
2016

Syllabus

For

B.Sc. (Honours) Botany

Under choice Based credit system (CBCS)

SEMESTER - I

Core course I: Microbiology and Phycology – 100 marks

(Credits-6: Theory-4, Practical-2)

THEORY (Each class 1 hour): PRACTICAL (Each class 2 hours)

{75 marks (Mid Sem 15 + End Sem 60)}

{Lectures: 60 (40 Theory + 20 Practical)}

- Unit-I** Introduction to microbial world, microbial nutrition, growth and metabolism → 2 Lect.
- Viruses:-** Discovery, physicochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses with reference to vaccine production, medicine and as casual organisms of plant diseases. → 5 Lect.
- Unit-II Bacteria:** Discovery, general characteristics, types-Archaeobacteria, Eubacteria, wall-less forms (Mycoplasma), cell structure, nutritional types, reproduction-vegetative, asexual and recombination, (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine). → 5 Lect.
- Unit-III Algae :** General characteristics; Ecology and distribution; range of thallus organization; Cell structure and components; cell wall, pigment system, reserve food (of only groups represented in the syllabus), flagella; and methods of reproduction, classification; criteria, system of Fritch. Significant contributions of important phycologists (F. E Fritsch, G.M. Smith, R. N. Singh, T.V. Desikachary, H. D. Kumar, M.O.P. Iyengar). Role of Algae in the environment, agriculture, biotechnology and industry. → 6 Lect.
- Unit- IV Cyanophyta :** Ecology and occurrence, range of thallus organization, cell structure, heterocyst, reproduction, economic importance; role in biotechnology. Morphology and life cycle of *Nostoc*. → 5 Lect.
- Chlorophyta :** General characteristics, occurrence, cell structure and reproduction. Morphology and life cycles of *Chlamydomonas*, *Volvox*, *Oedogonium*, *Coleochaete*. → 5 Lect.
- Unit - V Charophyta :** General characteristics; occurrence, morphology, cell structure and life cycle of *Chara*; evolutionary significance. → 2 Lect.
- Xanthophyta:** General characteristics; occurrence, morphology, cell structure and life-cycle of *Vaucheria*. → 3 Lect.
- Phaeophyta:** Characteristics; occurrence, morphology, cell structure and reproduction. Morphology and life cycles of *Ectocarpus*. → 3 Lect.
- Rhodophyta:** General characteristics; occurrence, morphology, cell structure and life-cycle of *Polysiphonia*. → 4 Lect.

Practical (20 classes, each class of 2h)

1. Electron micrograph/ photograph of lytic and lysogenic cycle.
2. Sterilization and Preparation of culture media.
3. Gram staining (Identification and observation of bacteria).
4. Photographs/Electron micrographic of Bacteria, binary fission.
4. Temporary preparation of vegetative and reproductive structure *Nostoc*, *Chlamydomonas*, *Volvox*, *Oedogonium*, *Coleochaete*, *Chara*, *Vaucheria*, *Ectocarpus*, *Fucus* and *Polysiphonia*. Study of permanent slides of the above specimen.

Sahayal

M. P. Rao

SEMESTER - I

Core course II: Biomecules and Cell Biology – 100 marks
(Credits-6: Theory-4, Practical-2)

THEORY (Each class 1 hour): PRACTICAL (Each class 2 hours)
{75 marks (Mid Sem 15 + End Sem 60)
{Lectures: 60 {40 Theory + 20 Practical}

