DEPARTMENT OF BOTANY
FACULTY OF LIFE SCIENCES
A.M.U., ALIGARH
Syllabus for Ph.D Admissions Test 2020-21

SECTION-B

Classification, general characteristics and plant diseases caused by viruses, phytoplasma, bacteria, fungi and nematodes. General characteristic features of *Aphelenchoide, Anguina, Meloidogyne, Heterodera.* Interaction of Plant parasitic nematodes with fungi, bacteria and viruses. Nematode-Nematode interactions. Causal organism, symptoms and management of stem gall of coriander, powdery mildew of cucurbits, apple scab, ergot of rye, loose smut of wheat, brown rust of wheat and Tikka disease of groundnut. Bacterial blight of rice, potato scab, Citrus-canker, tundu disease of wheat, Brinjal mosaic, potato leaf roll, cauliflower mosaic, potato spindle tuber viroid, diseases caused by *Rotylenchulus* on pulses, *Meloidogyne* on vegetables and *Globodera* on potato.

Plant water relations and mineral nutrition; Evolution and scope of plant nutrition; classification of mineral nutrients. Nomenclature, classification and properties of enzymes; Photosynthesis; Respiration; Nitrogen and lipid metabolisms; Plant growth regulators; Photoperiodism; Vernalization; Phytochromes; Cryptochromes and phototropins. G-proteins.. role of cyclic nucleotides; calcium-calmodulin cascade; diversity in protein kinases and phosphatases; and sucrose sensing mechanism. High temperature, salt and heavy metal stress, heat shock proteins

Hydrosphere, lithosphere, biosphere and atmosphere (troposphere, stratosphere, mesosphere, ionosphere and exosphere); Ozone hole, CFC cycle, green house gases, global warming; Air, water, soil and noise pollution, and their control. Climate, soil and vegetation patterns of the world; energy dynamics (trophic organization, energy flow pathways, ecological deficiencies); Distribution and global patterns of terrestrial biodiversity hot spots, inventory, IUCN categories of threat. Forest and forest management stress and plant life, Pollution and animate Pathogens, Allelopathy / weed science, Pollution control measures.

Structure of plant cell and its organelles; Cell cycle and its control mechanism. Vegetative and sexual reproduction in plants; Embryogeny in dicotyledons and monocotyledons; Apomixis. Gene mapping – restriction mapping, mapping with molecular markers, linkage maps; Classification, replication and transfer of plasmids; IS elements, Ac-Ds elements, Spm and dSpm elements; Spontaneous and induced mutations. Aneuploidy: monosomy, nullisomy, trisomy, tetrasomy. Monoploidy and Haploidy, Polyploidy, Structural changes in chromosomes. Nuclear DNA contents, C-value paradox, cot curve and its significance. Restriction mapping: concept and techniques, multigene families and their evolution, physical mapping of genes on chromosomes.

Plant tissue culture; Somaclonal variations; MS, plant tissue culture media; Cloning vectors; Genomic and cDNA libraries. Molecular markers and crop improvement, Genetic engineering of plants, Genetic manipulation and its application. In vitro mutagenesis, Plant Biotechnology in India and scope, Plant growth regulations and adjuvants, Production of herbicide resistant plants; engineering Plants for abiotic stress, senescence- tolerance and male sterility, environmental, social and legal implications. Production of genetically modified (GM) plants.

Distribution, diagnostic characteristics, vegetative structure, classification, reproduction, life cycles and economic importance of Algae, Bryophytes, Pteridophytes and Gymnosperms. History, basis, outlines, and relative merits and demerits of system of plant classification, ICBN, Malvaceae, Brassicaceae, Solanaceae, Ranunculaceae and Poaceae. Origin, evolution, botany, cultivation and uses of (i) Cereal crops (ii) Fibre crops (iii) Vegetable oil crops and (iv) Medicinal and aromatic plants; Diagnostic features and uses of timber and fire woods; Root crops, pulse crops.