SECTION – A

(Common for all candidates)

RESEARCH METHODOLOGY

Total Marks: 50

Unit	Content
1	**Basics of Research:** Research: Meaning, Objective, Characteristics, Steps of research, Methods of research, Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.
2	**Research Problem and Research Design:** Introduction to Research Problem, Necessity of Defining the Problem, Selecting the Problem, Techniques Involved in Defining a Problem, Meaning and Types of Research Design, Important Concepts Relating to Research Design
3	**Sampling Design:** Census and sample survey, Implications of a Sample Design, Steps in sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs
4	**Data Collection and Analysis:** Methods of Data Collection- Observation, Interview, Questionnaires, Schedules, Survey and Experimental. Selection of Appropriate Method for Data Collection, Different Techniques of Sampling such as Probability and Non-Probability, Basic Statistical Methods of Data Analysis such as Frequency distribution, Measures of central tendency, Measures of Dispersion, Coefficient of variation, correlation and regression.
5	**Research Ethics and Morals:** Environmental impacts and Ethical issues, Commercialisation, Copy right, Royalty, Intellectual property rights and Patent law, Plagiarism, Citation, Referencing style and acknowledgement.

SECTION – B

(Faculty of Science)

Total Marks: 50

Department: Botany

Cell communication and cell signaling: Host parasite interaction Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

Photosynthesis: Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO2 fixation-C3, C4 and CAM pathways.

Respiration and photorespiration: Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

Nitrogen metabolism: Nitrate and ammonium assimilation; amino acid biosynthesis.

Plant hormones: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

The Environment: Physical environment; biotic environment; biotic and abiotic interactions.

Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax.

Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.

Applied Ecology: Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches; Bioresource.

Transgenic Plants: Methods and applications of transgenic plants.

Principles & methods of taxonomy: Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms.

Outline classification of plants: Important criteria used for classification in each taxon. Natural, Artificial and Evolutionary System of Plants Classification.

Mendelian principles: Dominance, segregation, independent assortment NBBN