

DEPARTMENT OF BOTANY, ST. XAVIER'S COLLEGE (Autonomous), Mumbai.

Course: MS.BOT.2.01 PLANT DIVERSITY- VI (BRYOPHYTES AND PTERIDOPHYTES)

LEARNING OBJECTIVES

The students will be able to understand-

- The range of structural variation in bryophytes and pteridophytes.
- The classification (as per G. M. Smith) of bryophytes and pteridophytes up to orders.
- The significance of bryophytes as pioneer plants on land and their role in the origin of pteridophytes.
- The role of pteridophytes in the origin of seed plants.
- The economic importance of pteridophytes.

Unit I: Bryophyta I : Classification up to order as per the system proposed by G. M. Smith, ecological and economic importance of Bryophytes. Life cycle of following- *Targionia*, *Notothallus*, *Polytrichum*, *Porella*.

Unit II: Bryophyta II : Origin and evolution of Bryophyta with reference to habitat and form. Evolution of the Sporophyte in Bryophyta.

Unit III: Pteridophyta I : Classification of Pteridophyta (order level only). Study of life cycles of *Osmunda*, *Marsilea*, *Ophioglossum*, *Azolla*.

Unit IV: Pteridophyta II : Apospory and apogamy, Heterospory. Soral evolution, Fossil Pteridophytes. Economic importance of Pteridophyta. Cultivation and Maintenance of ornamental Ferns.

Practicals MS.BOT.PR.2.01

- 1) Study of vegetative and reproductive features of *Targionia*, *Notothallus*, *Polytrichum*, *Porella*.
- 2) Study of vegetative and reproductive features of *Osmunda*, *Marsilea*, *Ophioglossum*, *Azolla*.
- 3) Study of sori of ferns.

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

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

Course: MS.BOT.2.02 ANATOMY, DEVELOPMENTAL BOTANY & PALYNOLOGY

LEARNING OBJECTIVES

The students will be able to-

- Differentiate between the different meristems, learn about their locations and functions, and their division according to different theories.
- Learn the mechanism of interaction of pollen and pistil during pollen germination and their role in applied biology.
- Understand the relationships and interactions of pollen during their formation and in tetrad conditions.
- Learn the different pollen proteins, their properties and their role as allergens.

Unit I: Anatomy I: Meristems and sensory and Tactile tissue system: Meristems: Definition type of meristems, Apical cell theory, Histogen theory and Tunica corpus theory. Sensory and tactile tissue system: Tactile sense organs, Gravitational and Optical sense organs.

Unit II: Wood Anatomy: Types of wood elements. Macroscopical and microscopical features of wood. Physical and mechanical properties of wood. Protection and treatment of wood.

Unit III: Developmental Botany-I: Organization of shoot and root apical meristems. Shoot and root development, leaf development and phyllotaxy. Transition of flowering. Floral meristems and floral development in *Arabidopsis* and *Antirrhinum*.

Unit IV: Developmental Botany-II: Pollen development and gene expression, male sterility, sperm dimorphism and hybrid seed production; pollen storage; pollen embryos. Types of embryo sacs. Pollen-pistil interaction and fertilization, sporophytic and gametophytic self-incompatibility (cytological, biochemical and molecular aspects). Seed development and fruit growth, embryo culture.

Practicals MS.BOT.PR.2.02

- 1) Study of wood elements in *Annona*, *Michelia*, *Sterculia* and *Thuja*, using the maceration technique.
- 2) Study of the following leaves with respect to leaf surface characters (wax, cuticle, epidermis, stomata, epidermal outgrowth): *Pistia*, *Ficus*, *Avicennia* and *Peperomia*.
- 3) Photosynthetic system in *Pinus* (arm palisade), *Cyperus*, *Ficus* and *Oxalis*.
- 4) Study of morphology of the pollens- excluding those covered at UG level.
- 5) Double staining of sections and making permanent slides (at least 5 different materials)
- 6) Study of pollen viability.

