

Semester – V

B.Sc. Genetics

Paper –IX (Genetics & Crop Improvement – I)

Max. Marks: 45+5

Time : 3 Hours

Note : Question one will be compulsory and will have 8 short answer type covering entire syllabus. Four questions will be set from each section. Candidates will answer two questions from each section. All questions will carry equal marks.

SECTION –A

I Introduction to Plant Breeding:

History, Objectives and major achievements in crop improvement

II Plant Domestication:

Introduction, Changes in Plant species under domestication, Genetic erosion, Germ-Plasm conservation: In situ and Ex situ

III Plant Introduction:

Introduction, History, Purpose, Merits, Demerits and major achievements in crop improvement

IV Self incompatibility:

Introduction, mechanism of Heteromorphic and Homomorphic systems, Elimination and applications of self incompatibility in crop plants

SECTION-B

V Male Sterility:

Introduction, Phenotypic expression, Genetic, Cytoplasmic and gene-cytoplasmic male sterility, their utilization in plant breeding

VI Hybridization:

Techniques, Procedure objectives and consequences of hybridization, Limitations of distant hybridization, Merits, Demerits and main achievements of hybridization

VII Heterosis and inbreeding depression:

Introduction, Manifestations, Genetic basis and Molecular basis of Heterosis, Commercial utilization, Effects of inbreeding

VIII Mutations in Crop Improvements:

Spontaneous and induced mutations, Physical and Chemical mutagens, Gamma-Radiation, application, limitations and major achievements of mutation breeding

Semester – V

B.Sc. Genetics

Paper –X (Genetics & Animal Improvement – II)

Max. Marks: 45+5

Time : 3 Hours

Note : Question one will be compulsory and will have 8 short answer type covering entire syllabus. Four questions will be set from each section. Candidates will answer two questions from each section. All questions will carry equal marks.

SECTION –A

I Historical Aspect:

Ancient Animal Husbandry, 18th century animal husbandry, laying the foundation of pure breeds, Development of breed association

II Domestication of Animals:

Centers of domestication, Effects of domestication, Domestication of cattle, Buffalo, Sheep & Goats, Poultry

III Qualitative Genetics in Animal Breeding:

Lethal and genetic abnormalities, Genetic differences in disease and parasite resistance

SECTION-B

IV Inbreeding and Relationship:

Introduction, Effectiveness, Degree of inbreeding, Relationship, Genetic effects of inbreeding, Usefulness of inbreeding

V Out Breeding:

Introduction, Out- Crossing, Cross breeding, Grading, Crossing inbred lines for commercial production, Species hybridization

VI Principal of Selection:

Introduction, Effectiveness of selection, Individual, Pedigree selection, Progeny and selection, Family selection, Results of selection

Semester – VI

B.Sc. Genetics

Paper – XI (Genetics & Crop Improvement–I)

Max. Marks: 45+5

Time : 3 Hours

Note : Question one will be compulsory and will have 8 short answer type covering entire syllabus. Four questions will be set from each section. Candidates will answer two questions from each section. All questions will carry equal marks.

SECTION –A

I Polyploidy in Plant Breeding:

Autopolyploidy and allopolyploidy, their application in crop improvement and origin of crop plants, Colchicine induced polyploidy and limitation of polyploidy

II New Approach to Breeding of Self Pollinated Crops:

Multi-line varieties, their merits, demerits and achievements, Population approach, Its merits and demerits.

III Biotechnology in Crop Improvements:

A brief account of plant tissue culture-technique, embryo culture, meristem culture, another culture, somatic hybridization, achievements and future prospects

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SECTION-B

IV Varietal Release and Seed Production:

Evaluation: Station trial, Multilocation trial, Disease and Insect Tests, Quality Test and identification of entries for release

V Certified Seed:

Introduction, Requirement for certified seed, Certified Seed Production in Some Crops, Self-Pollinated Crops: Hybrid Maize, Hybrid Jawar, Hybrid Bajra and potato.

VI Brief account of the following: Research Centers:

International Rice Research Institute(IRRI), Sugarcane Breeding Institute(SBI), Central Potato/Research Institute(CPRI), Central Institute of Cotton Research(CICR), International Centre for Improvements of Maize and Wheat(CIMMYT).

VII Plant Breeder's Rights (PBR):

Historical, Requirements of PBR, Farmer's Right, need for PBR, Benefits from PBR, Disadvantages from PBR.

Semester – VI

B.Sc. Genetics

Paper – XII (Genetics & Animal Improvement–II)

Max. Marks : 45+5

Time : 3 Hours

Note : Question one will be compulsory and will have 8 short answer type covering entire syllabus. Four questions will be set from each section. Candidates will answer two questions from each section. All questions will carry equal marks.

SECTION –A

I Breeds of Live Stock:

A brief account of important indigenous and exotic breeds of dairy cattle, Sheep, Goat, Swine and poultry

II Animal Genetics Resources:

Live Stock, Poultry and fish genetic resources in India and their conservation strategies

III Sire Evaluation:

Introduction, Sire indexing, Daughter average index, Correlated daughter average index, Contemporary daughter average index

SECTION-B

IV Biotechnology for the improvement of animals:

Frozen semen and artificial insemination, Embryo manipulation, Gene targeting and transgenesis, Sex selection

V Exsitu Cryopreservation of Animal Genetic Resources:

Cryopreservation of embryos, Insemination and flushing of embryos, Cryopreservation of ovaries, Conservation of genetic material

VI Brief account of the following: Animal Research Centers:

National Bureau of Animal Genetic Resources (NBAGR), National Dairy Research Institute (NDRI), Indian Veterinary Research Institute (IVRI)

VII Intellectual Property Right (IPRs) and Patents:

Introduction, Process Patent, Product patent, non patentable inventions, Animal patents- classical cases

Semester – V & VI

B.Sc. Genetics

Practical Examination

Max. Marks : 90+10*

Time : 6 Hours

(Two sessions of 3 hours each)

1. Estimation of DNA
2. Estimation of RNA
3. To study emasculation and cross pollination techniques in rice, wheat and pea
4. To study selfing technique in maize.
5. Study of Pollen viability using staining test
6. To test seed by viability using Tetrazolium test method.
7. Study of human pedigrees and their possible genetic explanation
8. Construction of Sire index from the given data.
9. Practical Record 12
Marks
10. Viva-Voce 12
Marks

Note: Students must be taken to visit the institution /higher centers engaged in research activities in genetics and related fields.