

ST. PHILOMENA'S COLLEGE (Autonomous), MYSURU-570 015

Subject: BOTANY REVISED SYLLABUS FOR B.Sc., UNDER SEMESTER SCHEME From The Academic Year 2016-17 Onwards The Scheme of Teaching and Examination

| ŗ | paper | le | Teaching h week | | ours/ | | Examination | | |
|--|--|---------------|--------------------|-----------|---------|----------|---|---------|-------|
| Semeste | Title of the] | Q P Coc | Theory | Practical | Credits | Duration | Theory/ practical paper mark max | A marks | Total |
| I | Paper- I Microbial Diversity, Viruses, Mycoplasma, Bacteria, Cyanobacteria and Mycology. | 16MA250 | 03 | - | 03 | 03 | 60 | 10 | 100 |
| | Practical paper -1 | 16MA 252 | | 03 | 1.5 | 03 | 20 | 10 | |
| п | Paper- II Plant Pathology, Plant Diversity-I – Algae and Bryophytes. | 16MB 250 | 03 | - | 03 | 03 | 60 | 10 | 100 |
| | Practical paper -II | 16MB 252 | | 03 | 1.5 | 03 | 20 | 10 | |
| III | Paper- III Plant Diversity II- Pteridophytes, Gymnosperms, Anatomy and Paleobotany. | 16MC 250 | 03 | | 03 | 03 | 60 | 10 | 100 |
| | Practical paper -III | 16MC252 | | 03 | 1.5 | 03 | 20 | 10 | |
| | Paper- IV Reproductive Biology of Angiosperms, Ecology, Ethnobotany and Economic Botany. | 16MD 250 | 03 | | 03 | 03 | 60 | 10 | |
| IV | Practical Paper- IV | 16MD 252 | - | 03 | 1.5 | 03 | 20 | 10 | 100 |
| | Paper-V Morphology and Taxonomy of Angiosperms | 16ME 250 | 03 | - | 03 | 03 | 80 | 20 | 200 |
| | Paper-VI Cell Biology, Molecular Biology and Evolution | 16ME 252 | 03 | - | 03 | 03 | 80 | 20 | |
| v | Practical Paper- V | 16ME254 | - | 02 | 01 | 03 | 40 | 10 | 300 |
| · | Practical Paper- VI | 16ME256 | | 02 | 01 | 03 | 40 | 10 | 500 |
| | Paper- VII Plant Physiology | 16MF250 | 03 | - | 03 | 03 | 80 | 20 | |
| | Paper- VIII Genetics, Genetic Engineering, Plant Biotechnology, Plant Breeding and Plant Proagation | 16MF252 | 03 | - | 03 | 03 | 80 | 20 | 300 |
| VI | Practical Paper- VII | RMF254 | - | 02 | 01 | 03 | 40 | 10 | 500 |
| | Practical Paper- VIII | RMF256 | - | 02 | 01 | 03 | 40 | 10 | |
| Dissertation Project Report – 30 marks. Viva – 20 Total marks = 50 | | | | | 34 | | 800 | 200 | 1000 |

FIRST SEMESTER PAPER – I

(MICROBIAL DIVERSITY, VIRUSES, MYCOPLASMA, BACTERIA CYANOBACTERIA AND MYCOLOGY) Theory 60 + 10 (IA) Marks 3 Hrs/wk = 42 Hrs

| UNIT-I | 3 Hrs |
|---|---------|
| Introduction and a brief account of Microbiology - Microbes from soil, air & water | 0 11 |
| UNIT-II Landmarks in Virology – History and Discovery | 8 Hrs. |
| Status of viruses in microbiology (Living & non-living characteristics) | |
| Structure and multiplication of TMV and Bacteriophage [T4]. General account of | |
| Symptoms, transmission and control of Tobacco mosaic disease, SARS, HIV, ZIKA, | |
| Viriods, Prions | |
| UNIT-III Museularma A concernt of Museularma History Discovery and | 2 Hrs |
| Characteristics Sandal spike disease – Symptoms and management | |
| UNIT-IV | 9 Hrs |
| Bacteria : History and discovery | |
| Occurrence, classification based on morphology and flagellation, Ultra structure, | |
| Genetic recombination conjugation transformation and transduction | |
| Role of bacteria in human welfare-As Natures' scavengers, Biofertilizers, Industrial | |
| curing of Tea, Tobacco, Leather, Retting of fibres, Alcohols and Acids. | |
| UNIT-V | 4 Hrs |
| Cyanobacteria : A general account of occurrence, structure, reproduction | |
| and economic importance. | |
| Type study : Spirulina and Nostoc, food value, biofertilizers, pioneers in plant succession biological indicators water blooms | |
| UNIT-VI | 13 Hrs. |
| MYCOLOGY : A general account of occurrence, thallus, Nutrition and Reproduction, | |
| Classification and Economic importance of fungi | |
| Type study : 1) Albugo,2) Rhizopus ,3) Pencillium ,4) Lycoperdon | |
| Cultivation of Mushrooms, Spawn production, Cultivation methods of Pleurotus on | 1 Hrs. |
| Paddy straw – polythene method, Nutritional values of Mushrooms. | |
| Lichens : Distribution types structure reproduction and economic importance | 2 Hrs. |

