GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

B.Sc. -I (BOTANY)
SESSION:2020-2021
PAPER -I (Course Code- BBO01)
BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

UNIT -I

VIRUSES: General characteristics, types of viruses based on structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle.Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages.Mycorrhiza-Types and Significance.

UNIT –II

BACTERIA: General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and Gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, Rhizobium, Azatobactor, Anabena.

UNIT-III

FUNGI: General account of habit and habitat, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi. Heterothallism and Parasexuality. Outlines of classification of fungi. Economic importance of fungi. Life cycles of Saprolegnia, Albugo, Aspergillus, Peziza, Agaricus, Ustilago, Puccinia, Alternaria and Cercospora. VAM Fungi

UNIT-IV

ALGAE: Algae: General characters, range of thallus organization, Gaidukov phenomenon, reproduction, life cycle patterns and economic importance.Classification, Systematic position, occurrence, structure and life cycle of following genera:Nostoc, Gloeocaspsa,Volvox,Oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia.

UNIT–V

Lichens-General account, types, structure, nutrition, reproduction and economic importance.Mycoplasma: Structure and importance.Blue Green Algae (BGA) in nitrogen economy of soil andreclamation of Ushar land. Mushroom Biotechnology

Books Recommended:

Dubey R.C. and Maheshwari D.K. A text book of Microbiology,S. Chand Publishing, New Delhi

Presscott, L. Harley, J.and Klein, D. Microbiology, 7th edition, Tata Mc Graw-Hill Co.New Delhi

Sharma P.D., Microbiology and Plant pathology,Rastogi Publication. New Delhi.

Alexopolous, C.J. Mims, C.W. and Blackwell, MM.Introduction to Mycology,John Wiley & Sons.

Dubey H.C. An Introduction to Fungi,Vikas Publishing, New Delhi

Mehrotra R.S. & Agrawal A., Plant Pathology,Tata McGraw, New Delhi

Sharma P.D. Plant Pathology, Rastogi Publishers, Meruth.

Srivastava, H.N. Fungi, Pradeep Publications, Jalandhar

Webster, J. & Weber, R.Introduction to Fungi,Cambridge University Press, Cambridge

Kumar H.D.Introduction to Phycology ,Aff. East-west Press, New Delhi

Lee RE,Phycology, Cambridge University Press U.K.

Srivastava, H.N., Algae, Pradeep Publications, Jalandhar

Pandey S.K. Quick Concept of Botany, Lambert Academic publishing, Germany

Pandey S.N., Mishra S,P.& Trivedi P.S.A Text Book of Botany (Vol.-I), Vikas Publishing, New Delhi

Singh, Pandey and Jain, A Text book of Botany,Rastogi Publication, Meerut.

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
B.Sc. -I (BOTANY)
SESSION: 2020-2021

PAPER–II (Course Code- BBO02)
(BRYOPHYTES,PTERIDOPHYTES, GYMNOSPERMS ANDPALAEOBOTANY)

UNIT–I

BRYOPHYTA:General characteristics, affinities, range of thallus organization, generalclassification and economic & ecological importance, Systematic position, occurrence,morphology anatomy and reproductive structure inRiccia, Marchantia, Pellia, Anthoceros,Funaria.Vegetative reproduction in Bryophytes, Evolution of sporophytes.

UNIT-II

PTERIDOPHYTES:General characteristics, affinities, economic importance and classification,Heterospory and seed habit, stellar system in Pteridophytes, Apospory and apogamy, Telometheory,Azollaas Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of Psilotum,Lycopodium, selaginella, Equisetum, Marsilea.

UNIT-IV

Gymnosperm: General characteristics, affinities, economic importance and classification, Morphology, anatomy and reproduction inCycas, PinusandEphedra.

UNIT-V

PALAEOBOTANY: Geological time scale, types of fossils and fossilization,Rhynia, study ofsomefossil gymnosperms.Lygenopteris

Books Recommended:

Parihar, N.S.The Biology and Morphology of Pteridophytes,Central Book Depot, Allahabad.

Parihar,N.S.An introduction to Bryophyta Vol.I:BryophytesCentral Book Depot, Allahabad.

Sambamurty,AVSS,A textbook of Bryophytes, Pteridophytes, Gymnosperms andPalaeobotany, IK International Publishers.

Pandey SN, Mishra SP and Trivedi PS A text Book of Botany (Vol.II), Vikas Publishing, New Delhi

B.Sc. I (BOTANY)

PRACTICAL

Study of external (Morphorgical) and internal (microscopic/anatomical) features of representative genera given in the theory.

1. **Algae:***Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria,Chara,Ectocarpus, Sargassum, Batrachospermum*

2.Gram staining

3.**Fungi**: Albugo, *Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora*

4.**Bryophyta**: *Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria*

5.**Pteridophyta**: Lycopodium, Selaginella, Equisetum, Marsilea.

6.**Gymnosperm**: *Cycas, Pinus, Epherda*.

