopy:** 1.1 Definitions - Resolving Power, Limit of Resolution and Magnification, Numerical Aperture. 1.2 Basic principle of microscopes - Light, Fluorescence, Phase Contrast, Stereo Microscope, SEM and TEM.	PPS
March	**2. Microtomy: Tissue fixation and Processing** 2.1 Methods of tissue fixation: Chemical fixation and physical fixation. 2.2 Procurement of tissue and importance of fixation of tissues. 2.3 Dehydration, clearing, impregnation, embedding and block making. 2.4 Types of microtomes. 2.5 Section cutting: steps and precautions, common faults in section cutting, reasons & remedies. 2.6 Mounting and spreading of ribbons. 2.7 General procedure for staining of sections. 2.8 Demonstration of Nucleic acid (Feulgen Reaction).	PPS
April	**3. Haematological Techniques:** 3.1 Total count of RBCs, WBCs and Differential count of WBCs and their significance. 3.2 Bleeding time, clotting time and their significance.	PPS
April	**4. Immunological Techniques:** 4.1 Antigen-Antibody Interactions – Immunodiffusion. 4.2 Principle & Working of ELISA. 4.3 Raising Monoclonal Antibodies. 4.4 Application of Immunological techniques in disease diagnosis.	PPS
April	**5. Types of PCR & DNA Barcoding**	PPS
May	**6. Methods in Biodiversity:** 6.1 Introduction to sampling and sample size. 6.2 Biodiversity Indices – Species richness, Simpson Diversity Index, Shannon Diversity Index.	PPS

	6.3 Measuring Biodiversity- Quadrat sampling, Transect sampling. Insect survey - Active (sweep netting, aquatic nets) and Passive methodology (Pit fall traps, Light traps).	
May	**7. Instruments in Field Biology:** 7.1 Binoculars, GPS, Basic digital camera techniques: Camera lens - prime and kit lens, Aperture mode, Shutter mode, Megapixels. Telephoto lens, macro lens. 7.2 Adapters for camera and microscopes, Mobile's camera.	PPS
May	**8. Laboratory techniques:** 8.1 Microphotographic techniques - CCD and CMOS camera. digital camera. 8.2 Software for image analysis - Image J and GIMP.	PPS

As per mention above 75% syllabus is completed and remaining will be complete in last week of May.

Prof. Shindekar P.P.

ZO 361 - Medical & Forensic Zoology

Month	Title	Teacher Name
March	**1. Introduction to medical zoology and its importance :** **2. Medico-legal Autopsy:** 2.1 Death and its Causes- External examination of deceased body – Internal Examination - Determination of time since death and cause of death. 2.2 Injuries – Classification - Medico-legal aspects of injuries. 2.3 Post-mortem changes - collection of post-mortem samples and Preservation. **3. Urine Analysis:** 3.1 Physical characteristics, abnormal constituents, renal failure, renal calculi, dialysis.	DNB
April	**4. Non infectious Diseases:** 4.1 Causes, Types, Symptoms, Complications, Diagnosis and Prevention of Diabetes (Type I and II), Hypertension, Hypotension, Obesity, Atherosclerosis, Myocardial Infraction. **5. Infectious Diseases:** 5.1 Causes, Types, Symptoms, Complications, Diagnosis and Prevention of Tuberculosis and Hepatitis.	DNB
April	**6. Introduction to Forensic Zoology:** 6.1 Definition, Scope and Application of Forensic Zoology. 6.2 Forensic Laboratories in India. 6.3 Basic Principles of Forensic Science with Examples. **7. Forensic Medicine:** 7.1 Introduction to Forensic Medicine: Definitions of Forensic Medicine. 7.2 Medical Jurisprudence. 7.3 Medical evidence documentations.	DNB
May	Forensic Analysis: 8.1 Examination of Biological Materials: Examination of Hair, Fibres, Diatoms, plants materials, human tissues. 8.2 Examination of Body Fluid: Blood, Semen and Saliva. 8.3 Forensic Importance of Insects: Insects of forensic importance - indicators of time of death stages of insect development & comparative decomposition of human body - colonization - Evidence collection of insects – Territorial & Aquatic Insects. 8.4 DNA Fingerprint Technique and Examination of Biological Traces: Liquid blood, blood stains, & swabs, semen, Seminal stains. tissues. Bones, Hairs, Teeth, Saliva, Skeletal remains. 8.5 Toxicological Investigations: Poisons – Definition, Forms of Poison –	DNB

| | Physical, Chemical & Mechanical state. Introduction with examples of – Neurotoxic Poisons – Cerebral & Spinal, Cardiovascular Poisons, Asphyxiants, Miscellaneous poisons – Pesticides, Pharmaceutical drugs. Petroleum poisons, Food poisons, Radioactive poisons. | |

As per mention above 80% Syllabus is completed. Remaining Syllabus will be complete in Last week of May.

Syllabus completion Report
(A.Y. 2021 – 2022)
T. Y. B. Sc. Zoology
ZO – 3611 Project

Students have successfully completed the research project in the stipulated time and present the dissertation at the time of the examination in a proper format. Students were encouraged from laboratory work, hands-on practical investigation and design experimental setup. Field work to be carried out under proper supervision and permissions from the concerned authorities.

Possible key aspects of the project work -

1. Planning the project

2. Selecting a suitable title

3. Significance of the work

4. Hypothesis, Objectives

5. Reviewing the available literature

6. Methodology to be used

7. Outcomes of the Project work

8. Conclusion and Discussion

9. Future plans

Future Plan:

All the students Research projects will be publish in UGC care list Research Journal having impact factor.

K.T. S. P. Mandal's

Hutatma Rajguru Mahavidyalaya, Rajgurunagar.

Department of Zoology

Syllabus Completion report

A.Y.-2022-2023   (Semester VI)

T.Y. B. Sc.

Course Title: Animal Physiology

Course Code: ZO-362

Month	Title	Teacher Name
Feb 2023	1.Nutrition and digestion: 1.1 Nutritional requirement & balanced diet. 1.2 Digestion and absorption of carbohydrates, proteins and lipids. 1.3 Vitamins - outline of fat soluble and water-soluble vitamins: Sources, deficiency and diseases.	SSN
March 2023	2.Respiration: 2.1 Mechanism of respiration: Regulation of ventilation in lungs, exchange of gases at respiratory surface. 2.2 Respiratory pigments in animals: Haemoglobin, Hemocyanin, Hemerythrin, Chlorocruorin. 2.3 Transport of gases : O2 and CO2 transport. 3.Circulation: 3.1 Blood: Definition and its constituents, functions of blood. 3.2 Heart: Structure of human heart, Pace maker, Cardiac Cycle. 3.3 Origin and conduction of heart beat.	SSN
April 2023	4. Excretion: 4.1 Structure of Uriniferous tubule. 4.2 Mechanism of urine formation. 4.3 Normal and abnormal constituents of urine, Elementary idea of dialysis.	SSN
April 2023	5.Muscles: 5.1 Structure of smooth, skeletal and cardiac muscles. 5.2 Mechanism of muscle contraction by Sliding filament theory.	SSN
May 2023	6.Reproduction and Endocrine Glands: 6.1 Physiology of male reproduction, hormonal control of spermatogenesis. 6.2 Physiology of female reproduction, hormonal control of menstrual cycle.Structure and functions of pituitary, thyroid, parathyroid, pancreas and adrenal glands.	SSN

As per mention above 90% syllabus is completed and remaining will be complete in Last Week of May.

T.Y.B.Sc

Course Title: Evolutionary Biology

Course Code: ZO 366

Semester: VI

Month	Title	Teacher Name
Feb 2023	1.Introduction: 1.1 Concept of Evolution. 1.2 Origin of life. 1.3 Origin of eukaryotic cell (Origin of mitochondria, plastids & symbionts). 2. Evidences of Evolution: 2.1 Analogy and Homology. 2.2 Embryological Evidences of Evolution. 2.3 Evolutionary & Paleontological Evidences.	SSN
March 2023	3. Historical Review of Evolutionary Concept: 3.1 Theories of Evolution. 3.2 Lamarckism. 3.3 Darwinism and Neo Darwinism. 3.4 Mutation Theory. 3.5 Modern Synthetic theory. 4. Sources of Variations: 4.1 Variation and Mutations.	SSN
March 2023	5. Isolation	SSN
April 2023	6.Speciation: 6.1 Types of speciation (Allopatric & Sympatric). 6.2 Mechanism of speciation. 6.3 Patterns of speciation. 6.4 Factors influencing speciation.	SSN
April 2023	7.Population Genetics: 7.1 Hardy-Weinberg Law & Genetic Drift. 7.2 Types of Natural Selection.	SSN
April 2022	8.Origin of Man: 8.1 Evolution of Man (Evolution of anthropoids including man) - Kenyapithecus to Homo sapiens.	SSN
May 2023	9.Zoogeographical Realms With reference to fauna:	SSN
May 2023	10.Extinctions: 10.1 Extinction - An Overview.	SSN

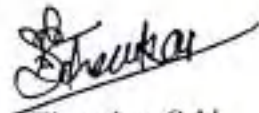As per mention above 90% syllabus is completed and remaining will be complete in Last Week of May.

Syllabus completion Report (A.Y. 2022 – 2023)

T. Y. B. Sc. Zoology

ZO- 364 Entomology

Sr. No	Month	Topic	Professor
1	March	**1. Fundamentals of Entomology** 1.1 Definition and scope of Entomology. 1.2 General Classification of Insects. 1.3 General Characters of Insects.	SVT
2	March	**2. Insect Morphology:** 2.1 Insect Integument and its derivatives. 2.2 Insect Head, Head Orientations, Head articulations, Insect antennae and Mouth parts. 2.3 Insect Thorax, Insect Wing and modifications, Insect Leg and Modifications – a) Cursorial – Cockroach, b) Fossorial – Mole cricket, c) Saltorial – Grasshopper, d) Raptorial – Praying mantis, e) Pollen basket – Honey bee. 2.4 Insect Abdomen, Genital and Pre – genital appendages of Grasshopper.	SVT
3	April	**3. Insect Anatomy (Grasshopper):** 3.1 Digestive System. 3.2 Circulatory System. 3.3 Nervous System. 3.4 Respiratory System. 3.5 Reproductive System.	SVT
4	April	**4. Insect Ecology:** 4.1 Definition of Insect Ecology.	SVT

		4.2 Abiotic Factors (Photoperiod, Temperature and Humidity) and Biotic Factors (Food, Foraging and Nesting). 4.3 Mimicry in insects with suitable examples.	
5	April	**5. Insect Metamorphosis:** 5.1 Definition. 5.2 Types and examples of Metamorphosis.	SVT
6	April	**6. Insects as social groups:** 6.1 Definition & significance of Eusociality, Intraspecific and Interspecific relationships among insects. 6.2 Social organization in Wasps and Termites.	SVT
7	May	**7. Economic Importance of Insects:** 7.1 Insects in Research. 7.2 Insects in Medicines and Cosmetics. 7.3 Insects as Vectors. 7.4 Insects as food.	SVT

As per above mention SPPU T.Y.B.Sc Zoology theory syllabus of Semester II completed successfully.

