DEPARTMENT OF BOTANY, ST. XAVIER'S COLLEGE (Autonomous), Mumbai.
S. Y. B. Sc. Botany Syllabus (2016-2017)

SEMESTER-III Course: S.BOT.3.01 PLANT DIVERSITY- II

LEARNING OBJECTIVES

The students will be able to-

- Understand the importance of bacteria and methods of their cultivation.
- Learn about the causal organisms of plant diseases.
- Learn the life cycles of the individuals belonging to Algae, Fungi and Lichens.

Unit I: MICROBIOLOGY : Basics principles of staining; culture media preparation; pure culture methods: Classification of bacteria based on mode of nutrition; Biofertilizers and methods of application; Bacteria in sulphur cycle; Bacteria in Phosphate solubilization.
Unit II: ALGAE AND LICHENS: Algae- Structure life cycle and systematic position of *Vaucheria* (Xanthophyta), *Sargassum* (Phaeophyta), *Batrachospermum* (Rhodophyta). Lichens- Classification, structure, method of reproduction and ecological significance.
Unit III: FUNGI AND PLANT PATHOLOGY : Fungi- Structure life cycle and systematic position of *Erysiphe, Fusarium*. Plant pathology- diseases, symptoms, causative organism, disease cycle and control measures of rust of wheat and late blight of potato.

Practicals- Course: S.BOT PR.3.01

1. Sterilization techniques, preparation of nutrient agar.
2. Preparation of slants and plates, Study of streak plate method.
3. Effect of plant extract (Turmeric / Garlic) on microbial growth by agar diffusion method.
4. Study of stages in the life cycle of *Vaucheria, Sargassum,* and *Batrachospermum,* diatoms.
5. Structure of crustose, foliose and fruticose lichens and their reproductive structures.
6. Study of stages in the life cycle of *Erysiphe* and *Fusarium.*
7. Study of diseases, (a) rust of wheat (*Puccinia*) (b) late blight of potato.

CIA- multiple choice questions / assignments / presentation / field report / test.

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SEMESTER-III Course: S.BOT.3.02 PLANT PHYSIOLOGY AND BIOCHEMISTRY- II

LEARNING OBJECTIVES

The students will be able to understand-

- The importance of minerals to plants,
- The catabolic process and synthesis of chemical energy in plants, the anabolic process in plants.
- And differentiate between light and dark reactions of photosynthesis.
- The respiratory process in presence of light and differentiate between C3, C4 and CAM plants

Unit I: RESPIRATION: Respiratory gas exchange, Respiratory substrates, Nature of biological oxidation, Outline of respiratory substrates, Glycolytic pathway, Oxidative pentose phosphate pathway, Anaerobic respiration, Tricarboxylic Acid Cycle, Respiratory chain, Significance of ATP, The chemiosmotic theory.

Unit II: PHOTOSYNTHESIS: Efficiency of plants in converting radiant energy and matter, Light phase of photosynthesis, The chloroplast as the unit of photosynthesis, Reaction scheme for ATP and NADPH formation, Role of ATP and NADPH in CO_2 fixation, The path of carbon in photosynthesis – C3, C4 and CAM, Factors influencing photosynthesis.

Unit III: PHOTORESPIRATION AND MINERAL NUTRITION: Photorespiration: Biochemistry of photorespiration in C_3 plants, Photorespiration in C_4 plants, Regulation of photorespiration, Mineral nutrition, Autotrophs and heterotrophs, Criteria of essentiality of elements, Essential elements, Nutritional disorders of plants, Sources of nutrients, Mycorrhiza.

Practicals- Course: S.BOT PR.3.02

1. Estimation of Ca^{2+} and Mg^{2+} in plant sample.
2. Estimation of phosphorous in plants.
3. Colorimetric estimation of total chlorophyll content.
4. Estimation of carotenoids from plant samples.
5. Separation of photosynthetic pigments by paper chromatography.
6. Isolation of chloroplasts and study of Hill Reaction (Demonstration only).
7. To study the Kranz anatomy.

CIA- multiple choice questions / test / assignment.

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SEMESTER-III Course: S.BOT.3.03 ANATOMY, EMBRYOLOGY & PALYNOLOGY

LEARNING OBJECTIVES :

The students will be able to-

- Differentiate between the normal and anomalous secondary growth.
- Learn about the different meristems their locations and functions.
- Learn the developmental stages of micro and megasporangium.
- Understand the pollen morphology and the applications of palynology.

Unit I: ANATOMY: Normal secondary growth in Dicotyledonous stem and root, Anomalous secondary growth in the stems of *Bignonia, Salvadora, Achyranthes* and *Dracaena;* Anomalous secondary growth in the roots of Beet and Radish, Root stem transition, Study of apical, lateral and root meristems.

Unit II: EMBRYOLOGY : Structure of Microsporangium, microsporogenesis and development of male gametophyte, Structure of Megasoporangium, megasporogenesis, and development of female gametophyte, Double fertilization and its significance, Development of embryo – Dicotyledonous– *Capsella* type.

Unit III: PALYNOLOGY: Pollen and spore morphology- size and shape, polarity, apertures, exine stratification, construction of palynogram, Application of palynology in honey industry, coal and oil exploration, forensic sciences, pollen allergy.

Practicals- Course: S.BOT PR.3.03

1. Study of normal secondary growth in sunflower stem and root.
2. Study of anomalous secondary growth in the stems of *Bignonia, Salvedora, Achyranthus,* and *Dracaena* by double staining technique and preparation of permanent slide using one of the above materials.
3. Study of anomalous secondary growth in the storage roots of Beet and Radish.
4. Study of apical, lateral and root meristem using slides / photomicrographs.
5. Study of various stages of microsporogenesis, megasporogenesis and embryo development with the help of permanent slides / photomicrographs
6. Study of pollen morphology of *Hibiscus*, *Canna, Pancratium* and *Ocimum.*
7. Pollen analysis from honey sample: Unifloral and Multifloral honey.

CIA- assignments / presentation / moodle / test.

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