

Syllabus for Ph.D. Entrance Test

**Part-A**  
**Research Methodology**

**Unit-1. WHAT IS RESEARCH?** Definition of Research, Focus on Basic and applied research, Qualities of Researcher, Components of Research Problem, Various Steps in Scientific Research. **LITERATURE COLLECTION:** Review of literature and its need, review process and bibliography, Sources of Data: Primary Data, Secondary Data, Working bibliography, index cards and reference cards, literature citation.

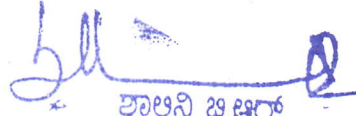
**Unit-2. RESEARCH DESIGN:** Selection and formulation of research problem. Contents of the plan (protocol), Choice of research topic, Synopsis, Research Design & Plan, Significance of research design, Meaning & process of design. Introduction to Research & plan of research methodology. Writing the plan (protocol). **SAMPLING DESIGN-** Enumeration and sample survey, steps in sampling, characteristics of good sampling design, types of sample designs, how to select a sample random design, complex random sample. Arithmetical Mean, mode, Standard deviation, T-test.

**Unit-3. TECHNIQUES IN BOTANY:** Microscopy, micrometry, centrifugation, pH and pH meter, chromatography, electrophoresis, colorimetric and spectrophotometer methods, PCR, Gel-doc, Elisa, handling microorganisms in laboratory, laboratory safety and disposal of Bio hazards, chemical hazards, fire hazards, electrical hazards, noise and radiation hazards.

**Part- B**  
**Cognate subject: Botany**

**Unit-4. GENERAL ACCOUNT** on morphology, Structure Reproduction and economic importance of Algae, Bryophytes, Pteridophytes and Gymnosperms. Angiosperm Taxonomy: Major systems of classification: Sexual systems and modern system of classification; Biodiversity profile in India and Karnataka: Hot spots; threat to Biodiversity; IUCN threat categories, Red Data Book; Conservation measures of Biodiversity. **POST HARVEST TECHNOLOGY:** Post harvest practices- processing, preservation & transportation. Marketing of agricultural crops (wheat, rice, maize, millets, cotton, sunflower, oil seeds, soybean seeds, coconut) vegetables, fruits; medicinal plants, ornamental plants; Post harvest losses.

**Unit-5. ENVIRONMENTAL POLLUTION AND MANAGEMENT:** Air, Water and Industrial pollution; Hazardous waste management: Hazardous substances and hazardous wastes and sources, composition, physical form, quantity and quality of hazardous wastes,

  
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e-waste. Waste management (physical, chemical and biological treatment & disposal technique); Remote sensing, Basic and fundamental concepts of remote sensing, Fundamentals of GIS satellite image Interpretation. Biodegradation of pesticides. Environmental Impact Assessment.

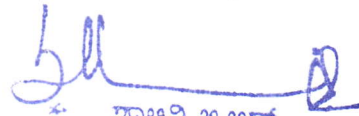
**Unit-6. PLANT PHYSIOLOGY AND METABOLISM:** Recent developments in Photosynthesis, Respiration and Photorespiration an overview: Signal transduction phytochrome, ABA, G proteins and phosphate signaling cyclic nucleotides, Calcium, protein receptors kinases. Senescence and programmed cell death.

**Unit-7. CELL AND MOLECULAR BIOLOGY:** Regulation of gene action in prakaryotes transcriptional control mechanism negative and positive control, translational control, post translational control. Regulation of gene action in eukaryotes levels Re-combinant DNA and genetic engineering; isolation of nucleic acids, radioactive kinds of regulations at different labeling of nucleic acids, restriction endonucleases, cloning vectors, vectors in molecular biology, DNA blotting, preparation of DNA complementary to RNA. Gene library.

**Unit-8. MICROBIOLOGY:** Microbes in Air, Water, soil and Food; Reproduction in microbes: methods of reproduction in bacteria, fungi, and viruses and in algae; Microbial genetics; structure of bacterial genome, mutations in microbes, bacterial recombination, bacterial plasmids and their application in genetic engineering; Microbial metabolism-Utilization of hexoses- EMP, PP, ED and PK pathways, and TCA cycle, Bacterial respiration and fermentation. **PLANT BIOTECHNOLOGY:** Techniques of plant regeneration Plant tissue culture, protoplast culture, somatic embryogenesis, anther and ovary culture and synthetic seeds: Different types Secondary metabolites, production, factors affecting yield. Different types of biotransformation with examples. Biosensor and biochips. Micro propagation, different stages of micro propagation, rooting and establishments in herbs & woody plants. Development of stress tolerant plants; Transgenics in crop improvement.

**Unit-9. MEDICINAL PLANTS AND PHYTOCHEMISTRY:** Scope of medicinal plants, poisonous plants and plants of importance in pesticides and essential oil; Conservation of endangered medicinal and aromatic plants with special reference to Karnataka; Intellectual property rights (patents, trade secrets, copyright, trademarks); IPR and plant genetic resources (PGR); GATT and TRIPS, patenting of biological material. Patenting transgenic organisms and isolated genes; patenting of genes and DNA sequence.

**Unit-10. MYCOLOGY:** General characteristics, reproduction, classification of Fungi. Mutualistic symbiosis - Introduction and importance, Mycorrhizae- kinds and biology of mycorrhizae; Lichens- mycobiont & phycobiont partners, morphological forms of lichens, reproduction, physiological relationships, Endosymbiosis endophytes and their taxonomy, endophytic mutualism, genetic variation in plant pathogen populations. **PLANT PATHOLOGY:** Plant disease diagnosis - pathogenic fungi, viruses, viroids, bacteria, and nematodes techniques for the detection of plant methods of diagnosis including seed health testing methods; Signaling in plant disease conventional and modern resistance mechanisms, RNA as a signal, coordination of cell death responses and interplay of downstream signaling pathways.



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ಅಧ್ಯಕ್ಷರು

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