Prof. Dr. Theurkar S.V.

Department of Zoology

Syllabus completion Report (A.Y. 2022 – 2023)
T. Y. B. Sc. Zoology
ZO – 3610 Environmental Impact Assessment

Sr. No	Month	Topic	Professor
1	April	1. Environment: 1.1 Definition. 1.2 Divisions. 1.3 Importance.	SVT
2	April	2. Pollution: 2.1 Definition and types. 2.2 Impact on wildlife, natural resources, development	SVT
3	May	3. Sustainable development: 3.1 Definition and need. 3.2 Exploitation of natural resources. 3.3 Concept of carrying capacity. 3.4 Three pillars of Sustainability. 3.5 UN 17 Sustainable Development Goals (SDGs)	SVT
4	May	4. Overview of Environmental Protection acts: 4.1 The Air (Prevention and Control of Pollution) Act 1981. 4.2 The Water (Prevention and Control of Pollution) Act 1974. 4.3 The Environment Protection Act 1986. 4.4 The National Green Tribunal Act 2010. 4.5 Biological Diversity Act 2002	SVT

5	May	**5. Environmental Impact Assessment (EIA):** 5.1 Definition, need and importance of EIA. 5.2 EIA notification 2006 - key elements, History and Evolution of EIA. 5.3 Categories of Industries / establishments requiring EIA, Types of EIA - strategic EIA, regional EIA, sectoral EIA. project level EIA and life cycle assessment. 5.4 Rapid and comprehensive EIA	SVT
6	May	**6. EIA Process:** 6.1 Screening, Scoping and consideration of alternatives. 6.2 Baseline data collection, Impact analysis, Mitigation, Reporting, Public hearing. 6.3 Review of EIA. 6.4 Decision-making, monitoring clearance conditions	SVT
7	June	**7. Stakeholders in EIA process:** 7.1 Project proponent, Environmental consultant. 7.2 CPCB / MPCB. 7.3 Public, EIA agency (IAA).	SVT
8	June	**8. Overview of Scheme for Accreditation of EIA Consultant Organizations (NABET / QCI):** 8.1 Eligibility and benefits. 8.2 EIA coordinator (EC), Functional area experts (FAEs). 8.3 Functional area associate (FAA) and team members: Role, educational qualification, experience and functions.	SVT

As per above mention SPPU T.Y.B.Sc Zoology theory syllabus of Semester II completed successfully.

Syllabus completion Report
(A.Y. 2021 - 2022)
T. Y. B. Sc. Zoology
ZO – 3611 Project

Students have successfully completed the research project in the stipulated time and present the dissertation at the time of the examination in a proper format. Students were encouraged from laboratory work, hands-on practical Investigation and design experimental setup. Field work to be carried out under proper supervision and permissions from the concerned authorities.

Possible key aspects of the project work -

1. **Planning the project**
2. **Selecting a suitable title**
3. **Significance of the work**
4. **Hypothesis, Objectives**
5. **Reviewing the available literature**
6. **Methodology to be used**
7. **Outcomes of the Project work**
8. **Conclusion and Discussion**
9. **Future plans**

Future Plau:

All the students Research projects will be publish in UGC care list Research Journal having Impact factor.

Class: F.Y.B.Sc. (Computer Science) Div:A

Subject Name- Paper I (CS-101): Problem Solving Concept Using Computer and 'C'

Programing -I

Subject Teacher- Prof. S.A.Randive **Syllabus Completed: 100%**
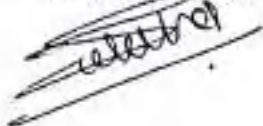
Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	July/August	Chapter 1 . Problem Solving Aspects 1.1. Introduction to problem solving using computers. 1.2. Problem solving steps. 1.3 Algorithms-definition, characteristics , examples ,advantages and limitations. 1.4 Flowcharts - definition, notations , examples , advantages and limitations, Comparison with algorithms. 1.5 Pseudo codes - notations, examples, advantages and limitations. 1.6 Programming Languages as tools, programming paradigms, types of languages 1.7 Converting pseudo-code to programs. 1.8 Compliation process (compilers , interpreters), linking and loading, syntax and semantic errors, testing a program 1.9 Good	05	09

		Programming Practices (naming conventions , documentation, indentation).		
2	August/ September	**Chapter2 'C' Fundamentals** 2.1 History of 'C' language. 2.2 Application areas. 2.2 Structure of a 'C' program. 2.3 'C' Program development life cycle. 2.4 Function as building blocks. 2.5 'C' tokens 2.6 Character set, Keywords , Identifiers 2.7 Variables, Constants (character, integer, float, string, escape sequences, enumeration constant). 2.8 Data Types (Built-in and user defined data types). 2.9 Operators, Expressions, types of operators, Operator precedence and Order of evaluation. 2.10 Character input and output. 2.11 String input and output. 2.12 Formatted input and output	07	14
3	September	**Chapter 3 Control Structures** 3.1 Decision making structures:- if ,if-else, switch and conditional operator. 3.2 Loop control structures:- while ,do while, for. 3.3 Use of break and continue. 3.4 Nested structures. 3.5 Unconditional branching	06	13

4	October	(goto statement) **Chapter 4** Functions 4.1 Concept of function, Advantages of Modular design. 4.2 Standard library functions. 4.3 User defined functions:- declaration , definition, function call, parameter passing (by value), return statement. 4.4 Recursive functions. 4.5 Scope of variables and Storage classes.	06	06
5	November	**Chapter 5** Arrays 5.1 Concept of array. 5.2 Types of Arrays – One , Two and Multidimensional array. 5.3 Array Operations - declaration, initialization, accessing array elements. 5.4 Memory representation of two-dimensional array (row major and column major) 5.5 Passing arrays to function. 5.6 Array applications - Finding maximum and minimum, Counting occurrences, Linear search, Sorting an array (Simple exchange sort, bubble sort), Merging two sorted arrays, Matrix operations (trace of matrix, addition, transpose, multiplication, symmetric, upper/ lower triangular matrix)	06	06

Prof. S.A.Randive

Class: F.Y.B.Sc. (Computer Science)   **Div:A**

Subject Name:-Database Management System

Subject Teacher:- Prof. Pardeshi P.N.   **Syllabus Completed:-100%**

Sr.No.	Month	Topic	Allocated lectures	Conducted lectures
1	August 2022	**1.Introduction To DBMS** 1.1. Introduction 1.2. File system Vs DBMS 1.3. Levels of abstraction & data independence 1.4.Structure of DBMS (Roles of DBMS Users) 1.5. Users of DBMS Advantages of DBMS	4	8
	August 2022	**3.SQL** 3.1. Introduction to query languages 3.2. Basic structure 3.3. DDL commands 3.4. DML commands 3.5. Forms of a basic SQL query (Expression and strings in SQL)	11	7
	September 2022	3.6. Set operations 3.7. Aggregate Operators and functions 3.8. Date and String functions 3.9. Null values 3.10. Nested Subqueries 3.11 SQL mechanisms for joining relations (inner joins, outer joins and their types) 3.12 Views 3.13. Examples on SQL (case studies) Practical Slip Solving		10
	October 2022	**2.Conceptual Design** 2.1. Overview of DB design process 2.2. Introduction to data models (E-R model, Relational model, Network model, Hierarchical model)	14	6

	November (2022)	2.3. Conceptual design using ER data model (entities, attributes, entity sets, relations, relationship sets) 2.4. Constraints (Key constraints, Integrity constraints, referential integrity, unique constraint, Null/Not Null constraint, Domain Check constraint, Mapping constraints) 2.5. Extended features – Specialization, Aggregation, Generalization 2.6. Pictorial representation of ER(symbols)\ 2.7. Structure of Relational Databases (concepts of a table) 2.8. DBMS Versus RDBMS 2.9. Case Studies on ER model.		9
	December (2022)	4.Relational Database Design 4.1. Introduction to Relational-Database Design (undesirable properties of a RDB design) 4.2. Functional Dependency(Basic concepts, F+, Closure of an Attribute set, Armstrong's axioms) 4.3. Concept of Decomposition 4.4. Desirable Properties of Decomposition (Lossless join, Lossy join, Dependency Preservation) 4.5. Concept of normalization, Normal Forms (1NF,2NF and 3NF), Examples 4.6 Keys Concept with Examples : Candidate Keys and Super Keys. Algorithm to find the super keys / primary key for a relation	8	8

Prof.P.N.Pardeshi

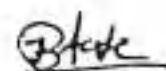Class: F.Y.B.Sc. (Computer Science)   Div:A

Subject Name- Paper I (MTC-111): Matrix Algebra

Subject Teacher- Prof. J.B.Arude   Syllabus Completed: 100%

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	July/August	Unit 1 : Introduction 1.1 Introduction 1.2 Matrix Operations 1.3 The Inverse of a Matrix 1.4 Characterization of invertible matrices 1.5 Matrix Operations 1.6 Vectors in R^3 1.7 Column Defination Of Matrix 1.8 Row Defination Of Matrix 1.9 Addition,Substraction,Multipli-Cation of Matrix	04	19
2	August	Unit 2 : Linear Equations in Linear Algebra-I 2.1 System of Linear equations 2.2 Row reduction and echelon forms 2.3 Vector equations 2.4 The matrix equation $Ax=b$ 2.5 Solution sets of linear systems	12	19
3	September	Unit 3 : Linear Equations	12	15

		in Linear Algebra -II 3.1 Partitioned Matrices 3.2 Matrix factorization [Lu decomposition]		
4	October	3.3 Linear Independence 3.4 Introduction to linear transformation		4
5	November	3.5 The matrix of linear transformation 3.6 Subspaces of Rn 3.7 Dimension and Rank		7
6	December	**Unit 4 : Determinants** 4.1 Introduction to determinants 4.2 Properties of determinants 4.3 Cramer's rule, Volume and linear transformations, multiplication, symmetric, upper/ lower triangular matrix)	08	08

Prof. .J.B.Arude.

