



Vijayanagara sri krishnadevaraya university  
Ballari-583105  
Department of studies in Botany,  
Syllabus for ph.d. Entrance examination 2020

## Part A: Research Methodology (40 Marks)

### Unit- I

Introduction, current trends, current area focus, objectives of scientific research. preparation of research report, components of a scientific research article, reading and understanding a research articles. presentation skills. topic selection: problem identification; criteria for prioritizing problems for research. literature survey. data analysis and statistical analysis. thesis writing and manuscript preparation.

### Unit- II

the functions of a research design, the theory of causality and the research design summary of selecting a study design differences between quantitative and qualitative study designs study designs in quantitative research study designs based on the number of contacts study designs based on the reference period study designs based on the nature of the investigation other designs commonly used in quantitative research

### Unit III

Selecting a method of data collection differences in the methods of data collection in quantitative and qualitative research major approaches to information gathering collecting data using primary sources observation, interview, the questionnaire. Constructing a research instrument in quantitative research

### Unit IV

How to write a research proposal the research proposal in quantitative and qualitative research contents of a research proposal preamble/introduction the problem objectives of the study hypotheses to be tested study design the setting measurement procedures ethical issues sampling analysis of data structure of the report problems and limitations appendix work schedule summary

## Part B: Core syllabus in BOTANY (60 Marks)

### Unit I

Plant Systematics: Introduction, ICBN, importance of herbarium, flora writing, monographs/ revisions, preparations of dichotomous key, field notes, taxonomy in relation with anatomy, embryology, chemotaxonomy, cytology. *in situ* conservation – protected areas, biosphere reserves, national parks, sanctuaries and sacred groves. *ex situ* – conservation, botanical gardens, gene banks, medicinal conservation parks, herbal gardens, Molecular taxonomy: identification of molecular markers, RFLP, RAPD, AFLP. DNA Libraries: Construction of genomic library, c-DNA Library.

## Unit-II

Natural Products and drug discovery :Biosynthetic pathway of important secondary metabolites. Chemoprospective studies of natural compounds for anticancer, antidiabetic, antihepatitis B, antimicrobial properties. Extraction, processing, composition and uses of essential oils. Separation, Purification and identification of phytochemicals using chromatography and spectroscopy techniques.

## Unit-III.

Mendelism: Pre Mendelian, Mendelian and Post Mendelian genetics. Complementary, epistasis, inhibitory, lethal and additive interaction of genes. Molecular basis for mendelism. Discovery of genetic material. Sex determination: Chromosomal theory of sex determination, hormonal influence on sex differentiation. Dosage compensation, sex-linked inheritance, sex determination in plants. Cytoplasmic inheritance: Chloroplast (*Mirabilis jalapa*, *Zea mays*) and Mitochondria (petite yeasts and cytoplasmic male sterility in higher plants), mitochondrial and chloroplast genomes, interaction between nuclear and cytoplasmic genes. (Rubisco and Cytochrome oxidase).

## Unit IV

Regulation of gene expression in Prokaryotes and Eukaryotes: An Overview, Operon concept: Lactose metabolism (An inducible gene system) and tryptophan Operon (repressible system) in *E. coli*. Transcription - Promoters, Enhancer, transcription factors, transcription termination and anti-termination. DNA methylation, RNA processing - Capping, polyadenylation, splicing-spliceosome and ribozyme. Translation- Structure and composition of ribosomes in prokaryotes and eukaryotes, Role of RNA in protein synthesis, RNA polymerases

## Unit V

R-DNA Technology: Introduction, Enzymes used in genetic engineering Nucleases : Restriction enzymes, (R E) Nomenclature of RE, Mode of Action of REs. DNA ligase, Kinase, Klenow fragment, Reverse transcriptase, Alkaline Phosphatases, Terminal Deoxynucleotide transferase, T4 Ligase. Cloning Vectors: Plasmids; Nomenclature and Classification, PBR-322, PUC Plasmid

## Unit-VI

Blotting techniques: Introduction, Southern Blotting, Northern blotting, western blotting. DOT blotting techniques, Plaque/Colony blotting technique. DNA Libraries: Construction of genomic library, c-DNA Library. 14 hours Polymerase Chain Reaction: Introduction, principle involved in PCR, components of PCR, basic reaction, different types of PCR (Inverse PCR, Anchored PCR, RT-PCR) Applications of PCR). Molecular Markers: Restriction fragment length Polymorphism (RFLP), Amplified fragment length polymorphism (AFLP), Random Amplified Polymorphic DNA (RAPD), Simple sequence repeats (SSR)