

शासकीय कमलाराजा कन्या स्नातकोत्तर स्वशासी महाविद्यालय ग्वालियर (म.प्र.)
स्नातकोत्तर स्तर पर सेमेस्टर पद्धति के अन्तर्गत वनस्पतिशास्त्र विषय के
अध्ययन मण्डल द्वारा अनुशंसित तथा अकादमिक परिषद द्वारा अनुमोदित

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Syllabus for P.G. Classes of Botany Under Semester System as recommended
by Board of Studies and approved by the Academic council of the college.
Effective from Session 2019-2020
M.Sc. Botany – II sem

BOT 201: ECOLOGY-I CLIMATOLOGY, SOIL SCIENCE AND AUTECOLOGY

UNIT I

Definition, scope and concept of plant ecology.
History of ecology and relation of ecology with other disciplines. Principles of
ecology.
Concept of environment, habitat and ecological niche.
The environment we live in.

UNIT II

Light and temperature as ecological factors.
Precipitation and Relative Humidity as ecological factors.
Measurement and analysis of light, temperature, precipitation and relative
humidity.
Importance of water as an important factor on the life of plants.

UNIT III

Origin, development and formation of soil. Soil profile.
Classification of soil.
Effects of soil environment of plants.
Chief soil types of India.

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Unit - VB

Biotic components of an ecosystem.
Interrelation of various organisms.
Population ecology, Natality, Mortality, Age distribution.
Concept of carrying capacity.

UNIT V

Morphological, anatomical and physiological relation of plants with their environment.

Plant indicators.

Ecotypic and Ecadic differentiation

Physical and physiological dryness.

Genecology

PRACTICALS 201

1. Study of physical and chemical characteristics of soil by rapid field test.
2. Determination of moisture constant of soil.
3. Determination of pH of water.
4. Determination of dissolved oxygen in water
5. Determination of following data.
 - a. Solar energy
 - b. Atmospheric temperature
 - c. Relative Humidity
6. Determination of soil profile.
7. Determination of soil texture, colour, consistence.
8. Determination of height of the tree.
9. Determination of light penetration under water by Sechii dish.

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**BOT 202: ANGIOSPERM ANATOMY, EMBRYOLOGY AND
PALYNOLOGY**

UNIT I

Origin, growth, differentiation and ultra structure of cell and tissue, fine structure of plasmodesmata, microtubules, microfibrils and secondary structure.

Apical, lateral and intercalary meristems- their ultra structure and histochemistry, organogenesis. Ontogeny, phylogeny, ultra structure and function of primary and secondary xylem; wood anatomy. Ontogeny, phylogeny, ultra structure and function of primary and secondary phloem.

Structure variability in leaves, leaf histogenesis, leaf meristem, origin, development ultra structure of trichomes and stomata.

UNIT II

Nodal anatomy-nodal types and evolutionary consideration

Vascular cambium vs. cork cambium factors controlling their activity, periderm, lenticles, abscission, wound healing.

Anatomy of monocotyledons and dicotyledonous seed and fruits, seed appendages, their anatomy structure and function. Anatomy in relation to taxonomy.

Contemporary plant anatomy: current trends and prospects

UNIT III

Microsporangium- structure and function of wall layers, ultra structure change in tapetum and meiocytes during Microsporogenesis, role of tapetum, pollen development, anther culture and haploid plants. Pollen wall morphogenesis- microspore pollen mitosis; division of generative cell; pollen fertility and sterility; pollen storage viability and germination.

Megasporogenesis, various types of embryosacs, their development and fertilization.

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Embryology and taxonomy; diagnostic embryological characters, primitive and advanced characters, comparative embryology of hybrids dysfunction of endosperm, arrested development of embryo.

UNIT V

Development and evolution of pollen types; stereo and ultrastructure of exine, apertures, furrow. Palynology and taxonomy.

Aerobiology and its application. Aeropalynology, methods of aerospora survey and analysis, pollen allergy and pollen calendars system approach for allergy.

