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**Uttar Pradesh Public
Service Commission
(UPPCS Mains)
Exam Syllabus**

Optional Subjects
Botany

:: PAPER - I ::

Microbiology, Pathology, Plant Diversity, Morphogenesis

Microbiology: Microbial diversity elementary idea of Microbiology of Air, Water and Soil, a general-account of Microbial infection and immunity, application of Microbiology with reference to Agriculture, Industry Medicine and Environment.

Plant Pathology: Mode of infection, defence mechanism, control of plant diseases, Important plant diseases caused by viruses, bacteria, fungi and nematodes with special reference to tobacco mosaic, leaf curl of papaya, citrus canker, rust of wheat, smut of barley, late blight of potato, red rot of sugarcane, ear cockle of wheat, ergot of bajara, stem gall of coriander and wilt of arhar.

Plant Diversity: Classification, structure, reproduction, life cycles and economic importance of viruses, bacteria, algae, fungi, bryophytes, pteridophytes and gymnosperms including fossils.
Morphology: Morphology of root, stem, leaf, flower and fruits, secondary growth.

Embryology: Microsporogenesis and male gametophyte, megasporogenesis and female gametophyte, fertilization, embryo and endosperm development.

Taxonomy: Principles of taxonomy, systems of classification of angiosperms (Bentham and Hooker, Takhtajan), rules of botanical nomenclature, chemotaxonomy distinguishing features of families- Ranunculaceae, Magnoliaceae, Brassicaceae, Malvaceae, Fabaceae, Rosaceae, Apiaceae, Cucurbitaceae, Asteraceae, Rubiaceae Apocyanaceae, Solanaceae, Acanthaceae, Varbenaceae, Lamiaceae Euphorbiaceae, Arecaceae, Orchidaceae, Poascae.

Morphogenesis: Correlation, Polarity, Symmetry, totipotency, differentiation and regeneration of tissues and organs; methods and applications of cell tissue, organ and protoplast cultures, somaclonal variations, somatic hybrid and cybrids.

:: PAPER - II ::

Cell Biology, Genetics, Physiology, Biochemistry, Ecology and Economic Botony

Cell Biology: Cell as structural and functional unit of life, Ultra structure of eucaryotic and prokaryotic cells, structure and functions of plasma membrane, endoplasmic reticulum, chloroplasts, mitochondria, ribosomes, golgibodies, and nucleolus: Cell cycle, mitosis and meiosis, Chromosomal morphology and chemistry, numerical and structural changes in chromosomes and their cytological and genetical effects.

Genetics: Mendel's Law of inheritance, interaction of genes, linkage and crossing over, genetic recombination in fungi, cyanobacteria, bacteria and viruses, gene mapping, sex linkage, determination of sex, cytoplasmic inheritance of plastid; gene concept, genetic code.

Moleculr Genetics: Moleculr genetics-DNA as genetic material. Structure and replication of DNA, role of nucleic acids in protein synthesis (transcription and translation) and regulation of gene expression, mutation and evolution, DNA damage and repair, gene amplification, gene rearrangement, oncogene, genetic engineering- restriction enzyme, cloning vectors (pBR 322, PTi lambda phage), gene transfer, recombinant DNA, application of genetic engineering in human welfare,

Physiology and Biochemistry: Water relations of plants, absorption, conduction of water and transpiration; mineral nutrition and ion transport, translocation of photosynthates, essential micro- and macroelements and their function, chemistry and classification of carbohydrates; photosynthesis-mechanism, factors affecting photosynthesis, C₃ and C₄ carbon fixation cycle, photorespiration; plant respiration and fermentation, enzymes and coenzymes, mechanism of enzyme action: secondary metabolites (alkaloids, steroids, terpenes, lipids), nitrogen fixation and nitrogen metabolism, structure of protein and its synthesis:

Plant Growth: Plant growth-growth, Movements and senescence, growth hormones and growth regulators their structure, role and importance in agriculture and horticulture; physiology of flowering, sexual incompatibility, seed germination and dormancy.

Ecology: Scope of ecology, ecological factors, plant communities and plant succession, concept of biosphere, ecosystem-structure and functions, abiotic and biotic components, flow of energy in the

ecosystem, applied aspects of ecology, natural resources and their conservation, endangered, threatened and endemic taxa, pollution and its control.

Economic Botany: Plants as sources of food, fibre, timber, drugs, rubber, beverage, spices, resin and gums, dyes, essential oils, pesticides and biofertilizers, ornamental plants, energy plantation and petrocrops.

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