Class: F.Y.B.Sc. (Computer Science)   **Div:A**

Subject Name- Paper II (MTC-112): Discrete Mathematics
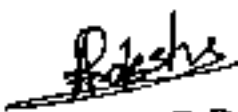
Subject Teacher- Prof. A.R.Rakshe   **Syllabus Completed: 100%**

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	July/August	**Unit 1 : Logic** 1.1 Revision : Propositional Logic, Propositional Equivalences. 1.2 Rules of Inference : Argument in propositional Logic, Validity Argument(Direct and Indirect methods) Rules of Inference for Propositional Logic, Building Arguments. 1.3 Predicates and Quantifiers : Predicate, n-Place Predicate or ,n-ary Predicate, Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains, Logical Equivalences involving Quantifiers.	07	12
2	August/ September	**Unit 2 : Lattices and Boolean Algebra** 2.1 Relations, types of relations, equivalence relations, Partial ordering relations	13	16

		2.2 Digraphs of relations, matrix representation and composition of relations. 2.3 Transitive closure and Warshall's Algorithm 2.3 Poset, Hasse diagram. 2.4 Lattices, Complemented lattice, Bounded lattice and Distributive lattice. 2.5 Boolean Functions : Introduction, Boolean variable, Boolean Function of degree n, Boolean identities, Definition of Boolean Algebra. 2.6 Representation of Boolean Functions : Minterm, Maxterm Disjunctive normal form,		
3	September	**Unit 3 : Counting Principles** 3.1 Cardinality of Set : Cardinality of a finite set. 3.2 Basics of Counting : The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle. 3.3 The Pigeonhole Principle: Statement, the Generalized Pigeonhole Principle, Its Applications. 3.4 Generalized Permutations and Combinations : Permutation and 3.5 Combination with Repetitions, Permutations with Indistinguishable Objects	07	12
4	October	**Unit 4: Recurrence Relations** 4.1 Recurrence Relations:	06	09

		Introduction, Formation.		
5	November	4.2 Linear Recurrence Relations with constant coefficients. 4.3 Homogeneous Solutions. 4.4 Particular Solutions. 4.5 Total Solutions	O3	06

Prof. .A.R.Rakshe

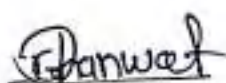**Class: F.Y.B.Sc.(Computer Science)**   **Div: A**

Subject Name-ELC-111: Semiconductor Devices and Basic Electronic Systems

Teacher :-Prof. Chanwat D.O.   Syllabus completed=100%

Sr. no	Month	Name Of Topics	Allocated Lectures	Conducted lectures
1	October	**Unit 1. Semiconductor Diodes** Semiconductor, P and N type semiconductors, Formation of PN junction diode, it's working, Forward and Reverse bias characteristics, Zener diode: working principle, breakdown mechanism and characteristics, Working principle of Light emitting diode, photo diode, optocoupler, Solar cell working principle and characteristics	6	5
2	October	**Unit 2. Bipolar Junction Transistor (BJT)** Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, Transistor amplifier configurations - CB, CC (only concept), CE configuration; input and output characteristics, Definition of α, β and Y , Concept of Biasing (numerical problems not expected), Potential Divider bias, Transistor as amplifier (Concept of Gain and Bandwidth expected), Transistor as a switch.	7	8
3	November	**Unit 3. MOSFET** MOSFET types, Working principle, Characteristics, Application of MOSFET as a Switch	5	4
4	November	**Unit 4. POWER SUPPLY** Block Diagram of Regulated Power Supply, Rectifiers (half wave, full wave, Bridge), rectifier with capacitor-filter, Use of Zener Diode as a Voltage Regulator, IC 78XX and 79XX as regulator, Block Diagram and explanation of SMPS, Block diagram and explanation of UPS	6	5

5	December	**Unit 5. OSCILLATORS** Barkhauson Criteria, Low frequency Wein-bridge oscillator, High frequency crystal oscillator, IC 555 as astable multivibrator used as square wave generator / clock Unit	6	5
6	December	**6. DATA CONVERTERS** Need of Digital to Analog converters, parameters, weighted resistive network, R-2R ladder network, need of Analog to Digital converters, parameters, Flash ADC, successive approximation ADC	6	5

Prof. Ghanwat D.O.

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
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ACADEMIC YEAR-2022-2023 SEM-I

Class: F.Y.B.Sc.(Computer Science)   **Div:A**

Subject Name- Paper II (ELC 122): Principles of Digital Electronics

Subject Teacher- Prof.A.P.Kulkarni   **Syllabus Completed: 100%**

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	July/August	**Unit 1: Number Systems and Digital codes** Introduction to Decimal, Binary and Hexadecimal number systems and their inter-conversions, binary addition and binary subtraction using 2's complement, Binary Coded Decimal number, Gray Codes, Gray to Binary and Binary to Gray conversion, Alphanumeric representation in ASCII codes.	8	10
		Unit 2: Logic gates and Boolean Algebra Logic gates (NOT, AND, OR, NAND, NOR, XOR gate) with their symbol, Boolean equation and truth table, Universal gates Rules and laws of Boolean algebra,	12	5
2	September	De Morgan's theorem, simplification of Logic equations using Boolean algebra rules, Min terms, Max terms, Boolean		11

		expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form Introduction to Karnaugh Map, problems based on SOP (upto 4 variables), digital designing using K Map for: Gray to Binary and Binary to Gray conversion. Introduction of CMOS and TTL logic families, Parameters like voltage levels, propagation delay, noise margin, fan in, fan out, power dissipation (TTL NAND, inverter, CMOS gates etc. not expected)		
3	October/November	**Unit 3: Combinational Circuits** Half adder and full adder, 4-Bit Universal adder/ Subtractor, applications of Ex-OR gates as parity checker and generator, study of Multiplexer (4:1) and Demultiplexer (1:4), Encoders - Decimal/BCD to binary, 3X4 matrix keyboard encoder, priority encoder, Decoder- BCD to seven segment decoder, IC 74138 and IC 7447, Digital comparator.	10	14

Prof.A.P.Kulkarni

Head,

Department of Computer Science.

Hutatma Rajguru Mahavidyalaya

Rajgurunagar. (Pune) - 410 505.

K.T.S.P.MANDAL'S
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-I

DIV-A

Class-S.Y.B.SC (Comp.Sci)

Subject – Data Structure and Algorithm-I

Subject Teacher: Prof.Y.J.Patangade   SyllabusCompleted=100%

Sr.No.	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	September-October	UNIT-1: Introduction to Data Structures and Algorithm Analysis:-1.1 Introduction ,Need of Data Structure , Definitions - Data and information, Data type, Data object, ADT, Data Structure ,Types of Data Structures , Algorithm analysis ,Space and time complexity, Graphical understanding of the relation between different functions of n, examples of linear loop, logarithmic,quadratic loop etc. , Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω,), Problems on time complexity calculation	4	6
2	October	UNIT 2-Array as a Data Structureence:-ADT of array, Operations 2.2Array	10	9

		applications - Searching 2.2.1 Sequential search, variations - Sentinel search, Probability search, ordered list search 2.2.2 Binary Search 2.2.3 Comparison of searching methods 2.3 Sorting Terminology- Internal, External, Stable, In-place Sorting 2.3.1 Comparison Based Sorting - Lower bound on comparison based sorting, Methods- Bubble Sort, Insertion Sort, Selection Sort, Algorithm design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort, complexity analysis of sorting methods.Non Comparison Based Sorting: Counting Sort, Radix Sort, complexity analysis. Comparison of sorting methods			
3	October-Novembe r	UNIT 3-Linked List:-List as a Data Structure, differences with array. Dynamic implementation of Linked List, internal and external pointers ,Types of Linked List – Singly, Doubly, Circular , Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, time complexity of operations. ,Applications of Linked List – polynomial representation, Addition of two polynomials ,Generalized linked list –	10		9

		concept, representation, multiple-variable polynomial representation using generalized list.,			7
4	November - December	UNIT 4-Stack:-Introduction Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations. Implementation- Static and Dynamic with comparison , Applications of stack . Function call and recursion, String reversal, palindrome checking .Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix) .Backtracking strategy – 4 queens problem (implementation using stack)	6		
5	December	**UNIT 5-Queue** Introduction Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(),time complexity of operations, differences with stack. Implementation - Static and Dynamic with comparison Types of Queue - Linear Queue, Circular Queue, Priority Queue, Double Ended Queue (with implementation) Applications – CPU Scheduling in	6		6

		multiprogramming environment. Round robin algorithm .		

Prof-Y.J.Patangade

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
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Class-S.Y.B.SC (Comp.Sci) **DIV-A**
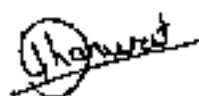
Subject – Software Engineering

Subject Teacher: Prof.Ghanwat D.O. **Syllabus Completed=100%**

Sr.No	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	October	**Unit 1:Introduction To Software Engineering and Process Models** 1.1 Definition of Software 1.2 Nature of Software Engineering 1.3 Changing nature of software 1.4 Software Process 1.4.1 The Process Framework 1.4.2 Umbrella Activities 1.4.3 Process Adaptation 1.5 Generic Process Model 1.6 Prescriptive Process Models 1.6.1 The Waterfall Model 1.6.2 Incremental Process Models 1.6.3 Evolutionary Process Models 1.6.4 Concurrent Models 1.6.5 The Unified Process	8	7

2	October/ November r	Title : Agile Development 2.1 What is Agility? 2.2 Agile Process 2.2.1 Agility Principles 2.2.2 The Politics Of Agile Development 2.2.3 Human Factors 2.3 Extreme Programming(XP) 2.3.1XP Values 2.3.2XP Process 2.3.3 Industrial XP 2.4 Adaptive Software Development(ASD) 2.5 Scrum 2.6 Dynamic System Development Model (DSDM) 2.7 Agile Unified Process (AUP)	5	5
3		Unit 3 : Requirements Analysis 3.1 Requirement Elicitation, 3.2 Software requirement specification (SRS) 3.2.1 Developing Use Cases (UML) 3.3 Building the Analysis Model 3.3.1 Elements of the Analysis Model 3.3.2 Analysis Patterns 3.3.3 Agile Requirements Engineering 3.4 Negotiating Requirements 3.5 Validating Requirements.	7	6
4	November r/December ber	Unit : Requirements Modeling 4.1 Introduction to UML 4.2Structural Modeling 4.2.1 Use case model 4.2.2Class model	10	9

		4.3Behavioral Modeling 4.3.1 Sequence model 4.3.2 Activity model 4.3.3 Communication or Collaboration model 4.4 Architectural Modeling 4.4.1 Component model 4.4.2 Artifact model 4.4.3 Deployment model		
5	December	Unit :Design Concepts 5.1 Design Process 5.1.1 Software Quality Guidelines and Attributes 5.1.2 Evolution of Software Design 5.2 Design Concepts 5.2.1 Abstraction 5.2.2 Architecture 5.2.3 Patterns 5.2.4 Separation of Concerns 5.2.5 Modularity 5.2.6 Information Hiding 5.2.7 Functional Independence 5.2.8 Refinement 5.2.9 Aspects 5.2.10 Refactoring 5.2.11 Object Oriented Design Concepts 5.2.12 Design Classes 5.2.13 Dependency Inversion 5.2.14 Design for Test 5.3 The Design Model 5.3.1 Data Design Elements 5.3.2 Architectural Design Elements 5.3.3 Interface Design Elements 5.3.4 Component-Level Diagram 5.4.5 Deployment-Level Diagram	6	5

Prof. Ghanwat D.O.

