Subject: Biology (Part A: Botany and Part B: Botany)

Part A: Botany

Unit 1. Introduction:

Scope, branches and their relationship with other science, components of life.

Unit 2. Cell Biology:

Cell theory, cell organelles and inclusions, cell division. Methods of temporary and permanent slide preparation.

Unit 3. Diversity of Life:

i) Classification, nomenclature of plants, different types of classification with basic knowledge of APG system of classification.
ii) General characters of lower and higher groups of plants (Algae, Fungi, Bacteria, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms). Major plant diseases with their lifecycle and control measures with references to Nepal.
iii) Plant diversity – present status and conservation in Nepal.

Unit 4. Plant physiology:

Physiological processes (Diffusion, Osmosis, Photosynthesis, Respiration, Transpiration) and their importance in the plant life, Classroom/Lab demonstration of physiological processes.

Unit 5. Genetics:

Mendel's law of in heritance, Genetic interaction (DNA, RNA, gene mutation, genetic diseases), Sex determination.

Unit 6. Environmental Biology:

i. Ecosystem-types, energy flow, abiotic and biotic components,
ii. Pollution-types (air, water, soil), sources, effects to living organisms, control measures.
iii. Ecological Imbalances and impact assessment- Climate change, Greenhouse effect, Depletion of ozone layer, Effect of human activities, Sustainable Development, Conservation of resources, Environmental impact assessment (EIA) its components and processes.

Unit 7. Economic Botany:

i. Identification, use and their distribution of major economic (Medicinal, Crop, Vegetable, Oil, Fruit) plants of Nepal.
ii. General concept of Ethno botany and Traditional knowledge, NTFPs of Nepal.
iii. Plant collection and herbarium preparation techniques.

Unit 8. Biotechnology:

Introduction, scope and application;

Plant Tissue Culture, Tools and Techniques of Genetic Engineering, Plant Transformation Technology, Role of Plant Biotechnology in Agriculture, Environment and Industry.

Part B. Botany

Unit 1. Introduction:

Scope and branches of botany.

Unit 2. Life component:

Definition of cellular pool, biomolecules, micro and macromolecules, inorganic and organic molecules and monomers and polymers with examples.

Unit 3. Plant anatomy:

Definition of tissue Types of tissues- Meristematic, permanent and secretory Features of Meristematic tissues. Types and examples of Meristematic tissues apical, intercalary and lateral; primary and secondary Classification of permanent tissues as simple and complex Basic features, distribution and function of different simple and complex permanent tissues Definition of secretory tissues Types of secretary tissues, their examples and importance. Definition of primary and secondary tissues. Definition of Osmosis and related terms like, semipermeable, osmosis pressure, water potential, hypo- and hypertonic solution, endo- and exosmosis, plasmolysis, turgid and flaccid cells Definition of active transport and its significance.

Unit 4. Plant physiology:

Definition of diffusion, concentration gradient and facilitated diffusion Factors affecting diffusion and transpiration and photosynthesis. Significance of diffusion and transpiration and photosynthesis

Unit 5. Pollination:

Definition of pollination Definition of self and cross-pollination Types of pollination based on pollinating agents Modification of flowers in favor of particular pollinating agent Merits and demerits of self and crosspollination Mechanisms developed by flowering plants for cross-pollination

Unit 6: Virus, fungi, bacteria and cyanobacteria

Classification, economic importance, general characteristics, components and disease cause in plants.

Questions will cover all units as far as possible from both parts as a long or short question.