CIA- moodle/ project / assignment / presentation / field report / test.

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

Course: MS.BOT.2.03 ECOLOGY AND ENVIRONMENTAL BOTANY- II

LEARNING OBJECTIVES

The students will be able to understand-

- Use of various microbes and plants that can help to prevent pollution and clean up polluted environment.
- The demands of a given species from its environment at each stage of its life cycle.
- The reaction of a species to the changes in its environment.
- Various characteristics that is unique to the population as a whole and not to an individual in the group.
- The theories explaining population growth and the analytical and synthetic characters used to express the characteristics of a community.

Unit I: Natural resources and environmental Pollution : Natural resources- renewable and non-renewable resources, conservation of natural resources, equitable use of resources. Bioremediation with reference to algae. Environmental monitoring and Impact assessment (EIA). Environmental legislation.

Unit II: Autecology of species: Shelford's law of tolerance. Combined concept of limiting factors. Ecological concept of Species and Individual. Species richness. Community resistance to invasion by Exotic species.

Unit III: Population- Structure and Dynamics: Basic concepts- Hardy-Weinberg Principle and Hardy-Weinberg equilibrium. Population characteristics. Population dynamics.

Unit IV: Community structure and classification: Classification of community, characters used in community structure, methods of study of communities, classification of communities and main concept of classification.

Practicals MS.BOT.PR.2.03

- 1) To record temperature, relative humidity, light intensity, wind speed and windfall.
- 2) To determine the minimum size of the quadrat by Species-Area-Curve method.
- 3) To study the plant community by quadrat method.
- 4) To study the vegetation by line transect method
- 5) To compare the biomass and net primary production.
- 6) Measurement of water quality based on hardness, total alkalinity, total solids and total dissolved solids in water samples and determine potability of water based on these parameters.

CIA- assignment / presentation / field report / test.

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

Course: MS.BOT.2.04 MEDICINAL BOTANY

LEARNING OBJECTIVES

The students will be able to understand-

- The plant sources with medicinal properties and their distribution.
- The use of various macroscopical, microscopical and chemical evaluation parameters for authentication of crude drugs and detection of adulterants.
- The various groups of phytochemicals and their medicinal uses.
- Importance of nutraceutical as dietary supplements.
- The various biological properties of plants and estimation of their potency in various diseases.

Unit I: Sources and Geographical Distribution of Medicinal Plants: Sources and geographical distribution of medicinally important plants. Study of the following plant constituents: Alkaloids- Vasaka leaves, Cinchona bark. Glycosides- Digitalis, *Glycyrrhiza glabra*, *Dioscorea sp*, *Artemisia*. Tannins- *Terminalia bellerica*, *Terminalia chebula*. Essential oils- *Citronella*, Fennel, Lemon grass.

Unit II: Quality control of crude drugs : Morphological examination- Exomorphic characters. Microscopical evaluation- Anatomical characters. Chemical tests. Development of standardization parameters- Moisture content, Solvent extraction value, Bitter value, Foaming index, Heavy metals detection.

Unit III: Nutraceuticals: Introduction, Scope and future prospects. Nutraceuticals bridging the gap between food and drugs. Nutraceutical remedies for common disorders. Nutraceutical rich supplements.

Unit IV: Biological activity of medicinal plants: antibacterial, antidiabetic, antioxidant, hypertensive, antipyretic, immunomodulators, anticancer, antiprotozal.

Practicals MS.BOT.PR.2.04

- 1) Identification of exomorphic and endomorphic features of plants studied in theory.
- 2) Solvent extractive value, moisture content of the given sample.
- 3) MIC of the plant extract inhibiting the growth of microorganisms.
- 4) Study of antioxidant activity of the plant extract.
- 5) Estimation of vitamin C in plant sample.
- 6) Estimation of vitamin E in plant sample.
- 7) Analyze the nutrition value of honey- detection of sugars by chromatography and estimation of total soluble sugars.

CIA- short questions / assignment / presentation / test.