SECOND SEMESTER PAPER – II (PLANT PATHOLOGY, PLANT DIVERSITY 1- ALGAE AND BRYOPHYTES) Theory 60 + 10(IA) Marks

3 Hrs/week = 42 Hrs

| τ | JNIT - I | 15Hrs |
|---------|---|--------|
| Plant 1 | Pathology – Host parasite relationship, pathogenicity, general symptoms of plant | |
| disease | es, transmission and control. | |
| Gener | al account of Symptoms causal organisms and management of | |
| 1) | Tikka disease of groundnut | |
| 2) | Late blight of potato | |
| 3) | Koleroga of arecanut | |
| 4) | Grain smut of sorghum | |
| 5) | Wheat rust – Puccinia graminis | |
| 6) | Coffee rust. | |
| 7) | Citrus canker. | |
| 8) | Blast of Paddy. | |
| 9) | Red rot of sugarcane. | |
| UNIT | - 11 | 1 Hrs |
| A brief | f account of Biopesticides, Neem, Trichoderma, Bacillus thuringiensis in pest and | |
| disease | e control | |
| UNIT | - III | |
| Algae | : A general account, habitat, thallus, reproduction, economic importance. A brief | 14 Hrs |
| accoun | nt of classification. | |
| Type s | study : Chlorella, Oedogonium, Diatoms, Sargassum and Batrachospermum. | |
| UNIT | - IV | |
| Bryop | hytes : General characteristics and classification of bryophytes, Structure and | |
| Reproc | duction, Alternation of generations in | |
| 1. | Marchantia | 12 Hrs |
| 2. | Anthoceros | |
| 3. | Funaria | |
| Econor | mic Importance of Bryophytes | |

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THIRD SEMESTER PAPER – III

(PLANT DIVERSITY II- PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY) Theory: 60 + 10(IA) Marks

3 Hrs/wk 42 Hrs

| UNIT IPTERIDOPHYTA | 2 Hrs |
|--|--------|
| Introduction, general characters, classification | |
| External and internal structure and reproduction of the following forms: | |
| (Developmental details not required) | |
| a. Psilotum | |
| b. Selaginella | |
| c. Equisetum | |
| d. Pteris | |
| e. Azolla | |
| A brief account of Heterospory and seed habit | 15 Hrs |
| Stelar evolution among Pteridophytes | |
| UNIT IIGYMNOSPERMS | 2 Hrs |
| Introduction, general characters, classification | |
| External and internal structure and reproduction of the following forms(developmental stages | |
| not required): | |
| Cycas – Coralloid root, Young stem-leaflet anatomy | |
| Reproductive organs. | |
| Pinus – Stem anatomy (Young), old stem and Needle | |
| Reproductive organs. | |
| Gnetum – Stem anatomy (Young), Eccentric secondary growth | 10 Hrs |
| in stem, leaf anatomy, reproductive organs. | |
| A brief account of economic importance of Gymnosperms | |
| UNIT III-ANATOMY (Angiosperms) | 4 Hrs |
| Classification of Meristems – Theories of apical meristem | |
| A brief account of Simple and complex tissues | |
| Study of anotomy of Diast and Managet , Dasta, Stams and Laguas | |
| Study of anatomy of Dicot and Monocol : Roots, Stems and Leaves | (II |
| A baief account of Trick areas. Stores to and Laticifier | 6 Hrs |
| A orier account of frictiones, Stomata and Laticiters | |
| UNIT IV – PALEOBOTANY | 3Hrs |
| A brief account of the study of Geological time-scale, Fossil types | |
| Type study of Rhynia, Cycadeoidea | |
| | |

FOURTH SEMESTER PAPER – IV (REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, ECOLOGY, ETHNO BOTANY AND ECONOMIC BOTANY) THEORY: 60 + 10(IA) Marks 3 Hrs/wk = 42 Hrs

| UNIT - I REPRODUCTIVE BIOLOGY (Embryology) | 12 hrs |
|--|-----------------|
| I. Structure of Anther, T.S. of anther, Microsporogenesis, Development of male Gametophyte, Role of tapetum, A brief account of Palynology | |
| II. Structure of Ovule, types of placentation, types of Ovule, Megasporogenesis, Development of female Gametophyte (Polygonum type) | |
| III. Pollination Biology : A brief account of interaction between pollen and pistil and its importance IV. Fertilization – a general account, recent understanding about fertilization in Angiosperms V. Endosperm – Types and development – a brief account VI. Embryo - Dicot type with development – Crucifer type VII. Experimental embryology. Apomixis, Polyembryony. | |
| VII. Experimental embryology, Apomixis, Polyembryony VIII .Scope of Reproductive Biology | |
| UNIT- II ECOLOGY 1. Ecosystem Concepts and components of ecosystem, Classification and Marine water ecosystem. 2. Ecological factors- Light, temperature, precipitation, humidity, wind, biotic factors, topographic factors. 3. Study of Forest ecosystem and its types, deforestation and conservation of forest , forest policy and legislation. Agroforestry & Social Forestry, Dendrology. 4. Endemism, Endangered plants, Red Data Book. 5. Ecological adaptations Hydrophytes, Xerophytes, Halophytes, Parasitic flowering plants, Epiphytes (A brief account of stress exhibited by these groups, heat shock proteins, their use, plant defense mechanisms). 6. Plant succession: Definition, general account Eg: Xerosere. 9. Phytogeography- Definition, Vegetational types of Karnataka UNIT- III | 20 Hrs 4 Hrs |
| ETHNOBOTANY Introduction and significance Examples under Ethnobotany used by Tribal people. 1. Phyllanthus, 2. Hemidesmus Indicus 3. Terminalia chebula 4. Strichnos nux-vomica, 5. Aloe vera 6. Boerhaavia diffusa 7. Withania somnifera. Importance of sacred groves and their conservation. Narcotic Plants : 1. Opium, 2. Cannabis, 3. Tobacco | |