Class: S.Y.B.Sc. (Computer Science)   Div:A

Subject Name- Paper I(ELC 231):Microcontroller Architecture Programming

Subject Teacher- Prof.A.P.Kulkarni   Syllabus Completed: 100%

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	September	UNIT-1:Basics of Microcontroller& Intel 8051 architecture: Introduction to microcontrollers, Difference in controller and processor, Architecture of 8051, Internal block diagram, Internal RAM organization, SFRS, pin diagram of 8051, I/O port structure & operation, External Memory Interface.	08	13
2	October	UNIT-2: Programming model of8051 Instruction classification, Instruction set, Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives (ORG, END), features with example, I/O Bit & Byte programming using assembly language for LED and seven segment display (SSD) interfacing. Introduction to8051 programming in C.	12	15

3	November	UNIT 3: Timer / counter, Interrupts : Timer / counter: TMOD, TCON, SCON, SBUF, PCON Registers, Timer modes, programming for time delay using mode 1 and mode2. Interrupts: Introduction to interrupt ,Interrupt types and their vector addresses, Interrupt enable register and interrupt priority register(IE,IP),	10	10
4	November	UNIT 4: Interfacing, Serial Communication : Programming of serial port without Interrupt, Interrupt, Serial Communication: Synchronous and asynchronous serial communication, Use of timer to select baud rate for serial communication. Interfacing: ADC, DAC, LCD, Stepper motor.	08	06

Prof.A.P.Kulkarni

Class: S.Y.B.Sc.(Computer Science)   Div:A
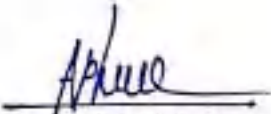
Subject Name- Paper II(ELC 232): Digital Communication & Networking

Subject Teacher- Prof.A.P. Kulkarni   Syllabus Completed: 100%

Sr. No	Month	Name Of Tuple	Allocated Lectures	Conducted Lectures
1	November	**UNIT 1: Introduction to Electronic Communication** Introduction to Communication: Elements of Communication system, types of noise sources, Electromagnetic spectrum, signal and channel bandwidth, Types of communication: simplex, half duplex, full duplex, baseband and broadband, Serial communication: asynchronous and synchronous, Information Theory: Information entropy, rate of information (data rate, baud rate), channel capacity, Nyquist theorem, Signal to noise ratio, Noise Figure, Shannon theorem, Error handling codes: Necessity, Hamming code, CRC	09	12
2	November	**UNIT 2: Modulation and Demodulation:** Introduction to modulation and demodulation: Concept and need of modulation and demodulation, Digital Modulation techniques: Pulse Code Modulation (PCM), FSK, QPSK, QAM.	05	05
3	December	**UNIT 3: Multiplexing, Spectrum Spreading and Media Access Control** Multiplexing techniques: Frequency	12	12

		division multiplexing, wavelength division multiplexing, Time division multiplexing Spread Spectrum techniques: Frequency hopping Spread Spectrum, Direct Sequence Spread Spectrum Media Access Control (MAC): Random Access Protocol: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access Protocols: Reservation, Polling, Token passing, Channelization Protocols: FDMA, TDMA, CDMA.		
4	January	**UNIT 4: Computer Networking** Introduction to computer networks Types of networks : LAN, MAN, WAN, Wireless networks, Switching, Internet, Network topology : point to point, Star, Ring, Bus, Mesh, Tree, Daisy Chain, Hybrid Network devices : Repeater, Switch, Networking cables, Router, Bridge, Hub, Brouter, Gateway. Wired LANs:- Ethernet: Ethernet protocol, standard Ethernet, 100 MBPS Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, Computer network model: OSI and TCP/IP.	10	07

Prof.A.P.Kulkarni

Class: S.Y.B.Sc. (Computer Science)   **Div:A**

Subject Name- Paper I (MTC-231): Group And Coding Theory

Subject Teacher- Prof. J.B.Arude   **SyllabusCompleted:100%**

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	September/ October	**Unit 1. Integers** 1.1 Division Algorithm (without Proot) 1.2 G.C.D. using division algorithm and expressing it as linear combination 1.3 Euclid's lemma 1.4 Equivalence relation (revision), Congruence relation on set of integers, Equivalence class partition	05	10
2	October	**Unit 2. Groups** 2.1 Binary Operation 2.2 Group: Definition and Examples 2.3 Elementary Properties of Groups	03	09
3	October/November	**Unit 3. Finite Groups and Subgroups** 3.1 Order of a group, order of an element 3.2 Examples $(Zn, +)$ and $(U(n), *)$ 3.3 Subgroup definition, Finite subgroup test, subgroups of Zn 3.4 Generator, cyclic group,	05	12

		finding generators of Zn(Corollary 3,4 without proof)		
4	November	3.5 Permutation group, definition, composition of two permutations, representation as product of disjoint cycles, inverse and order of a permutation, even/ odd permutation 3.6 Cosets: Definition, Examples and Properties, Lagrange Theorem(without Proof) Error detection	05	12
5	December	Unit 4. Groups and Coding Theory 4.1 Coding of Binary Information and 4.2 Decoding and Error Correction 4.3 Public Key Cryptography	18	20

Prof. J.B.Arude

Class: S.Y.B.Sc. (Computer Science) Div:A

Subject Name- Paper II (MTC-232): Numerical Techniques

Subject Teacher- Prof. A.R.Rakshe SyllabusCompleted:100%

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	September/ October	**Unit 1: Algebraic and Transcendental Equation** 1.1 Introduction to Errors 1.2 False Position Method 1.3 Newton-Raphson Method	04	10
2	October	**Unit 2: Calculus of Finite Differences and Interpolation** 2.1 Differences 2.2. Forward Differences 2.3 Backward Differences 2.4 Central Differences 2.5 Other Differences (δ, μ operators) 2.6 Properties of Operators	08	10
3	October/November	2.7 Relation between Operators 2.8 Newton's Gregory Formula for Forward Interpolation 2.9 Newton's Gregory Formula for Backward Interpolation 2.10 Lagrange's Interpolation Formula 2.11 Divided Difference 2.12 Newton's Divided Differenee Formula	08	14
4	November	**Unit 3: Numerical Integration**	08	12

		3.1 General Quadrature Formula 3.2 Trapezoidal Rule 3.3 Simpson's one-Third Rule 3.4 Simpson's Three-Eight Rule		
5	December	**Unit 4: Numerical Solution of Ordinary Differential Equation** 4.1 Euler's Method 4.2 Euler's Modified Method 4.3 Runge-Kutta Methods	08	13

Prof. .A.R.Rakshe

K.T.S.P.MANDAL'S

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
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ACADEMIC YEAR-2022-2023 SEM-I

DIV-A

Class-T.Y.B.SC (Comp.Sci)

Subject – Operating System-I

Subject Teacher: Prof.Y.J.Patangade   Syllabus

Completed=100%

Sr.No.	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	September-October	UNIT-1:Indroduction to Operating Systems: Introduction of operating system,genaratlons& evolution of os,types of os,memorymanagement,protection and security,osstructure,microkernel,os module –open source system,process managements system calls,types of system call &working privileged instruction	6	9
2	October	UNIT-2:Processes and Threads:process concepts,process states ,PCB ,Process Scheduling-Scheduling queue,Scheduler,ContextSwitch,types of scheduler,operation on process –creation and termination,creation using fork () system call,Threads-Types of threads,benefits of	6	6

			threads,libraries.		
3	October - Novem ber	**UNIT -3:Process Scheduling:-** Basic Concepts CPU/IO burst cycle,CPUScheduler, scheduling criteria, dispatcher ,merits &demerits Types of Scheduler -preemptive,non-preemtive,Scheduling algorithm-FIFO,SJF,PRIORITY Scheduling, Roundrobin Algorithm,multiple queue scheduling,	7	6
4	Novem ber- Decemb er	**UNITS- Memory Managements:-** Basic hardware address binding ,logical address,physicaladdress,dyna mic address vs static linking,dynamicloading,and sheared libraries,swapping,memoryma pping,protection,mft,fragment ation.,contiguous memory alloction,paging,segmentation, segmentaion with paging,VM- ,demondpaging,Performance of demand paging,page removal algorithm-FIFO,Optimal,LRU,MFU.	12	11
5	Decemb er	**UNIT:-4 Sychronization:-** Critical Section Problem, semaphore usage,Implementaion, classic Problem of Sychronization-The bounded buffer	5	5

		problem,The Reader writer Problem,The dinning Philosopher Problem.		

Prof-Y.J.Patangade

Class-T.Y.B.SC (Comp.Sci) **DIV-A**

Subject – Course Title :Computer Networks – II
Subject Teacher: Prof. Ghanwat D.O. Syllabus completed=100%

Sr. No.	Month	Name Of Topics	Allocated Lecture	Conducted Lectures
1	October	Unit 1:-Application Layer Domain Name System Name space-Flat name space, Hierarchical name space Domain Name Space -Label ,Domain name, FQDN,PQDN Distribution of Domain Name Space-Hierarchy of name servers, zone, Root server, Primary and secondary servers. DNS in the Internet: Generic domains, Country domains,inverse domain Resolution-Resolver,mapping names to address,mapping addresses to names,recursive resolution,iterative resolution,caching Electronic Mail- Architecture-First scenario, second scenario, Third scenario, Fourth scenario User agent-services of user agent, types of UA Format of e-mail	10	9

			MIME-MIME header Message transfer agent-SMTP Message Access Agent: POP and IMAP File Transfer FTP-Communication over data control connection,File type,data structure,Transmission mode,anonymous FTP		
2		October/ Novembe r	**Unit 2:Multimedia** Digitizing audio and video, Audio and Video compressionStreaming Stored audio/video First approach Second approach Third approach Fourth approach Streaming live audio/video Real time interactive audio/video-Characteristics, Time relationship, timestamp, Playback buffer, ordering multicasting, translation RTP-Packet format RTCP-Message types Voice over IP-SIP,SIP session H.323-Architecture, Protocols	8	7
3		Novembe r/ **December**	**Unit 3:-Cryptography and Network Security** Terminology: Cryptography, plain text and cipher text, cipher key, categories of cryptography-Symmetric key, asymmetric key Encryption model Symmetric key cryptography Traditional ciphers – substitution cipher, shift cipher, Transposition cipher Simple Modern ciphers-XOR, Rotation cipher, s-box,p-box	9	8

			Modern round ciphers-DES Mode of operation-ECB,CBC,CFB,OFB Asymmetric key cryptography-RSA Security Services Message confidentiality-With Symmetric key cryptography, with asymmetric key cryptography Message integrity-Document and fingerprint, message and message digest Message authentication-MAC,HMAC Digital signature Entity Authentication-Passwords, Fixed passwords challenge-response		
4	Novembe r/ December	Unit 4:-Security in the Internet IPSecurity(IPSec) Two modes• Two security protocols• Services provided by IPSec• Security association• Internet key exchange• Virtual private network• SSL/TLS SSL services• Security parameters• Sessions and connections• Four protocols• Transport layer security• PGP Security parameters• Services• PGP algorithms• Key rings• PGP certificates• Firewalls Packet filter firewall•	9	8

Prof. Ghanwat D.O.

