Syllabus for Research Entrance Test (RET)

Genetics And Plant Breeding

Paper 1st Research Methodology

Unit 1

Chapter 1st: Principals of field experimental designs.

Chapter 2nd: Analysis of variance and covariance.

Chapter 3rd: Completely Randomized Design (CRD), Randomized Block Design (RBD).

Chapter 4th: Latin Square Design (LSD) and Factorial Design.

Chapter 5th: Preparation of layout plans, and field visits to application of these designs.

Chapter 6th: Null hypothesis and Alternate hypothesis

Chapter 7th: Test of significance, Z, t & X^2 (Chi-square) tests.

Unit 2

Chapter 1st: Genetic diversity analysis- metroglyph cluster and D^2 analysis

Chapter 2nd: Association analysis: phenotypic and genotypic correlation

Chapter 3rd: path analysis and estimation of direct and indirect effects on yield.

Chapter 4th: Selection indices- Selection of parents, simultaneous selection model.

Chapter 5th: concept of selection- general and specific combining ability.

Chapter 6th: Selection intensity and selection differential and genetic gain.

Chapter 7th: heritability, genetic advance and discriminant function analysis.

Unit 3

Chapter 1st: Diallel analysis: Griffin's method 1st and 2nd, Hayman's graphical approach

Chapter 2nd North Carolina Design (NCD) and their interpretation.

Chapter 3rd Line x tester analysis.

Chapter 4th: Triple test cross analysis.

Chapter 5th: Stability models.

Chapter 6th: Nature of gene action - additive, dominance and epistasis.

Chapter 7th: Estimation of heterosis and inbreeding depression.

Unit 4

Chapter 1st: Polygenic characters.

Chapter 2nd: Features of polygenic traits.

Chapter 3rd: Inheritance of polygenic traits.

Chapter 4th: Analysis of Polygenic traits.

Chapter 5th: Significance of polygenic traits.

Chapter 6th: Phenotypic and Genotypic variation.

Chapter 7th: Environmental variation.

Unit 5

Chapter 1st: Determination of objectives of research.

Chapter 2nd: Role of plant breeding research in development of Country.

Chapter 3rd: Different review and literature related to plant breeding research.

Chapter 4th: Germ plasm resources related to plant breeding research.

Chapter 5th: Problems related to field experimentation.

Chapter 6th: Modern and innovative approaches in plant breeding.

Chapter 7th: References and bibliography.

Syllabus for Research Entrance Test (RET)

Genetics And Plant Breeding

Paper 2nd

Subject Content

Unit 1

Chapter 1st: History of cytology.

Chapter 2nd: Ultrastructure of plant cell – cell organelles and their function.

Chapter 3rd: Cell cycle and mitotic cell division.

Chapter 4th: Reductional cell division.

Chapter 5th: Importance of cell division.

Chapter 6th: Molecular basis of cell division.

Chapter 7th: Physical basis of heredity.

Unit 2

Chapter 1st: Role of crop physiology in crop improvement.

Chapter 2nd: Role of soil water relation in crop improvement.

Chapter 3rd: Role of photosynthesis to increase crop productivity.

Chapter 4th: Growth parameters and their measurers.

Chapter 5th: Role of growth hormones to increase crop productivity.

Chapter 6th: Role of physiological breeding to develop ideal plant type.

Chapter 7th: Crop ideotype breeding.

Unit 3

Chapter 1st: Mendelian principals of inheritance.

Chapter 2nd: Gene interaction and modifications of F_2 ratio.

Chapter 3rd: Linkage their types and phases.

Chapter 4th: Crossing over and their molecular basis.

Chapter 5th: Forms of chromosomes, chromosomal aberrations.

Chapter 6th: Gene Mapping.

Chapter 7th: Pleiotropism, Penetrance and expressivity.

Chapter 8th: Multiple alleles.

Chapter 9th: Multiple factor hypothesis.

Chapter 10th: Sex linked, sex influenced and sex-limited traits.

Chapter 11th: Sex determination in plants and animals.

Chapter 12th: Structure and function of Nucleic acid.

Chapter 13th: Replication of DNA.

Chapter 14th: Repair of DNA.

Chapter 15th: Extra chromosomal inheritance.

Chapter 16th: Maternal effects.

Chapter 17th: Genetic Code.

Chapter 18th: Protein synthesis.

Unit 4

Chapter 1st: Nature and scope of plant breeding.

Chapter 2nd: Objectives of plant breeding.

Chapter 3rd: Domestication and plant introduction.

Chapter 4th: Reproductive system in plants

Chapter 5th: Apomixis and development of vybrids.

Chapter 6th: Genetic basis of self-pollinated crops.

Chapter 7th: Breeding method of self-pollinated crops.

Chapter 8th: Genetic basis of cross-pollinated crops and hardy Weinberg law.

Chapter 9th: Role of distant hybridization in plant breeding.

Chapter 10th: Breeding methods for asexually propagated crops.

Chapter 11th: systems of mating.

Chapter 12th: Self incomfortability and their role in plant breeding, male sterility their role in plant breeding.

Chapter 13th: Mutation breeding and polyploidy.

Chapter 14th: Population improvement methods.

Chapter 15th: Multi line synthetic and composite varieties.

Chapter 16th: Classes of quality seeds their maintenance and multiplication.

Chapter 17th: Varietal deterioration and their control. Identification, release and notification of a variety

Chapter 18th: Biotechnology in crop improvement.