UNIT - IV6 HrsECONOMIC BOTANY (Cultivation aspects not required)Food plants : Rice, Wheat, Maize, PotatoPulses: Pigeon Pea, Bengal gram, Black gram, Green gramFibers : Cotton, Jute, CoirOil and Fat : Ground nut, Coconut, Safflower, SunflowerFirewood, Timber and Bamboos: Rose wood, Teak and Honne and AcaciaSpices : Cardamom, Clove, Cinnamon, PepperBeverages : Coffee and TeaMedicinal plants : Rawoulfia serpentine, Vinca rosea, Adathoda vasica , Centellaasiatica

FIFTH SEMESTER PAPER -V (MORPHOLOGY OF ANGIOSPERMS, TAXONOMY OF ANGIOSPERMS) THEORY : 80 + 20(IA) Marks

3 Hrs/wk = 42 Hrs

| UNIT - I I. Technical description of Angiosperm Plants, Floral diagram, Floral formula | 10 Hrs. |
|---|---------|
| (Monocotyledons, Gamopetalae, Polypetalae). | |
| II. Shoot system: 1. Stem- Parts- Stem modifications : Rhizome, Tuber, Corm, Bulb, Runner, Stolon, Offset, Sucker, Phylloclade (Opunita, Euphorbia tirucalli), Cladode(Ruscus, Asparagus) | |
| 2. Leaf Parts - Phyllotaxy, Simple and Compound leaves (Pinnate and Palmate) Leaf modifications : Tendril, Spine, Phyllode, Pitcher. | |
| 3. Inflorescence : Racemose Types, Cymose types and Special types (Cyathium, Thyrsus, Verticillaster, Hypanthodium) | |
| Fruits : Classification – Simple (Dry dehiscent, dry indehiscent, Schizocarpic and Fleshy types), Aggregate and Composite types. | |
| Structure of seed : Dicot Structure of Grain : Monocot (Maize / Sorghum or any grades). | |
| UNIT – II TAXONOMY Principals of Taxonomy. | 32 Hrs |
| Systems of classification, Broad outline of Bentham and Hooker. Engler and Prantl and Cronquist's systems, ofClassifications, a brief account of APG III (Angiosperm Phylogeny Group). | |
| Plant Nomenclature- Binomial system, ICN(ICBN) Principles and aims Recent trends- Chemotaxonomy, Cytotaxonomy | |
| UNIT - III Field and Herbarium Techniques, Herbaria, Botanical gardens, Floras and their importance, Botanical Survey of India and its functions | |
| Study of following Families according to Bentham and Hooker's system of Classification | |
| DICOTS: 1.Magnoliaceae, 2.Brassicaceae, 3.Malvaceae, 4.Rutaceae, 5.Fabaceae, 6.Myrtaceae, 7. Cucubitaceae, 8. Apiaceae, 9. Asteraceae 10. Asclepiadaceae, 11.Solanaceae, 12. Acanthaceae 13. Apocynaceae 14. Verbenaceae 15. Rubiaceae. 16.Lamiaceae, 17.Amaranthaceae 18.Euphorbiaceae. | |
| MONOCOTS : 1. Orchidaceae 2. Musaceae 3 Liliaceae 4.Arecaceae, 5. Poaceae | |

FIFTH SEMESTER PAPER -VI

(CELL BIOLOGY, MOLECULAR BIOLOGY AND EVOLUTION)

THEORY : 80 + 20 Marks

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3 Hrs/wk = 42 Hours

| CELL BIOLOGY | 6 Hrs |
|--|---------|
| UNIT-I | |
| Principles and uses of Light, Phase-contrast, Fluorescent and Electron Microscopes, Ultra structure of Prokaryotic and Eukaryotic cells. Nucleus, Chromosome-Structure and number, Karyotype and Idiogram, Nucleosome concept. | |
| UNIT – II | 10 Hrs |
| Cell cycle – Mitosis, Meiosis and their significance | |
| Numerical variation in chromosomes, Euploidy and Aneuploidy (Detailed account) Structural changes in Chromosomes: Deletion, duplication, Inversion And Translocation | |
| MOLECULAR BIOLOGY | 10 Hrs |
| UNIT- III | 10 1115 |
| Nucleic acids as genetic material-Avery et al's experiment. Franenkal Conrat's experiment | |
| DNA – Chemistry, structure, types and function | |
| RNA - Chemistry, structure, types and function | |
| DNA-replication - mechanism of replication in Prokaryotes and Eukaryotes | |
| Gene Concept- Gene structure, action, One gene-one polypeptide concept | |
| UNIT -IV | 11 Hrs |
| Central dogma of Molecular Biology, Genetic code, Protein Synthesis- | |
| Transcription, RNA splicing and Translation, Gene regulation in prokaryotes (Operon concept) and Eukaryotes, Transposable elements in prokaryotes and eukaryotes- Barbara | |
| Mc Clintok experinment | |
| UNIT- V | 5 Hrs |
| Evolution: A brief account of the origin of Life and concept of evolution | |
| Theories of Organic Evolution- Lamarckism, Darwinism, Weismanism, | |
| Devries theory Neo Darwinism – Isolation, Mutation, Gene flow, Genetic Drift and | |
| Speciation. | |