Class: T.Y.B.Sc. (Computer Sci) **Div:A**

Subject Name- Paper 1 (CS – 354): Foundation Of Data Science
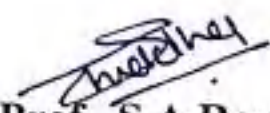
Subject Teacher- Prof. . S.A.Randive **Syllabus Completed: 100%**

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	September/ October	**Chapter 1 Introduction to Data Science** Introduction to data science, The 3 V's: Volume, Velocity, Variety Why learn Data Science? Applications of Data Science The Data Science Lifecycle Data Scientist's Toolbox Types of Data Structured, semi-structured, Unstructured Data, Problems with unstructured data Data sources Open Data, Social Media Data, Multimodal Data, standard datasets Data Formats Integers, Floats, Text Data, Text Files, Dense Numerical Arrays, Compressed or Archived Data, CSV Files, JSON Files, XML Files, HTML Files , Tar Files, GZip Files, Zip Files, Image Files: Rasterized, Vectorized, and/or Compressed	06	05
2	October	**Chapter 2** Statistical Data Analysis 2.1.Role ofstatistics in data science 2.2.Descriptive statistics Measuring the Frequency Measuring the Central Tendency: Mean,	10	09

			Median, and Mode Measuring the Dispersion: Range, Standard deviation, Variance, Interquartile Range 2.3.Inferentialstatistics Hypothesis testing, Multiple hypothesis testing, Parameter Estimation methods, 2.4.Measuring Data Similarity and Dissimilarity Data Matrix versus Dissimilarity Matrix, Proximity Measures for Nominal Attributes, Proximity Measures for Binary Attributes, Dissimilarity of Numeric Data: Euclidean, Manhattan, and Minkowski distances, Proximity Measures for Ordinal Attributes 2.5.Concept of Outlier, types of outliers, outlier detection methods		
3	November		**Chapter 3 Data Preprocessing** Data Objects and Attribute Types: What Is an Attribute?, Nominal , Binary, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes Data Quality: Why Preprocess the Data? 3.3.Data munging/wrangling operations Cleaning Data - Missing Values, Noisy Data (Duplicate Entries, Multiple Entries for a Single Entity, Missing Entries, NULLs, Huge Outliers, Out-of- Date Data, Artificial Entries, Irregular Spacings, Formatting Issues - Irregular between Different Tables/Columns, Extra Whitespace, Irregular	10	08

		Capitalization, Inconsistent Delimiters, Irregular NULL Format, Invalid Characters, Incompatible Datetimes) Data Transformation – Rescaling, Normalizing, Binarizing, Standardizing,Label and One Hot Encoding Data reduction Data discretization		
4	December	**Chapter 4:**Data Visualization Introduction to Exploratory Data Analysis Data visualization and visual encoding Data visualization libraries Basic data visualization tools Histograms, Bar charts/graphs, Scatter plots, Line charts, Area plots, Pie charts, Donut charts Specialized data visualization tools Boxplots, Bubble plots, Heat map, Dendrogram, Venn diagram, Treemap, 3D scatter plots Advanced data visualization tools- Wordclouds Visualization of geospatial data Data Visualization types	10	08

Prof. .S.A.Randive

Class-T.Y.B.SC (Comp.Sci)

Subject – Python Programming   DIV-A
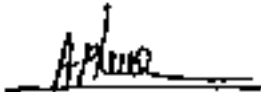
Subject Teacher: Prof.Y.J.Patangade

Syllabus Completed=100%

Sr.No.	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	October	UNIT-1:Introduction to Python:-Introduction to Python The Python Programming Language, History, features, Applications, Installing Python, Running Simple Python program Basics of Python Standard data types - basic, none, Boolean (true & False), numbers, Variables, Constants,Python identifiers and reserved words, Lines and indentation, multi-line statements and Comments,Input/output with print and input ,functions Declaration, Operations on Data such as assignment, arithmetic, relational, logical and bitwise operations, dry run, Simple Input and o/p.	3	3
2	November	UNIT 2:-Control Statements:-Sequence Control – Precedence of	4	3

		operators, Type conversion Conditional Statements: if, if-else, nested if-else, Looping-for, while, nested loops, loop controlstatements (break, continue, pass) a. Strings: declaration, manipulation, special operations, escape character, string formatting operator, Raw String, Unicode strings, Built-in String methods.		
3	Novembe r- Decembe r	**Unit 3:-Lists, functions, tuples and dictionaries, Sets:**-Python Lists: Concept, creating and accessing elements, updating & deleting lists, traversing a List, reverse Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods. Functions: Definitions and Uses, Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Flow of Execution, Parameters and Arguments, Variables and Parameters, Stack Diagrams, Void Functions, Anonymous functions Importing with from, Return Values, Boolean Functions, More Recursion, Functional programming tools - filter(), map(), and reduce(),recursion, lambda forms. Tuples and Dictionaries: Tuples,	7	7

4	December	UNIT:- 4 :-Modules ,Working with file ,Exception Handling:-		4		4
		Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module **Packages:** Importing package, creating package,examples **Working with files:** Creating files and Operations on files (open, close, read, write), File object attributes, file positions, Listing Files in a Directory, Testing File Types, Removing files and directories, copying and renaming files, splitting pathnames, creating and moving directories **Regular Expression-** Concept of regular expression, various types of regular expressions, using match function. **Exception Handling:** Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defiued Exceptions.				
5	Nov-Dec	**Demonstration** **Assingment** Assignment 1 - Python Basics Assignment 2 – Arrays, Strings, and Functions	18			16

		Assignment 3 - List, Tuples, Sets, and Dictionary Assignment 4 - File Handling and Date-Time Assignment 5 - Exception handling and Regular expression		

Prof-Y.J.Patangade

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Class: T.Y.B.Sc. (Computer Science)　　　　　　　　　　　　　　　**Div:A**

Subject Name- Paper 1 (CS-355): Object Oriented Programming Using Java -I

Subject Teacher- Prof. S.A.Randive　　　　　　　　　**SyllabusCompleted:100%**

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	September/ October	**Chapter 1** An Introduction to Java Object Oriented Programming Concepts A short history of Java Features OR Buzzwords of Java Java Environment Simple Java Program Java Tools – jdb, javap, javadoc Types of Comments Data Types Final Variable Declaring 1D, 2D Array Accepting Input (Command Line Arguments, BufferedReader, Scanner)	06	05
2	October	**Chapter 2** Objects and Classes Defining your own classes Access Specifiers (public, protected, private, default) Array of Objects Constructors, Overloading Constructors and Use of 'this' keyword static block, static fields And methods Predefined Classes Object Class, Methods (equals(), toString(),hashcode(), getClass()) String Class And StringBufferClass,Formatting	07	07

		String data using format() method Creating , Accessing And Using Packages Wrapper Classes		
3	October/November	**Chapter 3** Inheritance and Interface Inheritance Basics (extends Keyword) and Types of Inheritance Superclass, Subclass and use of Super Keyword Method Overriding and runtime polymorphism Use of final keyword related to method and class Use of abstract class and abstract methods Defining and Implementing Interfaces Runtime polymorphism using interface Concept of Marker and Functional Interfaces	08	07
4	November	**Chapter 4** Exception and File Handling Dealing with errors , Exception class, Checked And Unchecked Exception Catching Exceptions, Multiple Catch Block, Nested try block Creating User Defined Exception Introduction to Files And Streams Input-OutputStream : FileInput/OutputStream, BufferedInput/OutputStream, DataInput/OutputStream Reader-Writer : FileReader/Writer, BufferedReader/Writer, InputStreamReader, OutputStreamWriter	05	04
5	December	**Chapter 5:**User Interface with AWT and Swing What is AWT? What is Swing?	10	8

		Difference between AWT and Swing The MVC Architecture And Swing Layouts And Layout Managers Containers And Components – JFrame, JButton, JLabel, JText, JTextArea, JCheckBox And JRadioButton, JList, JComboBox, JMenu And related Classes Dialogs (Message, Confirmation, Input), JFileChooser, JColorChooser Event Handling; Event Sources, Listeners Adapters And Anonymous Inner Class		

Prof. .S.A.Randive

Teacher Name:- Prof. Virkar P.P.   **Div :- A**

Class - T.Y.B.Sc(Comp. Sci)

Subject- Blockchain Technology   **Syllabus Completed-100%**

Month	Topic	Allocated lectures	Conducted lectures
September 2022	1.Introduction to Blockchain Foundational Computing Concepts (Client-Server systems vs Peer to Peer Systems) , Evolution of Blockchain , Blockchain Vs Database ,Essentials of Blockchain (Blockchain generations, types of blockchain, benefits and challenges of blockchain usage) ,Types of Networks ,Layered Architecture of Blockchain Ecosystem ,Components of blockchain	5	7
October 2022	Cryptography (private and public keys, Hashing & , Digital Signature),Consensus Mechanisms, Cryptocurrency, Digital Currency Bitcoin and Ethereum, Smart Contracts ,Blockchain use cases 2.How Blockchain Works? Understanding SHA256 Hash,Immutable Ledger ,Distributed P2P Network ,	5	8
November 2022	How Mining Works? (The NONCE and Cryptographic Puzzle), Byzantine Fault Tolerance,Consensus Protocols: Proof of Work, Proof of State, Défense Against Attackers, Competing Chains ,Blockchain Demo 3.Smart Contracts- Ethereum Network,What is a Smart Contract?	10	11

| December 2022 | Ethereum Virtual Machine, Ether, Gas ,DApps,Decentralized Autonomous Organizations (DAO) ,Hard and Soft Forks ,Initial Coin Offerings ,Demo of Smart Contracts | 4 | 4 |

Prof. Virkar P.P.

K.T.S.P.MANDAL'S

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-I

Teacher Name:- Prof. Virkar P.P.　　　　　　　　**Div :- A**

Class - T.Y.B.Sc(Comp. Sci)

Subject- Web Technologies-I　　　　　**Syllabus Completed-100%**

Month	Topic	Allocated lectures	Conducted lectures
September 2022	**1.Introduction to HTML, HTTP and PHP-** Overview of HTML and Basic Tags , Creating Forms ,Tables, HTML5 Semantics. CSS basic concept ,Three ways to use CSS, Box Model, Navigation Bar . Introduction to Web server and Web browser . HTTP basics . PHP Basics: Use of PHP, Lexical structure, Language basics **2.Function and String-** Defining and calling a function, Default parameters	12	15
October 2022	Variable parameters, Missing parameters Variable function, Anonymous function Types of strings in PHP Printing functions Encoding and escaping Comparing strings Manipulating and searching strings Regular expressions	6	7
November 2022	**3.Arrays-** Indexed Vs Associative arrays Identifying elements of an array Storing data in arrays Multidimensional arrays 3.4Extracting multiple values Converting between arrays and variables Traversing arrays Sorting Action on entire array. **4.Files and database handling-** Working with files and directories Opening and Closing, Getting information about file, Read/write to file, Splitting name and path from file, Rename and delete files,Reading and	10	12

	writing characters in file Reading entire file, Random access to file data Getting information on file ,Ownership and permissions,		
December 2022	Using PHP to access, a database Relational databases and SQL, PEAR DB basics, Advanced database techniques 5.Handling email with php- Email background, Internet mail protocol ,Structure of an email message, Sending email and validation of Email_id with php	5	6

Prof. Virkar P.P.