- Unit-I Biomolecules:** Water; Structure and properties; pH and buffer. — 2 Lect-
Carbohydrates: Nomenclature and classification of Carbohydrate, structure and function of Monosaccharide – Glucose and Fructose; Disaccharides – Sucrose and Lactose; Polysaccharide – Cellulose and Starch. → 3 Lect-
Lipids: Definition and classification of Lipid structure and function of Fatty acid and triacyl glycerol. → 2 Lect-
Amino acid: Structure and classification of amino acid. → 1 Lect-
Nucleic acid:- Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA. → 3 Lect-
Unit-II Protein: Structure of amino acids; Peptide bonds; levels of protein structure-primary, secondary, tertiary and quaternary; Isoelectric point; Protein denaturation and biological roles of proteins. → 2 Lect-
Bioenergetics: Laws of thermodynamics, concept of free energy, endergenic and exogenic reactions, coupled reactions, redox reaction, ATP: structure, its roles as a energy currency molecule. → 3 Lect-
Enzymes: Structure of enzymes: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; classification of enzymes; features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced – fit theory), Michaelis- Menten equation, enzyme inhibition and factors affecting enzyme activity. → 4 Lect-
Unit – III The cell: Cell as unit of structure and function; Characteristics of prokaryotic and eukaryotic cells. → 2 Lect-
Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; membrane transport- Passive, active and facilitated transport. → 3 Lect-
Unit – IV Cell organelles: Nucleus; Structure – nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. → 3 Lect-
Cytoskeleton: Role and structure of microtubules, microfilament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semi-autonomous nature of mitochondria and chloroplast. Endoplasmic Reticulum, Golgi Apparatus, Lysosomes. → 6 Lect-
Unit – V Cell division: Mitosis, Meiosis, Cell cycle. → 6 Lect-
Practical (20 classes, each class of 2h)
1. Preparation of normal, molar & molal solutions.
 2. Hydrogen ion concentration and determination of pH of acid and base.
 3. Qualitative test for sugar.
 4. Qualitative test for lipids.
 5. Qualitative test for proteins.
 6. Study of mitosis in onion root tip cells by squashing technique.
 7. Study of meiosis in onion anther by squashing technique.
 8. Karyotypic study of chromosome.
 9. Induction of Nitrate reductase by Nitrate ion and light.

Dabank

Mah

SEMESTER – II

Core course III: Mycology and Phytopathology – 100 marks
(Credits-6: Theory-4, Practical-2)

THEORY (Each class 1 hour): PRACTICAL (Each class 2 hours)
{75 marks (Mid Sem 15 + End Sem 60)}
{Lectures: 60[40 Theory + 20 Practical]}

Unit-I Introduction to true fungi: Definition, General characteristics; Affinities with plants and animals; Thallus organization; Cell wall composition; Nutrition; Classification. → 5 Lect

Zygomycota: General characteristics; Ecology; Thallus organisation; life cycle with reference to *Rhizopus*. → 4 Lect

Ascomycota: General characteristics (asexual and sexual fruiting bodies); Ecology; life cycle, Heterokaryosis and parasexuality; life cycle and classification with reference to *Saccharomyces*, *Aspergillus*, *Penicillium*, *Alternaria*. → 6 Lect

Unit – II Basidiomycota: General characteristics; Ecology; life cycle and classification with reference to black stem rust on wheat *Puccinia* (Physiological Specialization), loose and covered smut (symptoms only), *Agaricus*, fairy Rings and Mushroom cultivation. → 6 Lect

Oomycota: General characteristics; Ecology; life cycle and classification with reference to *Phytophthora*, *Albugo*. → 5 Lect

Unit – III Symbiotic associations: Lichen – Occurrence; General characteristics; Growth forms and range of thallus organization; Nature of associations of algal and fungal partners; Reproduction. → 4 Lect

Unit – IV Applied Mycology: Role of fungi in biotechnology, Application of fungi in food industry (flavour & texture, fermentation, Baking, organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology. → 5 Lect

Unit – V Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; symptomology; diseases cycle and environmental relation; prevention and control of plant diseases. Bacterial disease – Citrus canker. Viral diseases – Tobacco Mosaic viruses. Fungal diseases – Early blight of potato, Black stem rust of wheat, white rust of crucifers. → 5 Lect

Practical(20 classes, each class of 2h)

1. Introduction to the world of fungi (Unicellular, coenocytic/septate mycelium, ascocarps & basidiocarps).
2. *Rhizopus*: study of asexual stage from temporary mounts and sexual structures through permanent slides.
3. *Aspergillus* and *Penicillium*: study of asexual stage from temporary mounts. study of sexual stage from permanent slides/photographs
4. *Puccinia*: Herbarium specimens of Black stem Rust wheat/mounts of spores on wheat and permanent slides of both hosts.
5. *Agaricus*: Specimen of button stage and full grown mushroom; sectioning of gills of *Agaricus*
6. *Albugo*: Study of symptoms of plant infected with *Albugo*; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.