SIXTH SEMESTER PAPER – VII (PLANT PHYSIOLOGY) THEORY : 80 + 20(IA) Marks

| UNIT - I Brief account of Biomolecules- carbohydrates, proteins, lipids. | 12 Hrs |
|---|--------|
| Plant and Water Relations -Diffusion, Imbibition, Osmosis, Plasmolysis. Cell as an Osmotic system, Concept of water Potential | |
| Short Distance Transport – Active and Passive absorption of water, Absorption of minerals- Donnan's Equilibrium, Carrier, Concept. | |
| Long Distance Transport – Ascent of Sap, Root Pressure Theory, TCT, Theory, Phloem Transport- Munch Hypothesis. | |
| Transpiration –Definition, Types, Mechanism of Stomatal Transpiration-Starch-Sugar Inter Conversion Hypothesis, Action of potassium ion transport, Antitranspirants, Guttation. | |
| A brief account of mineral nutrition, Role of P, Mg, K, Mn, Bo, Cu. Hydroponics. | |
| UNIT - II Growth – Definition, Phases of growth, Sigmoid curve Growth Hormones – Chemical nature, biosynthesis and application of Auxins, Gibberellins, Cytokinins, ethylene and ABA Growth and Movements – Trophisms- Photo, Thigmo, Geo and Hydrotrophism. | 8 Hrs |
| UNIT - III | |
| Enzymes – Classification, properties and mode of action. Photosynthesis –Introduction, significance, photosynthetic apparatus, mechanism-light and dark reactions – C3, C4 and C2 pathways. Respiration - Introduction, significance, types Aerobic – mechanism, Glycolysis, Kreb's cycle, Terminal Oxidation, ATP Synthesis, Chemiosmotic theory. Anaerobic respiration – alcoholic and lactic acid fermentation UNIT – IV | 14 Hrs |
| Nitrogen metabolism – nitrogen fixation, mechanism- biological nitrogen fixation, Nitrate | 3 Hrs |
| reduction. Amino acids and their synthesis. UNIT - V Photoperiodism and Vernalisation Instrumentation- spectrophotometer, Chromatography, Electrophorosis turnes and technique | 5 Hrs |
| types and technique. | |

SIXTH SEMESTER PAPER – VIII (GENETICS, GENETIC ENGINEERING, PLANT BIOTECHNOLOGY ,PLANT BREEDING AND PLANT PROPAGATION) THEORY : 80 + 20(IA) Marks

3 Hrs/wk = 42 Hours

12 Hrs

GENETICS

UNIT – I

Introduction – Mendel's law of inheritance, Test cross, Back cross, Incomplete dominance. Interaction of Genes – **Complementary gene action** – flower color in sweet pea

Supplementary Interaction – Snapdragon.

Epistasis – fruit color in summer squashes

Multiple factor inheritance – Kernal colour in Wheat.

Linkage and crossing over – linkage in maize mapping by 2 point test cross.

Cytoplasmic inheritance – Plastid inheritance in *Mirabillis* – / Cytoplasmic male sterility in Maize. Mutation – spontaneous and induced, Transposable genetic elements.

UNIT- II

GENETIC ENGINEERING

A concise account of methods used in DNA- Technology, Restriction enzymes, Ligases, Cloning vectors, Construction of Recombinant DNA, and C-DNA libraries. A brief account of Genomics and its applications. A brief account of hazards and safe guards in Recombinant Technology.

UNIT-III

PLANT BIOTECHNOLOGY

Introduction – Scope of Biotechnology

Tissue culture – Techniques, differentiation, totipotency, Organogenesis, Somatic hybridization, Somatic embryos and synthetic seeds. Anther culture – haploid production and its significance. Gene transfer methods – Agrobacterium mediated gene transfer, Electrophoration and shot gun method.

Applications of Biotechnology – Transgenic plants in crop improvement, use of microbes in Industry and Agriculture. Production of Penicillin, Alcohol, Single Cell Proteins.

UNIT- IV

PLANT BREEDING

A brief history – Aims and objectives of plant breeding - Techniques in plant breeding – hybridization (intergeneric and interspecific), Hybrid vigour and Hybrid seed production. Germplasm maintenance, pollen banks, and quarantine measures. Plant breeding work done in India:- paddy and cotton.

UNIT- V

PLANT PROPAGATION – grafting, layering, Basic nursery methods and green House techniques, Advantages of plant propagation

8 Hrs

13 hrs

6 Hrs

3 Hrs

FIRST SEMESTER PRACTICAL PAPER – I (MICROBIAL DIVERSITY, VIRUSES, MYCOPLASMA, BACTERIA CYANOBACTERIA AND MYCOLOGY) Practicals 20 + IA 10 Marks

One practical of 3 hours per week

- 1. **PRACTICAL-I**: Study of Microscope Use , care and Mounting techniques.
- **PRACTICAL -II** : Microbial instruments Inoculation loops, Hot air oven, Incubator,
 i. Pressure cooker,
- PRACTICAL -III : Sterilization techniques, study of microbes in water, air and soil by

 Petri-plate exposure method (2 Practicals)
- 4. **PRACTICAL -IV** : Demonstration of anti microbial activity.
- 5. PRACTICAL- V : Simple and double staining of bacteria Crystal violet / Safranin
- 6. PRACTICAL- V1 : Study of TMV, Sandal spike, Citrus canker

Type study of the following forms:

- 7. PRACTICAL- VI1 Spirulina and Nostoc, Scytonema.
- 8. PRACTICAL -VII1 Albugo, Rhizopus.
- 9. PRACTICAL IX Pencillium, yeast, Lycoperdon.
- **10. PRACTICAL X** Media preparation and culturing of fungi.
- **11. PRACTICAL XI** Serial dilution, methods of inoculation.
- **12. PRACTICAL XII** Lichens.