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HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-I

Class:- T.Y.Bsc (Computer Science)   **Div:-A**

Subject Name:-Theoretical Computer Science

Subject Teacher:- Prof. Pardeshi P.N.   **Syllabus Completed:-100%**

Sr. No.	Month	Topic	Allocated lectures	Conducted lectures
1	September 2022	**1 Finite Automaton** 1.1 Introduction: Symbol, Alphabet, String, Prefix & Suffix of Strings, Formal Language, Operations on Languages. 1.2 Deterministic finite Automaton – Definition, DFA as language recognizer, DFA as pattern recognizer. Nondeterministic finite automaton – 1.3 Definition and Examples. NFA To DFA (Myhill Nerode Method) NFA with ε- transitions 1.4 Definition and Examples. NFA with ε-Transitions to DFA &	10	11

	October 2022	1.5 Examples Finite automaton with output – Mealy and Moore machine, Definition and 1.6 Examples. Minimization of DFA, Algorithm & Problem using Table Method.		5
		2.Regular Expressions and Languages 2.1 Regular Expressions (RE): Definition & Example Regular Expressions Identities. 2.2 Regular language-Definition and 2.3 Examples. Conversion of RE to FA- Examples. Pumping lemma for regular languages and applications. Closure Properties of regular Languages.	6	8
	November (2022)	**3. Context-Free Grammars and Languages** 3.1 Grammar - Definition and Examples. Derivation-Reduction - Definition and Examples. Chomsky Hierarchy. 3.2 CFG: Definition & Examples. LMD, RMD, Parse Tree Ambiguous Grammar: Concept & Examples. 3.3 Simplification of CFG: Removing Useless Symbols, Unit Production, ϵ-production and Nullable Symbol. 3.4 Normal Forms: Greibach Normal Form (GNF) and Chomsky Normal Form (CNF) 3.5 Regular Grammar: Definition. Left linear and Right Linear Grammar-Definition and Example.	14	17
	December (2022)			
		3.6 Equivalence of FA & Regular Grammar Construction of regular		

		grammar equivalent to a given DFA. Construction of a FA from the given right linear grammar		
		4.Push Down Automata 4.1 Definition of PDA and examples. Construction of PDA using empty stack and final State method: Examples using stack method. 4.2 Definition DPDA & NPDA, their correlation and Examples of NPDA CFG (in GNF) to PDA: Method and examples	5	4
		5. Turing Machine 5.1 The Turing Machine Model, Definition and Design of TM Problems on language recognizers. 5.2 Language accepted by TM. Types of Turing Machines (Multitrack TM, Two-way TM, Multitape TM, Nondeterministic TM) Introduction to LBA (Basic Model) & CSG. (Without Problems).	5	4

Prof. P.N.Pardeshi

Class-F.Y.B.SC (Comp.Sci) **DIV-A**

Subject – Advanced 'C' Programming
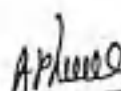
Subject Teacher: Prof. S.A.Randive   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	Feb	**UNIT 1: Pointers :-** Introduction to Pointers. Declaration, definition, initialization, dereferencing. Pointer arithmetic. . Relationship between Arrays & Pointers- Pointer to array, Array of pointers. . Multiple indirection (pointer to pointer). . Functions and pointers- Passing pointer to function, Returning pointer from function, Function pointer. . Dynamic memory management- Allocation(malloc(),calloc()), Resizing(realloc()), Releasing(free())., . Memory leak, dangling pointers. Types of pointers.	08	06
2	March	**UNIT 2: Strings** :- String Literals, string variables, declaration, definition, initialization. Syntax and use of predefined string functions Array of strings. Strings and Pointers Command line arguments.	06	05
3	March	**UNIT 3: Structures And Unions. :-** Concept of structure, definition and initialization, use of typedef. Accessing structure members. . Nested Structures . Arrays of Structures. Structures and functions- Passing each member of structure as a separate argument, Passing structure by value / address. . Pointers and structures. Concept of Union, declaration, definition, accessing union members. Difference between structures and union	08	08

4	April	UNIT 4- File Handling : . Introduction to streams. . Types of files. . Operations on text files. . Standard library input/output functions. . Random access to files.	06	05
5	April	UNIT 5: Preprocessor :- Role of Preprocessor . Format of preprocessor directive . File inclusion directives (#include) . Macro substitution directive, argumented and nested macro . Macros versus functions	02	02

Prof.S.A.Randive

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Class-F.Y.B.SC (Comp.Sci)   **DIV-A**
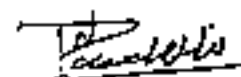
Subject – Relational Database Management Systems

Subject Teacher: Prof.P.N.Pardeshi   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	Feb-March	**UNIT 1: Relational Database Design Using PLSQL** Introduction to PLSQL PL/PgSqL: Datatypes, Language structure. Controlling the program flow, conditional statements, loops. Stored Procedures. Stored Functions. Handling Errors and Exceptions. Cursors. Trigger	08	09
2	March-April	**UNIT 2: Transaction Concepts and concurrency control:** Describe a transaction, properties of transaction, state of the transaction. Executing transactions concurrently associated problem in concurrent execution. Schedules, types of schedules, concept of Serializability, Precedence graph for Serializability. Ensuring Serializability by locks, different lock modes, 2PL and its variations. Basic timestamp method for concurrency, Thomas Write Rule. Locks with multiple granularities, dynamic database concurrency (Phantom Problem). Timestamps versus locking. Deadlock and deadlock handling - Deadlock Avoidance (wait-die, wound-wait), Deadlock Detection and Recovery (Wait for graph). .	10	11
3	April	**UNIT 3: Database Integrity and Security Concepts:-** Domain constraints Referential Integrity Introduction to database security concepts Methods for database security .1Discretionary access control method .2Mandatory access	06	06

		control. Role base access control for multilevel security. Use of views in security enforcement. Overview of encryption technique for security. Statistical database security.		
4	April-May	**UNIT 4- Crash Recovery:** Failure classification Recovery concepts. Log base recovery techniques (Deferred and Immediate update) Checkpoints, Relationship between database manager and buffer cache. Aries recovery algorithm. Recovery with concurrent transactions (Rollback, checkpoints, commit) Database backup and recovery from catastrophic failure.	04	05
5	May	**UNIT 5: Other Databases:-** Introduction to Parallel and distributed Databases. Introduction to Object Based Databases. XML Databases. NoSQL Database. Multimedia Databases. Big Data Databases	04	04

Prof.P.N.Pardeshi

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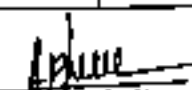**Class-F.Y.B.SC (Comp.Sci)**

DIV-A

Subject – ELC 121: Instrumentation Systems

Subject Teacher: Prof.A.P.Kulkarni

Syllabus Completed=100%

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	April	**Unit 1: Introduction to Instrumentation System** : Block diagram of Instrumentation system. Definition of sensor, transducer and Actuators, Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility.	08	08
2	April	**Unit 2: Sensors and Actuators :**Temperature sensor (Thermistor, LM-35), optical sensor (LDR), Passive Infrared sensor (PIR), Tilt Sensor, ultrasonic sensor, Motion sensor, Image Sensor, Actuators: DC Motor, stepper motor	10	10
3	May	**Unit 3: Smart Instrumentation System and Smart Sensors:** Block diagram of Smart Instrumentation system, Concept of smart sensor, Film sensors, Nano sensor	06	06
4	May	**Unit 4: OPAMP as signal Conditioner** :Concept, block diagram of Op amp, basic parameters (ideal and practical): input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, IC741/ LM324, Concept of virtual ground, Op amp as inverting and non inverting amplifier, Unity gain follower, Opamp as adder, substractor, Op amp as current to voltage and voltage to current convertor, Voltage to frequency converter, Op amp as comparator, Problems based on above Op Amp applications.	12	12

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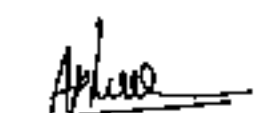**DIV-A**

Class-F.Y.B.SC (Comp.Sci)

Subject – ELC 122 : Basics of Computer Organisation

Subject Teacher: Prof.A.P.Kulkarni

SyllabusCompleted=100%

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	Feb	Unit 1: Flip-flops : RS Flip Flop using NAND gate, clocked RS Flip Flop, D Latch, J K Flip Flop,T Flip Flo .	05	05
2	March	Unit 2: Shift registers and Counters :Shift registers - SISO, SIPO, PISO, PIPO shift registers, Ring Counter using D Flip flop, Counters -Synchronous and Asynchronous type, 3-bit Up, Down and Up-Down counter, Concept of modulus Counters (Timing Diagram of all above are expected)	09	09
3	March/ April	Unit 3: Basics of Computer System :Basic Computer Organization, Concept of Address Bus, Data Bus, Control Bus. CPU Block Diagram and Explanation of each block, Register based CPU organization, Concept of Stack & its organization, I/O organization: need of interface, block diagram of general I/O interface	12	12
4	April	Unit 4: Memory Organization : Memory Architecture, Memory hierarchy, Types of Memories, Data Read/ Write process, Vertical and Horizontal Memory Expansion, Role of Cache memory, Virtual Memory	10	10

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K.T.S.P.MANDAL'S

HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-II

Class-S.Y.B.SC (Comp.Sci)   **DIV-A**

Subject – Data Structure and Algorithm-II

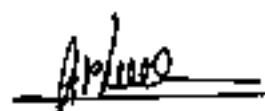**Subject Teacher: Prof.Y.J.Patangde**   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	February	UNIT-1: Tree:- Concept and Terminologies .Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree, Heap . Representation – Static and Dynamic . Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search, Tree traversals– preorder, inorder, postorder (recursive implementation), Level-order traversal using queue, Counting leaf, non-leaf and total nodes, Copy, Mirror. Applications of trees.1 Heap sort, implementation .2 Introduction to Greedy strategy. Huffman encoding (implementation using priority queue	10	10
2	February-March	UNIT 3-Graph :-Concept and terminologies Graph Representation –Adjacency matrix, Adjacency list, Inverse Adjacency list, Adjacency multilist Graph Traversals – Breadth First Search and Depth First Search (with implementation) .Applications of graph CBCS: Topological sorting Use of Greedy Strategy in Minimal Spanning Trees (Prims and	12	12

