GANPAT UNIVERSITY									
FACULTY OF AGRICULTURE, ALLIED SCIENCES AND TECHNOLOGY									
Programme	B.Sc. (Hons.)					Branch/Spec.	Agriculture		
Semester	IV					Version	1.1.1.0		
Effective from Academic Year			2026-27			Effective for the Batch admitted in			July 2025
Course Code	IVA08BPB		Course Name			Basics of Plant Breeding			
Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	40	40	80
Hours	2	0	2	0	4	Practical	20	00	20

Pre-requisites

Not Applicable

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	To describe and explain the historical development, concept, nature and role of plant breeding, major achievements, future prospects, and the utilization and conservation of plant genetic resources.
CO2	To analyse genetic principles related to plant breeding including modes of reproduction, apomixis, self-incompatibility, male sterility, domestication, centres of origin, genetic variation, heritability and genetic advance.
CO3	To apply and analyse breeding methods in self-pollinated crops such as mass selection, pure line selection, hybridization and handling of segregating populations, including pre-breeding concepts.
CO4	To apply and analyse population genetics principles and breeding methods in cross-pollinated crops including recurrent selection, ear-to-row methods, heterosis exploitation, and development of hybrids, composites and synthetic varieties.
CO5	To analyse and evaluate breeding strategies for asexually propagated crops, wide hybridization, polyploidy, mutation breeding, biotic and abiotic stress resistance, participatory plant breeding, and evaluate variety release procedures, IPR, patents and Plant Breeders' and Farmers' Rights.

Theory Syllabus

Unit	Content	Hrs.
1	Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male-sterility-genetic consequences, cultivar options, Plant genetic resources, its utilization and conservation Domestication, Acclimatization and Introduction.	6
2	Centres of origin/ diversity, Components of Genetic variation. Heritability and genetic advance. Pre-breeding and Universal Plant Breeder's equation. Genetic basis and breeding methods in self-pollinated crops, mass and pure line selection, hybridization techniques and handling of segregating population.	8
3	Multiline concept, Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross-pollinated crops, modes of selection. Population movement schemes Ear to Row method, Modified Ear to Row, recurrent selection schemes. Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties	8
4	Breeding methods in asexually propagated crops, clonal selection and hybridization. Wide hybridization and pre-breeding. Polyploidy in relation to plant breeding, mutation breeding- methods and uses. Breeding for important biotic and abiotic stresses. Participatory plant breeding. Variety Release and notification. Intellectual Property Rights, Patenting, Plant Breeders and Farmer's Rights.	8

Practical Content

1. Plant Breeder's kit, Study of germplasm of various crops
2. Study of floral structures of self-pollinated and cross-pollinated crops
3. Emasculation and hybridization techniques in self- and cross-pollinated crops
4. Consequences of inbreeding on genetic structure of resulting populations
5. Study of male sterility system
6. Handling of segregating populations
7. Methods of calculating mean, range, variance, standard deviation, heritability
8. Designs used in plant breeding experiments, analysis of Randomized Block Design
9. To work out the mode of pollination in a given crop and extent of natural out-crossing

Note: Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)

L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work

CE= Continuous Evaluation, SEE= Semester End Examination

10. Prediction of performance of double cross hybrids 11. Maintenance of breeding records and data collection 12. Screening tests for biotic and abiotic stresses.	
Text Books	
1	Plant Breeding- B.D. Singh.
Reference Books	
1	Plant Breeding: Principles & Practices by JR Sharma.
2	Principles and Procedures of Plant Breeding - Biotechnical and Conventional Approaches by GS Chahal and SS Gosal.
3	Principles of Plant Genetics and Breeding by George Acquaah.

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	1	2	1	2	1	1	3	3
CO2	2	1	2	2	2	1	1	2	1	2	2	2
CO3	3	2	3	1	2	2	1	2	2	1	2	3
CO4	3	1	2	3	1	1	1	2	2	1	1	2
CO5	1	1	2	2	3	3	2	1	2	1	2	1

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