Indrani

Mahar

7. Lichen: Study and growth forms of Lichens(crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures(soredia and apothecium)through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza(photographs).

10. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Viral diseases, fungal diseases included in course.

Sahapul

Naha

SEMESTER – II

Core course IV: Archegoniate – 100 marks

(Credits-6: Theory-4, Practical-2)

THEORY (Each class 1 hour): PRACTICAL (Each class 2 hours)

{75 marks (Mid Sem 15 + End Sem 60)}

{Lectures: 60[40 Theory + 20 Practical]}

Unit – I Introduction: Unifying features of archegoniates; Transition to land habit; Alternation of generations. → 2 Lect.

Unit – II Bryophytes: General characteristics; Adaptations to land habit; Classification; Range of thallus organization. Classification (up to family). *Riccia*, *Marchantia*, *Anthoceros*, *Sphagnum* and *Funaria* (development stage not included). Ecological and economic importance of bryophytes with special reference to *Sphagnum*. → 10 Lect.

Unit – III Pteridophytes: General characteristics, Classification (up to family), morphology, anatomy and reproduction of *Selaginella*, *Equisetum* and *Marsilea*. (Developmental details not to be included). Heterospory and seed habit, telome theory, stelar evolution. Ecological and economic importance. → 12 Lect.

Unit – IV Gymnosperms: General characteristics, Classification (up to family), morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Ginkgo* and *Gnetum*. (Developmental details not to be included). Ecological and economic importance. → 8 Lect.

Unit – V Fossils: Geographical time scale, fossils and fossilization process. Morphology, anatomy and affinities of *Rhynia*, *Calamites*, *Lepidodendron*, *Lyginapteris* and *Cycadeoidea*. → 8 Lect.

Practical (20 classes, each class of 2h)

1. *Riccia* - Morphology and Anatomy of thallus.
2. *Marchantia* - Morphology and Anatomy of thallus, whole mount of rhizoids & scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of sporophyte (all permanent slide).
3. *Anthoceros* - Morphology of thallus, dissection of sporophyte (to show stomata, spores, pseudoelaters, columella) (temporary slides), vertical section of thallus (permanent slide).
4. *Sphagnum* - Morphology and Anatomy of plant, whole mount of leaf (permanent slide only).
5. *Funaria* - Morphology, whole mount of leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, longitudinal section of capsule and protonema.
6. *Selaginella* - Morphology, whole mount of leaf with ligules, transverse section of stem, whole mount of microsporophyll (temporary slides), longitudinal section of strobilus (permanent slide).
7. *Equisetum* - Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of sporangiophore, whole mount of spores (wet & dry) (temporary slides), transverse section of rhizome (permanent slide).
8. *Marsilea* - Morphology, transverse section of rachis, sporocarp.
9. *Cycas* - Morphology (coralloid roots, bulbil, leaf), whole mount of microsporophyll, transverse section of coralloid root, transverse section of rachis, vertical section of leaflet, vertical section of microsporophyll, whole mount of spores (temporary slides), longitudinal section of ovule, transverse section of ovule, transverse section of root (permanent slide).

Sahani
Neha

10. *Pinus* – Morphology (long and dwarf shoots, whole mount of dwarf shoot, male and female cones), transverse section of Needle transverse section of stem, longitudinal section of transverse section of male cone, whole mount of microsporophyll, whole mount of microspores (temporary slides), longitudinal section of female cone, tangential longitudinal section & radial longitudinal sections stem (permanent slide).

11. *Gnetum* – Morphology (stem, male & female cones), transverse section of stem, vertical section of ovule (permanent slides).

12. Botanical excursion.

P. Mohan
Shahani

Shahani