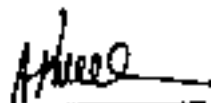|		Kruskals algorithm) Single source shortest path - Dijkstra's algorithm 3. Dynamic programming strategy. All pairs shortest path - Floyd Warshall algorithm 3. Use of graphs in social networks		
3	March-April	UNIT 2-Efficient Search Trees: - Terminology: Balanced trees - AVL Trees, Red Black tree, splay tree, Lexical search tree -Trie AVL Tree- concept and rotations Red Black trees - concept, insertion and deletion. Multi-way search tree - B and B+ tree - Insertion. Deletion	8	8
4	May	UNIT 4-Hash Table:-Concept of hashing Terminologies – Hash table,Hash function, Bucket, Hash address, collision, synonym, overflow etc. Properties of good hash function Hash functions : division function, MID square , folding methods Collision resolution techniques.1 Open Addressing - Linear probing, quadratic probing, rehashing.2 Chaining - Coalesced , separate chaining	6	7

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SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-II

Class-S.Y.B.SC (Comp.Sci)   DIV-A

Subject – Computer Networks-I

Subject Teacher: Prof. S.A.Randive   Syllabus Completed=100%

Sr. No.	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	April	**Unit 1:Introduction to Networks and Network Models** 1.Data communication, components, data representation . Networks, network criteria, network types - LAN, WAN, Switching, The Internet, Accessing the Internet . Network Software- Protocol hierarchies, Design Issues of the layer, Connection Oriented and Connectionless Services, . Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models.	8	7
2	April	**UNIT 2:Lower Layers :-** Communication at the physical layer, data rate limits - Noiseless channel (Nyquist bit rate), noisy channel (Shannon capacity), Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter .Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flags bits with Bit Stuffing, Physical Layer Coding Violations The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching Wired LANs - Standard Ethernet characteristics, Addressing, Access method,	10	10

		implementation, Fast and Gigabit Ethernet Wireless LANs - Architectural comparison, Characteristics, Access control, IEEE 802.11 CBCSarchitecture, Physical layer, MAC sublayer, Bluetooth architecture, Layers.		
3	May	**Unit 3 : Network Layer** Network layer services - Packetizing, Routing and forwarding, other services Open and closed loop congestion control IPv4 addressing- Address space, classful addressing, Subnetting, Supernetting, classless addressing, Network address resolution (NAT) Forwarding of IP packets- based on destination address, based on label Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options Mobile IP-addressing, agents, Three phases Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between 1Pv4 and 1Pv6 Routing - General idea, Algorithms - Distance vector routing, link state routing, pathvector routing	12	10
4	May	**Unit 4 : Transport Layer** Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, Acknowledgements, sliding window, congestion control Connectionless and Connection-oriented service, Port numbers Transport layer protocols- User datagram protocol, user datagram, UDP services Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP.	10	07

Prof.S.A.Randive

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SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 SEM-II

Class: S.Y.B.Sc. (Computer Science)   Div:A

Subject Name- Paper I MTC-241: Computational Geometry

Subject Teacher- Prof. J.B.Arude   SyllabusCompleted:100%

Sr. No	Month	Name of Topic	Allocated Lectures	Conducted Lectures
1	March	Unit 1. Two dimensional transformations: Introduction. Representation of points. Transformations and matrices. Transformation of points. Transformation of straight lines Midpoint Transformation Transformation of parallel lines Transformation of intersecting lines Transformation: rotations, reflections, scaling, shearing. Combined transformations. Transformation of a unit square. Solid body transformations. Translations and homogeneous coordinates.Rotation about an arbitrary point. Reflection through an arbitrary line.	12	10
2	April	Unit 2. Three dimensional transformations: Introduction, Three dimensional – Scaling, shearing, rotation, reflection, translation. Multiple transformations. Rotation about – an axis parallel to coordinate axes, an arbitrary line Reflection through – coordinate planes, planes parallel to coordinate planes , an arbitrary plane	08	10
4	April	Unit 3. Projection :Orthographic projections. Axonometric projections. Oblique projections . Single point perspective projection	08	08
5	May	Unit 4. Plane and space Curves: Introduction. Curve representation. Parametric curves. Parametric representation of a circle and generation of circle. 4 Bezier Curves – Introduction, definition, properties (without proof), Curve fitting (up to $n = 3$), equation of the curve in matrix form (upto $n = 3$)	08	08

Prof. J.B.Arude

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Class: S.Y.B.Sc. (Computer Science)

Div:A

Subject Name- Paper II MTC-242: Operations Research

Subject Teacher- Prof. A.R.Rakshe

Syllabus Completed:100%

Sr. No	Month	Name Of Topic	Allocated Lectures	Conducted Lectures
1	March	Unit 1: Linear Programming Problem I Introduction Definition and Examples Problem solving using Graphical method Theory of Linear Programming. Slack and surplus variables, Standard form of LPP, Some important definitions. Assumptions in LPP, Limitations of Linear programming. Applications of Linear programming. Advantages of Linear programming. Techniques . Simplex method, Big- M-method	12	10
2	April	Unit 2: Linear Programming Problem II Special cases of LPP : Alternative solution, Unbounded solution, Infeasible solution Duality in Linear Programming. Primal to dual conversion, Examples	08	10
4	April	Unit 3: Assignment Models Assignment Model -Introduction Hungerian method for Assignment problem	06	06
5	May	Unit 4: Transportation Models Introduction, Tabular representation Methods of IBFS (North-West rule, Matrix-minima, Vogel's Approximation), Algorithms The Optimality Test of Transportation Model (MODI method only)	10	10

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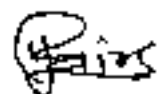Class: S.Y.B.Sc. (Computer Science)

Div:A

Subject Name- Embedded System Design (ELC-241)

Subject Teacher- Prof. Y.J.Patangde

Syllabus Completed: 100%

Sr. No	Month	Name of Topic	Allocated Lectures	Conducted Lectures
1	March	UNIT-I: Introduction to Embedded systems using single board computers (SBC):- Single boards computer block diagram, types, Comparison of SBC models, Specifications, I/O devices (Storage, display, keyboard and mouse), Network access devices.	08	08
2	March	Unit 2: Architecture of System on Chip (SOC):- Architecture of SoC, Basic version Broad Coprocessor, Pin Description of Raspberry Pi, Architectural features: CPU Overview, CPU Pipeline stages, CPU Cache Organization, Branch Prediction & Folding (Concept), GPU Overview	08	10
3	April	Unit 3:Programming using Python:- Overview of Rasberian OS (Operating System), Installation, different types of Operating Systems Basic Python Programming (Script programming):Variable & data types, Flow Control structures, Conditional statements (If...Then...else), Functions: I/O function (GPIO, Digital),Time functions, Library functions Basic Arithmetic Programs: Addition, Subtraction, Multiplication, Division	10	10
4	May	Unit 4 : Interfacing of devices using Python Programming : Basic interfacing: LED, Switch, LCD Internal Advanced: Bluetooth, Wifi, Ethernet, External advanced: Camera, Serial Communication GSM, Ultrasonic Sensor, PIR, Finger Print reader.	10	10

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K.T.S.P.MANDAL'S
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS COMPLETION REPORT
ACADEMIC YEAR-2022-2023 (SEM-II)

Class: S.Y.B.Sc.(Computer Science)   **Div:A**

Subject Name- Wireless Communication and Internet of Things (ELC242)

Subject Teacher- Prof.A.P.Kulkarni   **Syllabus Completed: 100%**

Sr. No	Month	Name of Topic	Allocated Lectures	Conducted Lectures
1	February	**Unit1: Wireless Communication: Cellular Telephony :-** Overview of wireless communication. Introduction of cellular telephony system: Frequency reuse, handoff strategies, Co-channel and adjacent channel interference, block diagram of mobile handset Overview of Cellular Telephony generations: 1G to 5G,3G (W-CDMA, UMTS), 4G(LTE) GSM: architecture, frame structure, mobility management, GPRS : architecture, application	12	14
2	March	**Unit 2 : Short Range Wireless Technologies and Location Tracking:** Short range Technologies : Bluetooth: Bluetooth architecture, Bluetooth protocol stack, Bluetooth frame structure Zigbee: Architecture, topologies, applications, Z wave: Protocol architecture, applications RFID: working of RFID system, types of RFID tags, RFID frequencies, applications Location Tracking: GPS system: components of GPS system (space segment, control segment, user segment), GPS receiver, Applications	12	15
3	April	**Unit 3: IoT Architecture** Introduction to IOT : Evolution of IOT, M2M and/or IOT, Seven layer architecture of IoT, Role of cloud in IoT, cloud topologies, Cloud access,	08	10

		Protocols in IoT. Cross connectivity across IoT system components: Device to Gateway-short range Wireless: cellphone as gateway, dedicated wireless• Access points Gateway to cloud: Long range connectivity. (wired, cellular, Satellite, WAN)• Direct Device to Cloud connectivity ,• Networking technologies: Low power local area networking (LPLAN), Low power wide area networking (LPWAN) technologies, comparison of LoRa, sigfox NB-IoT, Cat –M.		
4	May	Unit 4: IoT Applications Introduction to computer networks Types of networks : LAN, MAN, WAN, Wireless networks, Switching, Internet, Network topology : point to point, Star, Ring, Bus, Mesh, Tree, Daisy Chain, Hybrid Network devices : Repeater, Switch, Networking cables, Router, Bridge, Hub, Brouter, Gateway. Wired LANs:- Ethernet: Ethernet protocol, standard Ethernet, 100 MBPS Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, Computer network model: OSI and TCP/IP.	04	05

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DIV-A

Class-T.Y.B.SC (Comp.Sci)

Subject – Operating Systems-II

Subject Teacher: Prof.Y.J.Patangade

Syllabus Completed=100%

Sr.No.	Month	Name OF Topics	Allocated Lectures	Conducted lectures
1	February	UNIT-1: Process Deadlocks:- System model Deadlock Characterization - Necessary conditions, Resource allocation graph Deadlock Methods- Prevention and Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm Deadlock Detection Recovery from Deadlock - Process termination, Resource preemption File system Management	07	07
2	February	UNIT 2- File system Management :- File concept , File attributes, File operations Access Methods – Sequential, Direct, Other access methods Directory overview, Single level directory, Two level directory, Tree structure.directory, Acyclic graph directory, General graph directory Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation.Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps	06	06
3	March	UNIT 3- Disk scheduling :- Overview, Disk Structure Disk Scheduling, FCFS Scheduling, SSTF Scheduling, Scan Scheduling-Scan Scheduling, Look Scheduling , Disk Management	04	04
4	March/ April	UNIT 4- Introduction to Distributed operating systems & Architecture :- What is a distributed system, Design goals Types of distributed systems Architectural styles : Layered architectures , Object-based	11	11

		architectures. Resourcecentered architectures.System architecture -- Centralized organization. Decentralized organizations, peer-topeer systems, Hybrid architectures. Example architectures : Network file system(NFS). Web-based distributed systems		
5	April / May	**Unit 5:Mobile Operating Systems** Introduction Features Special Constraints and Requirements of Mobile Operating System Special Service Requirements ARM & Intel architectures – Power management Mobile OS architectures -- Underlying OS, kernel structure & native level programming. Runtime issues, Approaches to power management Commercial Mobile Operating Systems - Windows Mobile, iPhone OS (iOS), Android A Comparative Study of Mobile Operating Systems (Palm OS, Android, Symbian OS, Blackberry OS, Apple iOS)	07	07