Revision & Test

SECOND SEMESTER PRACTICAL PAPER- II) (PLANT DIVERSITY 1- ALGAE AND BRYOPHYTES) Practicals 20 + IA 10 Marks

One practical of three hours per week

- 1. **PRACTICAL I** : Methods of staining and mounting of Algae.
- 2. **PRACTICAL II** : Study of morphological/Internal structure/Reproduction of *Chlorella, Oedogonium.*
- 3. **PRACTICAL III** : Study of morphological/ Internal structure/ Reproduction of *Diatom, Hydrodictyon.*
- 4. **PRACTICAL IV** : Study of morphological/ Internal structure/ Reproduction of *Sargassum, Batrachospermum.*
- 5. **PRACTICAL V** : Study of fungal diseases. Tikka disease of groundnut, Late blight of potato, Koleroga of arecanut, White rust, Blast of Paddy.
- 6. **PRACTICAL VI** : Grain smut of sorghum, wheat rust, coffee rust, Red rot of sugarcane.
- 7. **PRACTICAL VII** : Study of Biopesticides- Neem, *Trichoderma and Bacillus thuringiensis*.
- 8. **PRACTICAL VIII**: Study of morphology, Internal Structure and reproduction in *Marchantia*
- 9. **PRACTICAL IX :** Study of morphology, Internal Structure and reproduction in *Anthoceros*
- **PRACTICAL X** : Study of morphology, Internal Structure and reproduction in *Funaria*

Revision, Practical Test

THIRD SEMESTER PRACTICAL PRACTICALS – III (PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY) Practicals 20 + IA 10 Marks

One practical of three hours per week

- 1. **PRACTICAL 1**. Sectioning and staining method, Slide preparation, The material for slide preparation may be chosen from any Angiosperm-Roots, Stems and Leaves.
- 2. **PRACTICAL 2**: Study of Tissue systems: Parenchyma, Collenchyma Selerenchyma, Xylem and Phloem.
- 3. **PRACTICAL 3:** Anatomy of Dicot and Monocot Stems (Materials may be chosen from Sunflower *Tridax/Zinnia/* Grass/Sorghum)
- 4. **PRACTICAL 4 :** Anatomy of Dicot and Monocot Roots and Leaves (Materials may be chosen from *Cicer*, *Musa/Sorghum*-**Roots** *Tridax/Zinnia*, Grass/*Sorghum*/Maize **Leaves**.
- 5. **PRACTICAL 5 :** Study of morphology, anatomy and reproductive organs of *Psilotum* and *Selaginella*.
- 6. **PRACTICAL 6:** Study of morphology, anatomy and reproductive organs of *Equisetum*.
- 7. **PRACTICAL 7:** Study of morphology, anatomy and reproductive organs of *Pteris*
- 8. **PRACTICAL 8:** Study of morphology, anatomy and reproductive organs of *Azolla*
- 9. **PRACTICAL 9:** Study of morphology, anatomy and reproductive organs of *Cycas*
- 10. PRACTICAL 10: Study of morphology, anatomy and reproductive organs of Pinus
- 11. PRACTICAL 11: Study of morphology, anatomy and reproductive organs of Gnetum
- 12. **PRACTICAL 12:** Study of morphology, anatomy and reproductive organs of Fossil forms-with slides and Photographs.

Revision & Practical Test

FOURTH SEMESTER- PRACTICAL PAPER- IV (REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, ECOLOGY, ETHNO BOTANY AND ECONOMIC BOTANY Practicals 20 + IA 10 Marks

One practical of 3 hours per week

- 1. **PRACTICAL 1:** Study of Anther (T.S), Placentation and Ovules of different types (L.S).
- 2. **PRACTICAL 2:** Mounting of different pollen grains in Lactophenol (*Hibiscus, Catharanthus, Solanum, Lycopersicum,* Honey-sample).
- 3. **PRACTICAL 3:** Mounting of Endosperm (*Cucumis*) Mounting of Embryo (*Crotalaria*).
- **4. PRACTICAL4:** Hydrophyte: *Elodea*, Anatomy of *Elodea* Stem Xerophyte: *Casuarina*, *E.tirucali*, *Opuntia*; Anatomy of *Casuarina* stem, and *Nerium* leaf.
- 5. **PRACTICAL 5 :** Epiphyte : *Vanda*, Anatomy of Orchid root Halophyte: Pneumatophore, Vivipary, Anatomy of Pneumatophore Parasite: *Cuscuta, Anatomy cuscuta on host*.
- 6. **PRACTICAL 6:** Estimation of Oxygen in water.
- 7. **PRACTICAL 7** : Estimation of total hardness of water.
- 8. **PRACTICAL 8** : Study of useful plants for man –Economic Botany
- 9. PRACTICAL 9 : Study of useful plants for man Economic Botany
- 10. **PRACTICAL 10**: Study of some medicinal plants used by tribal people.
- 11. PRACTICAL 11. Study of Narcotic plants Opium, Cannabis, Tobacco

Revision & Practical test

FIFTH SEMESTER PRACTICAL PAPER – V (MORPHOLOGY OF ANGIOSPERMS, TAXONOMY OF ANGIOSPERMS) Practicals 40 + IA 10 Marks

One Practical of 3 Hours/Week

- 1. Study of modifications of Stem, Leaf.
- 2. Study of types of Inflorescences and fruits.
- 3. Study of the plants belonging to the Families prescribed in the theory
 One or Two plant representatives per Family.
- 4. Technical description of the plants and construction of floral diagrams with floral formula
- 5. Field Visits : Field trips in the local areas to be conducted to study, identify and record the name of the plant, its family and uses.
- 6. Preparation of Five Herbarium sheets and submitting the same to the examination
- 7. (Mostly of weed plants)
- 8. As a part of the curriculum, a Botanical trip/ tour of about two days shall be undertaken, to study the different types of vegetation / herbal garden / Ayurvedic college during the semester vacation and Tour Report to be submitted for valuation for the coming 6 th Semester Practical Examination.