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG (C.G.)
B.Sc. Part-II
BOTANY
SESSION-2020-2021
PAPER –I(Course Code- BBO03)
PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY

M.M. 50 **Min. 17**

UNIT-I

Bentham and Hooker system of classification.Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy andchemotaxonomy. Preservation of Plant material and Herbarium techniques. Important botanical gardens and herbaria of India, Kew Botanical garden, England.

UNIT-II

Systematic position, distinguishing characters and economic importance of the followingfamilies, Ranunculaceae, Magnoliaceae, Brassicaeae, Rosaceae,Papaveraceae, Caryophyllaceae,Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

UNIT-III

Economic Botany: Botanical name, family, part used and uses of the following economicallyimportant plants, fiber yielding plants; Cotton, jute, sun, hemp, coir.Timber yielding plants: Sal,Teak, Shisham and Pine.Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy,Brahmi, Sarpgandhaof medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat,Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato.Fruit plants: Pear, Peach, Litchi.Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages : Tea, Coffee RubberCultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia. Ethnobotany in context of Chhattisgarh.

UNIT-IV

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.

UNIT-V

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules,megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self-incompatibility, fertilization, endosperm, embryo, polyembryony, apomixes and parthenocarpy.

Books Recommended:

Singh, Pandey,Jain. Diversity and Systematics of Seed Plants, Rastogi Publications Merrut
Sharma OP, Plant Taxonomy, Tata Mc Graw Hill, New Delhi
Pandey BP, Taxonomy of Angiosperms, S. Chand Publishing, New Delhi
Pandey, BP, Plant Anatomy, S.Chand Publishing, New Delhi
Pandey, BP, Economic Botany, S.Chand Publishing, New Delhi
Bhojwani, SS and Bhatanagar SP, Embryology of Angiosperm, Vikas Publication House, New Delhi
Singh, Pandey, Jain, Embryology of Angiosperms, Rastogi Publication, Meerut
Sharma, V, Alum, A. Ethnobotany, Rastogi Publications, Meerut Tayal, MS Plant Anatomy, Rastogi Publication, Meerut

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
B.Sc. Part –II
BOTANY
SESSION-2020-2021
PAPER –II(Course Code- BBO04)
ECOLOGY AND PLANT PHYSIOLOGY

M.M. 50 **Min. 17**

UNIT-I

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptations in hydrophytes, xerophytes and epiphytes.

UNIT-II

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids Biogeochemical cycles:carbon cycle, nitrogen cycle and phosphorus cycle

UNIT-III

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

UNIT-IV

Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C3, C4 CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis. Respiration: Aerobic and anaerobic respiration, Glycolysis, Kreb's cycle, factors affecting respiration, R.Q.

UNIT-V

Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

Books Recommended:

1. Koromondy, EJ. Concepts of Ecology, Prentice Hall, USA
2. Singh, JS Singh SP and Gupta SR. Ecology and Environmental Science and Conservation, S. Chand Publishing, New Delhi
3. Sharma, PD. Ecology and Environment, Rastogi Publications, Merrut
4. Hopkins, WG and Huner, PA. Introduction to Plant Physiology, John Wiley and Sons.
5. Pandey SN and Sinha BK, Plant Physiology, Vikas Publishing, New Delhi

6. Taiz, L and Zeiger. E. Plant Physiology, 5th edition, Sinauer Associates Inc. M.A, USA
7. Srivastava, HS Plant Physiology and Biotechnology, Rastogi Publications, Meerut.

B. Sc. –Part II
BOTANY (PRACTICAL)

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories.
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O_2 in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Study of anther and ovule
12. Anatomy of Monocot/Dicot stem/leaf/root.
13. Primary anomalous structure of stem (Nyctanthes, Boerhaavia) andAnamolous secondary growth in Dracaena, Bignonia.

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
B.Sc. – Part III
BOTANY
SESSION-2020-2021
PAPER-I(Course Code- BBO05)
PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY

M.M. 50 **Min. 17**

UNIT-I

Plant-water relations:

- Importance of water to plant life, physical properties of water, diffusion and osmosis, absorption, transport of water and transpiration physiology of stomata.
- Mineral nutrition: Essential macro and micro-elements and their role; mineral uptake; deficiency and toxicity symptoms.

UNIT-II

Transport of organic substances

- Mechanism of phloem transport ; source-sink relationship ; factors affecting translocation
- Basic of enzymology Discovery and nomenclature, characteristics of enzymes, concept of holoenzyme aposnzyme, coenzyme and cofactors, regulation of enzyme activity, mechanism of action.
- Photosynthesis Significance; historical aspects, photosynthetic pigments, action spectra and enhancement effects; concept of two pholosystems, Z-scheme, photo-phosphorylation, Calvin cycle, C4 pathway, CAM plants, photorespiration.

UNIT-III

Respiration:

- ATP - the biological energy currency. aerobic and anaerobic respiration, Kreb's cycle, electron transport mechanism (chemi-osmotic theory), redox potential, oxidative phosphorylation; pentose phosphate pathway.
- Nitrogen and lipid metabolism: Biology of nitrogen fixation .importance of nitrate reductase and its regulations ; ammonium assimilation ; structure and function ot lipids, fatty acid biosynthesis , Beta-oxidation , saturated and unsaturated fatty acids, storage and mobilization of fatty acids.