Prof-Y.J.Patangade

Class-T.Y.B.SC (Comp.Sci)   DIV-A

Subject – Software Testing

Subject Teacher: Prof .P.P.Virkar   Syllabus Completed=100%

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	April	UNIT-1: Introduction to Software Testing :Basics of Software Testing – faults, errors and failures Testing objectives Principles of testing Testing and debugging Testing metrics and measurements Verification and Validation Testing Life Cycle	05	08
2	April	UNIT 2- Software Testing Strategies & Techniques :Testability - Characteristics lead to testable software. Test characteristics Test Case Design for Desktop, Mobile, Web application using Excel White Box Testing - Basis path testing, Control Structure Testing. Black Box Testing- Boundary Value Analysis, Equivalence partitioning. Differences between BBT & WBT	10	10
3	May	UNIT 3- Levels of Testing:A Strategic Approach to Software Testing Test strategies for conventional Software Unit testing Integration testing – Top-Down, Bottom-up integration System Testing – Acceptance, performance, regression, Load/Stress testing, Security testing, Internationalization testing. Alpha, Beta Testing Usability and accessibility testing Configuration, compatibility testing	10	10
4	May	UNIT 4- Testing Web Applications: Dimension of Quality, Error within a WebApp Environment Testing Strategy for WebApp Test Planning The Testing Process –an overview	06	06
5	May	Unit 5: Agile Testing :Agile Testing, Difference between Traditional and Agile testing, Agile principles and values, Agile Testing Quadrants, Automated Tests.	05	07

(Virkar.P.P)

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Class-T.Y.B.SC (Comp.Sci)   **DIV-A**

Subject – Software Testing Tools

Subject Teacher: Prof.Y.J.Patangade   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	February	**UNIT 1:Introduction to Test case design** :-How to identify errors, bugs in the given application. Design entry and exit criteria for test case, design test cases in excel. Describe feature of a testing method used. .	04	04
2	March	**UNIT 2- Test cases for simple programs** : Write simple programs make use of loops and controlstructures. Write Test Cases for above programs.	04	04
3	March/ April	**UNIT 3- Test cases and Test plan** : Write Test Plan for given application with resources required. Write Test case for given application. Prepare Test report for test cases executed	04	04
4	April	**UNIT 4- Defect Report :** Defect Life Cycle Classification of Defect Write Defect Report	03	03
5	May	Unit 5: Testing Tools : How to make use of Automation Tools Types of Testing Tools	03	03
6	April/May	**Demontration:- Assignments**	18	19

Prof.Y.J.Patangade

Class-T.Y.B.SC (Comp.Sci)

DIV-A

Subject – Compiler Construction

Subject Teacher: Prof.P.N.Pardeshi

Syllabus Completed=100%

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	February	**UNIT 1:Introduction** :- Definition of Compiler, Aspects of compilation. The structure of Compiler. Phases of Compiler – Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, code optimization, code generation. Error Handling. Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping	04	04
2	February-March	**UNIT 2: Lexical Analysis (Scanner):** Review of Finite automata as a lexical analyzer, Applications of Regular Expressions and Finite Automata (lexical analyzer, searching using RE), Input buffering, Recognition of tokens. LEX: A Lexical analyzer generator (Simple Lex Program)	04	04
3	March	**UNIT 3- Syntax Analysis (Parser):** Definition, Types of Parsers Top-Down Parser – Top-Down Parsing with Backtracking: Method & Problems Drawbacks of Top-Down parsing with backtracking. 3.2.3Elimination of Left Recursion (direct & indirect) 3.2.4Need for Left Factoring & examples Recursive Descent Parsing: Definition Implementation of Recursive Descent Parser Using Recursive Procedures 3.4 Predictive [LL (1)] Parser (Definition, Model) 3.4.1Implementation of Predictive Parser [LL (1)] . FIRST & FOLLOW Construction of LL (1) Parsing Table Parsing of a String using LL (1) Table. Bottom-Up Parsers Operator Precedence Parser -Basic Concepts Operator Precedence	14	15

			Relations form Associativity & Precedence Operator Precedence Grammar Algorithm for LEADING & TRAILING (with ex.) Algorithm for Operator Precedence Parsing (with ex.) Precedence Functions Shift Reduce Parser Reduction, Handle, Handle Pruning Stack Implementation of Shift Reduce Parser (with examples) LR Parser: Model, Types [SLR (1), Canonical LR, LALR]-Method & examples. YACC (from Book 3) —program sections, simple YACC program for expression evaluation		
4	April	**UNIT 4- Syntax Directed Definition:** Syntax Directed Definitions (SDD) Inherited & Synthesized Attributes Evaluating an SDD at the nodes of a Parse Tree, Example Evaluation Orders for SDD's Dependency Graph Ordering the Evaluation of Attributes S-Attributed Definition L-Attributed Definition Application of SDT Construction of syntax trees, The Structure of a Type 4. 4 Translation Schemes 4.4.1 Definition, Postfix Translation Scheme	07	07
5	April	**Unit 5: Code Generation and Optimization:** Compilation of expression – Concepts of operand descriptors and register descriptors with example. Intermediate code for expressions – postfix notations, Triples, Quadruples and Expression trees. Code Optimization – Optimizing transformations – compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction. Three address code DAG for Three address code The Value-number method for constructing DAG's. Definition of basic block, Basic blocks, and flow graphs Directed acyclic graph (DAG) representation of basic block. Issues in design of code generator	07	07

Prof. P.N.Pardeshi

Class-T.Y.B.SC (Comp.Sci)   **DIV-A**

Subject – Object Oriented Programming using Java – II

Subject Teacher: Prof.S.A.Randive   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	February	UNIT-I: Collections:- Introduction to the Collection framework List - ArrayList, LinkedList Set - HashSet, TreeSet, Map - HashMap and TreeMap Interfaces such as Comperator, Iterator, ListIterator, Enumeration	07	07
2	February-March	UNIT 2- Multithreading:- What are threads? Life cycle of thread Creating threads - Thread class , Runnable interface Thread priorities Running multiple threads Synchronization and interthread communication	06	06
3	March	UNIT 3 :Database Programming:- The design of jdbc Types of drivers Executing sql statements, query execution Scrollable and updatable Resultset	06	06
4	April	UNIT 4- Servlets and JSP:- Introduction to Servlet and Hierarchy of Servlet Life cycle of servlet Handing get and post request (HTTP) Handling data from HTML to servlet Retrieving data from database to servlet Session tracking – User Authorization, URL rewriting, Hidden form fields,Cookies and HttpSession Introduction to JSP, Life cycle of JSP Implicit Objects Scripting	12	10

		elements - Declarations, Expressions, Scriplets, Comments JSP Directives - Page Directive, include directive Mixing Scriplets and HTML JSP Actions - jsp:forward , jsp:include, jsp:useBean, jsp:setProperty and jsp:getProperty		
5	April	**Unit 5: Spring Framework** Introduction of Spring framework Spring Modules / Architecture Spring Applications Spring MVC Spring MVC Forms, Validation	06	04

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Class-T.Y.B.SC (Comp.Sci)   DIV-A

Subject – Data Analytics

Subject Teacher: Prof.S.A.Randive   Syllabus Completed=100%

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	Feb	**UNIT 1: Introduction to Data Analytics :-** Concept of data analytics Data analysis vs Data analytics Types of analytics Diagnostic Analytics, Predictive Analytics , Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis Mathematical models - Concept Model evaluation: metrics for evaluating classifiers - Class imbalance - AUC, ROC (Receiver-Operator Characteristic) curves, Evaluating value prediction model	06	05
2	March	**UNIT 2: Machine Learning Overview** :Introduction to Machine Learning, deep learning, Artificial intelligence Applications for machine learning in data science The modeling process Engineering features and selecting a model, Training the model, Validating the model, Predicting new observations Types of machine learning Supervised learning, Unsupervised learning, Semi-supervised learning, ensemble techniques Regression models 2.6. Concept of classification, clustering and reinforcement learning.	06	05
3	April	**UNIT 3: Mining Frequent Patterns, Associations, and Correlations :** What kind of patterns can be mined Class/Concept Description: Characterization and Discrimination, Mining Frequent Patterns, Associations, and Correlations, Classification and Regression for Predictive Analysis, Cluster Analysis, Outlier Analysis Mining	12	12

		frequent patterns - Market Basket Analysis. Frequent Itemsets, Closed Itemsets, and Association Rules Frequent Itemset Mining Methods Apriori Algorithm Generating Association Rules from Frequent Itemsets Improving efficiency of apriori algorithm Frequent pattern growth (FP-growth) algorithm			
4	April	**UNIT 4- Social Media and Text Analytics :** Overview of social media analytics Social Media Analytics Process, Seven layers of social media analytics, accessing social media data Key social media analytics methods Social network analysis Link prediction, Community detection, Influence maximization, Expert finding, Prediction of trust and distrust among individuals Introduction to Natural Language Processing Text Analytics : Tokenization, Bag of words, Word weighting : TF-IDF, n-Grams, stop words, Stemming and lemmatization, synonyms and parts of speech tagging Sentiment Analysis Document or text summarization Trend analytics Challenges to social media analytics	12	11	

Prof. S.A.Randive

Class-T.Y.B.SC (Comp.Sci)   **DIV-A**

Subject – Web Technologies - II

Subject Teacher: Prof.P.P.Virakar   **Syllabus Completed=100%**

Sr.No.	Month	Name of Topics	Allocated Lectures	Conducted lectures
1	Feb	**UNIT 1: Introduction to Web Techniques:-** Variables Server information Processing forms Setting response headers Maintaining state PHP error handling	06	06
2	Feb-March	**UNIT 2: XML :-**What is XML? XML document Structure PHP and XML XML parser The document object model The simple XML extension Changing a value with simple XML.	06	06
3	March	**UNIT 3: Java Script and Jquery:-** Overview of JavaScript Object Orientation and JavaScript Basic Syntax(JS datatypes, JS variables) Primitives, Operations and Expressions Screen Output and keyboard input(Verification and Validation) JS Control statements and JS Functions JavaScript HTML DOM Events(onmouseup, onmousedown, onclick, onload, onmouseover, onmouseout). JS Strings and JS String methods JS popup boxes(alert, confirm, prompt). Jquery library , Including jquery library in page Jquery selector , DOM manipulation using jquery	10	12

4	April	UNIT 4- Ajax:Introduction of AJAX, AJAX web application model AJAX –PHP framework Performing AJAX validation Handling XML data using php and AJAX Connecting database using php and AJAX.	06	05
5	April	UNIT 5:PHP framework CodeIgniter:- CodeIgniter - Overview, Installing CodeIgnite Application Architecture MVC Framework , Basic concept of CodeIgniter, Libraries Working with databases Load external JS and CSS page & redirecting from controller , Adding JS and CSS , Page redirection, Loading dynamic data on page & session management, cookies management	08	09

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