FIFTH SEMESTER PRACTICAL PAPER – VI (CELL BIOLOGY, MOLECULAR BIOLOGY AND EVOLUTION) Practicals 40 + IA 10 Marks

One Practical of 3 Hours / Week

- 1. Preparation of Fixatives and Stains
- 2. Study of Mitosis-Onion root tip
- 3. Study of Meiosis- Onion flower Buds
- 4. Micrometry
- 5. Karyotype Study
- 6. Isolation of DNA from Coconut endosperm
- 7. Photographs and Charts from Evolution, Molecular biology and Cell Biology.

SIXTH SEMESTER PRACTICALS PAPER- VII (PLANT PHYSIOLOGY) Practicals 40 + IA 10 Marks

One Practical of 3 Hours/Week

Major Experiments

- 1. Effect of temperature on cell permeability
- 2. Experiment on the relationship between transpiration and absorption
- 3. Experiment on Oxygen evolution during photosynthesis 1) Effect of light intensity
- 4. Separation of chloroplast pigment by paper chromatography.
- 5. Experiment to demonstrate the activity of enzyme catalase.
- 6. Suction force due to Transpiration.
- 7. Ganong's respirometer

Minor Experiments:

- 1. Determination of transpiration by Ganong's Potometer)
- 2. Experiment to demonstrate fermentation (Kuhne's vessel)
- 3. Measurement of growth by using Auxanometer
- 4. Experiment to demonstrate Geotrophism, Phototropism and Hydrotropism
- 5. Determination of rate of transpiration by using cobalt chloride paper
- 6. Demonstration of Starch in the leaf.

Biochemical tests for carbohydrates, fats and proteins.

- Study of instruments spectrophotometer, Chromatography, Electrophorosis types and technique.
- Charts and photographs- Bolting, Avena curvature test, Hydroponics, Transmission of vernalin in plants, Thigmotrophism.

SIXTH SEMESTER PRACTICALS PAPER- VIII (GENETICS, GENETIC ENGINEERING, PLANT BIOTECHNOLOGY ,PLANT BREEDING AND PLANT PROPAGATION) Practicals 40 + IA 10 Marks

One Practical of 3 Hours/Week

- 1. Solving the genetic problems related to theory portion. (Monohybrid / Dihybrid crosses/Interaction of genes).
- 2. Hybridization techniques emasculation and bagging.
- 3. Estimation of pollen viability (staining method) and pollen germination (hanging drop method).
- 4. Observation of biotechnology products- Antibiotic, Rhizobium, Single Cell Protein.
- 5. Tissue culture Equipments- Autoclave, laminar air flow
- 6. Tissue culture techniques
 - a) Media preparation
 - b) Explant preparation
 - c) Inoculation
- 7. Identification of photos and charts- callus, multiple shoots, Genomic library, gene cloning, c- DNA, PBR- 322, Ti plasmid.
- 8. Preparation of Synthetic seeds
- 9. Plant propagation- grafting, cutting and layering.
- 10. Visit to biotech lab.

PROBLEMS ON MONOHYBRID CROSS :-

- 1. In Tomatoes Red fruit color (R) is dominant over yellow (r) A pure Red fruited plant is crossed to a yellow fruited one, What will be the appearance of F_1 ? The F_1 are interbred and produce 320 off springs in the F_2 . How many of them will be red and how many yellow? What will be the genotypes of F_2 and in what numbers ?
- 2. In man, brown eye (B) is dominant over blue eye (b) A man and his wife both brown eyed, beget A blue eyed child. What are the genotypes of the parents ?
- 3. In pea plant, Tallness (T) is dominant over dwarfness (t) A tall pea crossed with dwarf produces offering of which 50% are tall and 50% are dwarf. What are the genotypes of the parents?
- 4. In Drosophila, grey (G) is dominant to black (g). Two grey bodied flies when crossed produce 150 grey and 49 black. Give the genotypes of the parents and genotypes of the progeny.

PROBLEMS ON DI-HYBRID RATIO

- 1. I garden pea, yellow seed color (Y) is dominant over green (y) and round seed shape (R) is dominant over wrinkled (r). The character par segregate separately. A pure yellow wrinkled variety is crossed to a pure green round. Give the phenotypes and genotypes of F_1 and phenotypic ratio of F_2 generation.
- 2. A Man has brown eyes and red hair. He married a women with blue eyes and dark hair. Give the genotype of the parents and children.

Note : Dark hair(D) is dominant over red (d) and brown eyes(B) is dominant over blue (b)

3. In garden pea, tall (T) is dominant over dwarf (t) and red flower color (R) is dominant over white (r).

A all red plant is crossed to dwarf white plant. Give the genotypes of P_1 and F_1 generations. Give the phenotypic ratio of F_2 .

4. A tall red when crossed with dwarf red produces a dwarf white. Give the genotypes of the parents.

PROBLEMS OF INTERACTION OF FACTORS :

In maize, the aleurone color (seed color) is expressed due to the effect between two different gene pairs. A maize variety with purple colored corn (AACC) is crossed to colorless corn (aacc). Give the phenotypes and genotypes of F_1 and F_2 generations. What will be the phenotypic ratio in F_2 generation?