Mellitopalynology: general account Paleopalynology: role in coal and oilgenesis.

PRACTICALS 202:

1. Use of paraffin method of microtechnique .
2. Acquaintance with ultratomy: use of wood microtomy and common and anatomy and histochemical methods.
3. Learning techniques of making temporary and permanent microscopic preparation.
4. Knowledge and use of photomicrography in anatomical studies.
5. Knowledge and use of the principles and working of electron microscopes.
6. Learning to use simple experimental method in anatomical studies.
7. Laboratory work planned on the basis of topic listed under theory.
8. Preparation of dissected whole mount of endothecium, tapetum, ovule, endosperm and embryo, squash preparation of tapetum, microspore mother cell, dyads, tetrads, pollinia, massulae.
9. Study of seed appendages from dissection, structure of seed coat from section and macerations.

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BOT 203: WATER RELATIONS, GROWTH AND DEVELOPMENT

UNIT I

Water relations of plants: Unique physio-chemical properties of water, chemical potential, water potential. Apparent free space, bulk movement of water, soil plant atmosphere, continuum (SPAC), stomatal regulation of transpiration, hormonal and energy dependent hypothesis. Inorganic nutrition, physicochemical aspects of solute transport, diffusion and facilitated diffusion, passive and active transport. Nernst equation and Donnan's potential. Role of ATPase as a carrier, co-transport (symport) and counter transport (antiport). Ion channels, role of calmodulin. Importance of foliar nutrition and use of chelates.

UNIT II

Photosynthesis: Energy pathway in photosynthesis, chloroplast as an energy transducing organelle. Composition and characterization of photo systems, I and II, electron flow through cyclic, non cyclic and pseudo cyclic photophosphorylation. Pathways of CO₂ fixation. Differences between C₃ and C₄ fixation and different kinds of C₄ pathways.

UNIT III

CAM pathway: Occurrence, biological events and adaptive advantage.
Photorespiration: Mechanism and regulation of photorespiration.
Introductory studies on water stress and its tolerance mechanisms.

UNIT IV

Enzymes: Classification, mode of action, K_m value.
Industrial application, immobilized enzymes, their preparation and application.
Enzyme regulation: Competitive and non-competitive, allosteric enzymes

UNIT V

Chemical control of growth and morphogenesis.

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Hormonal effects on growth and development.

Bioassay of plant growth regulators and mode of action with reference to auxins.
Gibberellins, cytokinins, abscisic acid and ethylene.

Phytochrome: Chemistry and photo morphogenetic effects and role in flowering.

Genetic study of secondary metabolites such as alkaloids (only types of wide occurrence.)

Dormancy: Seed and bud dormancy; hormonal regulation.

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BOT 204: PLANT BIOCHEMISTRY AND METABOLISM

UNIT I

Carbohydrates: classification, occurrence and structure of monosaccharide, oligosaccharides, polysaccharides (starch, cellulose and pectin).

Proteins: Amino acid, structure and characteristics, peptides and protein structure, function of proteins Conjugate proteins, Account of Lactins their function.

UNIT II

Lipids: classification, occurrence, structure and importance of acryl lipids and phosphates. Concept of free energy and entropy, high energy compound, Gibb's free energy concept in biochemical reaction.

Synthesis of ATP through oxidative electron transfer chain, chemiosmotic regeneration of ATP.

UNIT III

Gluconeogenesis vs glycolysis

Biosynthesis of fatty acids.

Degradation of fatty acids.

Lipid as high energy molecules.

Role of Kreb's Cycle.

UNIT IV

Nitrogen fixation by free living and symbiotic organisms, mechanism of nitrogen fixation, soil nitrogen sources, nitrogen uptake by plants and assimilation.

UNIT V

Nitrate reductase system, substrate controlled induction, interrelation between photosynthesis and nitrogen metabolism.

Brief account of amino acid synthesis by reductive amination, GS-GOGAT system, transmission. Basic structure of important phenolics and alkaloids: a general view of their synthesis.

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