SYLLABUS FOR Ph.D. ENTRANCE TEST

Ph. D. Entrance Test will have question paper in two parts: Part - A: Research Methodology having 50 objective type questions of 01 mark each(50 marks) and Part - B: Subject - Botany having 50 objective type questions of 01 mark each (50 marks). Maximum marks : 100 (50 + 50). Candidate must score 50 % marks to qualify. There shall be no negative marking.

Syllabus given below for each part is divided into five units.

PART - A: RESEARCH METHODOLOGY

UNIT-I

(1) **Basics Of Research:** Research methodology- research topic selection, Literature review etc. Research topic- problem formulation. Research and sampling design, Collection and organization of data, Types of research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.

(2) **Data Collection And Analysis:** Execution of the research- Observation and collection of data, methods of data collection, Sampling methods, Data processing and analysis strategies. Data analysis with statistical packages- Hypothesis testing. Generalization and interpretation.

UNIT- II

(1) **Research and Ethics:** Definition and overview of Research. Need of research. Research and personal goals, Unethical research practices, Code of conduct and legal issues, Ethical practices and principles, Roles and responsibility of Research Ethics Committees.

(2) **Ethics in Research Execution:** Importance of consent in Research, Fundamental Rights and Moral Principles, Informed consent, Implied consent, Explicit consent, Active consent, Passive consent, Written and oral consent, Privacy and Confidentiality.

UNIT- III

(1) **Basic Statistical Definition and Concepts:** Variables and Variation, Frequency distribution and Cumulative frequency, Distributions, Sample and Population. Centre of data distributions and spread of data, Data graphics: Histograms, Graphs.

(2) **Probability:** Basic Probability. Binomial Distribution, Continuous data distributions and Log Normal Distribution. Choosing samples: Random sampling, other sampling procedures, Stratified, Systematic and cluster sampling in quality control.

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Unit-III

Immunotechnology

Inflammation: its mediator and the process, cell adhesion, molecules and their role in inflammation, lymphocyte homing, tissue injury and immune response, leading to an inflammatory reaction, role of anaphylatoxins, granulocyte in inflammatory process.Antigen-Antibody interaction, avidity and affinity measurement.

Autoimmunity:Organ specific diseases,systemic disease, mechanism of autoimmunity immunodeficiency syndrome,primaryimmunodeficiencies and secondary immunodeficiencies and their diagnosis and therapeutic approaches.

Unit-IV

Microbiology, Environmental biotechnology and Animal cell culture

Infection and disease, types of infection, mechanism of pathogenesis of bacterial and viral disease, virus organization, types isolation, cultivation, identification and viral replication-integrated pest management.An ecological approach phytoremediation: Types and its applications.

Environmental monitoring: Bioindicators, introduction and organization of animal cell and tissue culture laboratory.

Unit-V

Metabolism: Basic concept and bioprocess engineering and technology

Electron transport and oxidation phosphorylation, energetics of oxidative, phosphorylation, energy yield by complete oxidation of glucose.

Citric acid cycle: Formation of acetyl CoA from pyruvate, biosynthesis of fatty acids, biosynthesis and degradation of nucleotides purine biosynthesis.

Introduction to bioprocess engineering, kinetics of microbial growth and death, microbial production of antibiotics: Penicillin, microbial production of alcoholic beverages, distilled alcoholic beverages, Beer, microbial production of vinegar.

(6)Restriction mapping: Southern blotting, Northern and Western blotting techniques, RFLP, RAPD, SSR, 16sRNA. DNA sequencing techniques, Preparation of radio-labelled and synthetic probes.Gene amplification, DNA chip technology and microarray.

PART - B: SUBJECT - BOTANY

UNIT - I: Biology & Diversity of Lower Plants

(1) General account, structure, reproduction of Bacteria, Virus, Cyano-bacteria, Actinimycetes.

(2) General characteristics, structure, reproduction of Fungi. Role of Fungi in Medicine, Food, Antibiotics,

Vitamins, Fermentation, Mycorrhiza, Fungi as biocontrol agent, Fungal diseases in plants.

(3) General characteristics, structure, reproduction of Algal classes. Economic importance of Algae.

(4) General characteristics, structure, reproduction of Bryophytic classes & their comparison in Gametophyte and Sporophyte.

(5) General characteristics, structure, reproduction of Pteridophytic classes. Stelar-organization, Heterospory and seed habit. Telome theory of Sporophyte development.

UNIT - II: BIOLOGY & DIVERSITY OF PHANEROGAMES

(1) General characteristics, structure, reproduction of Gymnospermal classes. Reason of restricted distribution of Gymnosperms & their economic importances.

(2) Origin and evolution of Angiosperms. Plant identification, Principles and rules of nomenclature, Modern trends in Taxonomy. Basic classification of Angiosperms.

(3) Characteristics and economic importance of Angiosperm families.

(4) Anatomy of dicot and monocot plants. normal and abnormal secondary growth, Anatomy of transition zone, nodal anatomy.

(5) General account of embryology of Angiosperm, Microsporogenesis, Megasporogenesis, Development of gametophyte, Fertilization, Endosperm, Embryogeny.

UNIT - III: MOLECULAR BIOLOGY

(1) Prokaryotic & Eukaryotic cell structure, Function of main cell organelles.

(2) Chromosome structure, Karyotype, Structural and Numerical changes & Transposable elements.

(3) Structure of RNA & DNA, DNA Replication, Mutation, DNA damage and repair, Protein synthesis.

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(4) Gene expression, Molecular Marker.

UNIT-IV: PLANT PHYSIOLOGY, BIOCHEMISTRY, BIO-TECHNOLOGY & TISSUE CULTURE.

(1) Enzymes.

(2) Water and Water relations of plant, Transpiration, Translocation of solutes.

(3) Plant metabolism- Photosynthesis, Respiration, Nitrogen metabolism.

(4) Biochemistry- Carbohydrates, Lipid, Protein.

(5) Elementary idea of flowering, Photoperiodism, Vernalization, Dormancy of seeds, Plant growth regulators.

(6) Biotechnology- Recombinant DNA technology, Genomic and cDNA library, PCR, DNA fingerprinting,

Transgenic plants, Role of biotechnology in industries, medical and agriculture fields. IPR

(7) Tissue culture- Techniques, Organogenesis, Somatic hybridization, Application of plant tissue culture, Secondary metabolites, Cryopreservation and Germplasm storage.

UNIT-V: ENVIRONMENTAL BIOLOGY & ECONOMIC BOTANY

(1) Ecosystem- Components, Energy flow, Succession, Ecological adaptation.

(2) Biodiversity and its conservation- Ex-situ and in-situ conservation, Hotspots, Endemism, Endangered and threatened species, National Parks, Sanctuaries, Botanical Garden & biosphere reserve.

(3) Pollution, its control and management, Natural hazards, Climate change & global warming.

(4) Utilization of renewable and non-renewable resources from forest, grassland and aquatic habitats, Wet lands, Waste land management, Ethno botany- its scope and importance. Economically important plants.

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