UNIT-IV

Growth and development –

- Definitions , phases of growth and development, kinetics of growth, seed dormancy, seed germination and factors of their regulation, plant movements ; the concept of photoperiodism , physiology of flowering , florigen concept, biological clocks ;
- Physiology of senescence, fruit ripening . plant hormones auxins, gibberellins, cytokinins, abscisic acid and elhylene, history of their discovery, biosynthesis

and mechanism of action , pholomorphogenesis , phyiochromes and cryptochromes, their discovery, physiological role and mechanism action.

UNIT-V

- Genetic engineering: Tools and techniques of recombinant DNA technology, cloning vectors , genomic and cDNA library ; transposable elements ; techniques of gene mapping and chromosome walking.
- Biotechnology : Functional definition , basic aspects of plant tissue culture , cellulartotipotency, differentiation and morphogenesis ; biology of Agrobacterium , vectors for gene delivery and marker genes ; salient achievements in crop biotechnology

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
B.Sc. Part-III
BOTANY
SESSION-2020-2021

PAPER-II(Course Code- BBO06)

ECOLOGY AND UTILIZATION OF PLANTS

M.M. 50 **Min. 17**

UNIT-I

- Plants and environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota.
- Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes), temperature (thermoperiodicity), tight (photopenodism, heliophytes and sciophytes) and salinity.

UNIT-II

- Community Ecology: Community characteristics, frequency, density, cover, life forms biological spectrum; ecological succession.
- Ecosystems: Structure, abiotic and biotic components; food chain, food web, ecological pyramids, energy flow; biogeochemical cycles of carbon, nitrogen and pnosphorus.

UNIT-III

- Population ecology: Growth curves; ecotypes; ecads.
- Biogeographical regions of India
- Vegetation types of India Forests and grasslands.

UNIT-IV

- Utilization of Plants,
- Food plants: Rice, wheat, maize, potato, sugarcane.
- Fibres Chiton and jute.
- Vegetables Groundnut, mustard and coconut.
- General account of sources of firewood, timber and bamboos.

UNIT-V

- Spices General account
- Medicinal plants General account
- Beverages Tea and coffee.
- Rubber

Suggested Laboratory Exercises (Physiology)

1. To study the permeability of plasma membranes using different concentrations of organic solvents,
2. To study the effect of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
5. Comparison of the rate or respiration of various plant parts.
6. Separation of chloroplast pigment by solvents method.
7. Determining the osmotic potential of vacuolar sap by plsmolytic method.
8. Determining the water potential of any tuber.
9. Separation of amino acids in a mixtue by paper chromatography and their identification by comparison with standards.
10. Bioassay of auxin, cytokmin, GA ABA and ethylene using appropriate plant material
11. Demonstration of the technique of micropropagation by using different explants, e.g. axillary buds, shoot rnenstems.
12. Demonstration of the technique of anther culture.
13. Isolation of protoplasts from different tissues using commercially available enzymes.
14. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.

Suggested Laboratory Exercises (Ecology)

1. To determine minimum number of quadrats required for reliable estimate of biomass in grasslands.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkair's Standard frequency diagram.
3. To estimate importance value index for grassland species on the basis of relative frequency, relative density and relative biomass in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the aboveground plant biomass in a grassland.
6. To determine Kemp's constant for dicot and monocot leaves and to estimate the leaf areaindex of a grassland community.

7. To determine diversity indices (richness, Simpson, Shannon-Wiener) in grazed andprotected grassland.
8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH and temperature of different water bodies.
12. To measure dissolved oxygen content in polluted and unpolluted water samples.
13. To estimate salinity of different water samples.
14. To determine the percent leaf area injury of different leaf samples collected around pollutedsites.
15. To estimate dust holding capacity of the leaves of different plant species.

PRACTICAL Suggested Laboratory Exercises (for Utilization of Plants)

1. Food Plants: Study of the morphology, structure and simple microchemical tests of thefood storing tissues in rice, wheat, maize, potato and sugarcane, Microscopic exmaination
of starch in these plants (excepting sugarcane)
2. Fibres: Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibers. Microscopic study of cotton and test forcellulose, Sectioning and staining of jute stem to show the location and development of fibers. Microscopic structure. Test for lignocellulose.
3. Vegetable oils: Study of hand sections of groundnut, mustard and coconut and stainingof oil droplets by Sudan III and Sudan Black.
4. Field visits: To study sources of firewood (10 plants), timber-yielding trees (10 trees) andbamboos. A list to be prepared mentioning special features.
5. Spices: Examine black pepper, cloves, cinnamon (hand sections) and opened fruits ofcardamom and describe them briefly.
6. Preparation of an illustrated inventory of 10 medicinal plants used in indigenous systemsof medicine or allopathy : Write their botanical and common names, parts used anddisease/disorders for which they are prescribed.
7. Beverages: Cut Sections of boiled coffee beans and tea leaves to study the characteristicstructural features.
8. Rubber: Collect illustrative materials of Hevea brasillensis ; morphology of the plant andtapping practices, history of rubber. List the many uses of rubber.