- Two white flowered strains of the sweet pea (*Lathyrus odoratus*) were crossed, producing an F1 with only purple flowers. Random crossing among the F1 produced 96 progeny plants, 53 exhibiting purple flowers and 43 with white flowers.
- a) What phenotypic ratio is approximated by the F2?
- b) What type of interaction is involved?
- c) What were the probable genotype of the parental strains.

PROBLEMS ON 2 POINT TEST CROSSES.

1. In tomato, red fruit (R) is dominant over yellow fruit (r) and yellow flowers (W f) are dominant over white flowers (w f). A cross is made between true breeding plants with red fruit and yellow flowers and plants with yellow fruit and white flowers. The F1 generation plants are then test crossed to plants with yellow fruits and white flower. The following results are obtained.

333 red fruits / yellow flowers64 red fruits / white flowers

58 yellow fruits/ yellow flowers350 yellow fruits/ white flowersCalculate the map distance between the two genes.

Two different traits affecting pod characteristics in garden pea plants are enclosed by genes found on chromosome 5. Narrow pod is recessive to normal pod, yellow pod recessive to green pod. A true breeding plant with narrow, green pods was crossed to a true breeding plant with normal yellow pods. The F1 were then test crossed to plants with narrow, yellow

pods. The following results were obtained. 144 narrow green pods

150 narrow yellow pods

11 Normal yellow pods

9 Normal green pods

How far apart are these two genes?

SCHEME OF VALUTION FOR BOTANY PRACTICAL EXAMINATION I SEMESTER PAPER- I (MODEL QUESTION PAPER) (MICROBIAL DIVERSITY, VIRUSES, MYCOPLASMA, BACTERIA, CYANOBACTERIA AND MYCOLOGY)

| | Time – 3 Hours | Aax marks 20 |
|-----|---|----------------------------|
| Ι | Identify the specimens A&B with reasons and labeled sketches (One from Cyanobacteria and one from fungi) Identification with reasons-01Labelled sketches-01 | 4 marks |
| II | Prepare a temporary stained slide of the material C Sketch, label identify with reasons. Leave the preparation for evaluat Staining and mounting - 2 marks Sketch, label ,reasons - 2 marks (Protophyta / fungi) | 4 marks ion. |
| III | Write critical note on D , E (From Protophyta i.e. bacterial/viral diseases/microbiological Instruments and one from fungi and cultures) | 4 marks |
| IV | Identify the Microslides F , G , Reasons and labelled sketch-01 Identification with reasons -01 | 4 marks (|
| V | Simple/ differential staining of Bacterial Procedure H Sketch, label, identify with reasons, leave the preparation for evaluat Staining and mounting Procedure | tion . 1 mark 1 mark |
| V1 | Serial dilution/ inoculation of fungi. Procedure – 1 mk, preparation- 1 mk | 2 marks |
| | ***** | |

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION

II SEMESTER PAPER- II ((MODEL QUESTION PAPER)

| Time – 3 Hours | | | Max marks 20 |
|----------------|---------|-------------------|---------------------------|
| (PLANT D | IVERSIT | FY 1- ALGA | E AND BRYOPHYTES) |

- I. Identify the specimens A and B with reasons and labeled sketches
 (from Algae and Bryophyta)
 Labeled sketch-01 Identification with reasons-01
- II. Prepare a temporary stained slide of the material C Sketch, label

and identify with reasons. Leave the preparation for evaluation.4 marksStaining and mounting = 02Identification, labeled sketch, reasons = 02

III Write critical notes on **D** and **E** (from algae/pathology/biopesticides and Bryophyta) 4 marks

 IV Identify the Microslides F, G, H and I with reasons and labeled sketches 8 marks Identification with reason-01 Labeled sketch-01 (One from algae/pathology/and from Bryophyta)

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION III SEMESTER PAPER-III (MODEL QUESTION PAPER) (PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY)

| | Time – 3 Hours | Max marks 20 |
|----|---|---|
| Ι | Identify the specimens A and B , giving reasons (One from Pteridophytes and one from Gymnosperms) | 4 marks |
| II | Prepare a temporary stained transverse section of the given materia Label and Identify giving suitable reasons (Preparation – 2 marks, Identification with diagram-1 mark and rea | al C . Sketch, 4 marks ason-1 mark) |
| Ш | Write critical notes on D and E (One from Pteridophytes and one from Gymnosperms) | 4 marks |
| IV | Identify the microslides- F.G.H and I , with labeled sketches, givin (One from Pteridophytes, one from Gymnosperms, one from Anat One from Paleobotany) | ng Suitable reasons. omy and 8 marks |
| N | OTE : In Paleobotany, Photograph or Slide may be kept. | |

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION IV SEMESTER PAPER- IV (MODEL QUESTION PAPER)

(REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, ECOLOGY, ETHNOBOTANY AND ECONOMIC BOTANY)

| | Time – 3 Hours | Max marks 20 |
|-----|--|-------------------------|
| Ι | Estimate total hardness/ / oxygen in the given sample of water | A 4 marks |
| II | Write Ecological features of B &C (From Hydrophytes, Xerophytes, Epiphytes, Halophytes, Parasitic flowering plants) | 1 1/2x2= 3 marks |
| III | Identify the slides D and E (Select one from Ecological Anatomy and one from Embryolog | y) 4 marks |
| IV | Prepare a temporary stained mount of F (Select from Pollen grains/ embryo / endosperm) | 2 marks |
| V | Comment on G,H,I, J (Economic Botany) | 4 marks |
| VI | Comment on K & L (Ethnobotany) | 3 marks |

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION V SEMESTER PAPER- V (MODEL QUESTION PAPER) Practical V (Based on Theory paper V)

(MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS)

| Time – 3 Hours | Max marks 40 |
|--|---|
| I Assign the plants A,B and C to their respective diagrams | families, giving reasons with labeled (3 x 5) = 15 marks |
| (one from Monochlamydeae / Monocots, one fr | rom polypetalae and one from |
| Gamopetalae) | |
| Family name-1 mark, | |
| Classification – 1 mark | |
| Characters with important diagrams | |
| II Describe plant D , in technical terms, | 5 marks |
| | |
| III Draw the floral diagram with floral formula of | E 5 marks |
| Floral diagram = (4 marks), floral formula-(1 r | nark) |

- IV Identify the specimens F, G and H, mentioning the type of modifications giving labeled diagram and suitable reasons (3 x 3) = 9 marks (one from one from stem, one from leaf modifications)
- V. Write critical notes on I and J (One from Inflorescence, one from fruit)

(2x3) = 6 marks

IA Marks= 10 mks a. Record= 5 mks b. Herbarium= 5 mks.

SHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION V SEMESTER PAPER- VI (MODEL QUESTION PAPER) (Based on Theory Paper VI) CELL BIOLOGY, MOLECULAR BIOLOGY AND EVOLUTION

Time – 3 Hours

Max marks 40

I. Make temporary squash preparation of the material A mitosis. Identify, sketch and label the stage with reasons. Leave the preparation for evaluation. **7 marks**

| Preparation | 3 marks |
|----------------|---------|
| Procedure | 1 marks |
| Identification | 1 mark |
| Labeled sketch | 1 mark |
| Reasons | 1 marks |

II. Make temporary squash preparation of the material B meiosis. Identify, sketch and label the stage with reasons. Leave the preparation for evaluation. **7marks**

| Preparation | 3 marks |
|----------------|---------|
| Procedure | 1 marks |
| Identification | 1 mark |
| Labeled sketch | 1 mark |
| Reasons | 1 marks |

III. Identify the given stages C and D (one from Meiosis I and one from Meiosis II permanent slides)

| Identification-1 | mark, labeled | diagram and | l reason- 1 mar | 4 marks |
|------------------|---------------|-------------|-----------------|----------------|
|------------------|---------------|-------------|-----------------|----------------|

 IV. Comment on E
 2 marks

 (Fixative or stains)
 Procedure for Preparation

 Procedure for Preparation
 1 marks

 Uses
 1 mark

 V. Micrometry F
 a) Calibrate one Ocular micrometer using the stage micrometer and write

 the procedure
 3 marks

b) Measure the length given material G **3 marks**

V1. Critically comment on Karyotype of H

VI1. Comment on I, J, K

One from Molecular biology and one from Evolution photographs and microscopes.

- 1. DNA Replication
- 2. Lac Operon
- 3. Dr. H. G. Khorana
- 4. Sickle cell anemia
- 5. Miller's Experiment
- 6. Lamarck
- 7. Darwin
- 8. Weismann
- 9. Microscopes.
- IA Marks= 10 mks
- a. Record= 5 mks
- b. Tour report= 5 mks.

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION VI SEMESTER PAPER- VII (MODEL QUESTION PAPER) (Based on Theory Paper VII) (PLANT PHYSIOLOGY) Time – 3 Hours Max marks 40

| 1) | Conduct the major experiment 'A'. Write the procedure, record the re- | esult, write the |
|----------|---|--------------------|
| | (Requirement 2, Setting 5, Procedure 5, Result 3 marks) | 15 Marks |
| 2) | Comment on minor experiment B, C, D | 9 Marks |
| 3) 1V | Write critical notes on E (any one instrument) (Identification 1 mark, critical notes 3 marks) . Comment on the physiological importance F (charts) | 4 Marks 4 Marks |
| 4) | Perform Micro Chemical test of E. Write the procedure by elimination Method (Result 4 marks, Procedure 6 marks) | on 8 Marks. |

IA Marks= 10 mks a. Record= 5 mks b. Submission= 5 mks.

2 marks

(3x 4)=12 mks

SCHEME OF VALUTION OF BOTANY PRACTICAL EXAMINATION VI SEMESTER PAPER- VIII (MODEL QUESTION PAPER (Based on Theory Paper VIII) GENETICS, GENETIC ENGINEERING, PLANT BIOTECHNOLOGY, PLANT PROPAGATION AND PLANT BREEDING

| | Time – 3 Hours | Max marks 40 |
|-----|---|----------------------------------|
| I. | Estimation of pollen viability / Pollen germination of A (Requirement 1 mark, Procedure and significance 2 marks, Prepara | 6 marks ation 3 marks) |
| II. | Solve the Genetic Problems B and C (B- Problems on Mendelian inheritance C- Problems on interaction of genes) | 2 x 5= 10marks |
| III | Perform the Biotechnology Experiments D (requirements 2 marks, Procedure 2 marks, Preparation 4 marks) (Media preparation/ Explant preparation/ Inoculation) | 8 marks |
| IV. | Prepare the synthetic seeds E and write the Procedure (Preparation 2 marks, Procedure 2 marks) | 4 marks |
| V. | Comment on F,G,H (from plant breeding, genetic Engineering, Plant Biotechnology). | 3 x 3 =9 marks |
| VI. | Perform plant propagation method I (procedure 1 mk, preparation 2 mks) | 3 marks. |
| та | | |

IA Marks= 10 mks. a. Record= 5 mks. b. Industrial visit report= 5 mks.

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