St. Aloysius' College Jabalpur, M.P. (Autonomous) Reaccredited A++ by NAAC with CGPA 3.58/4.00
College with Potential for Excellence (CPE) DST-FIST supported and DBT Star College Scheme
Department of Botany and Microbiology
Session 2025-26

Faculty of Science

Bachelor of Science (B.Sc.)

SUBJECT: BOTANY

VI Semester

Group B- Paper-1

Paper- Cytology, Plant Breeding and Biotechnology (Theory)

CORE COURSE 1

(S3-BOTA3D)

Course Outcomes

CO.No.	Course Outcomes	Cognitive Level
CO1	Learn the basic principles of cytology, plant breeding and biotechnology.	U
CO2	Acquire the applicability of Biotechnology in relation to the welfare of society.	U
CO3	Explain the importance of plant breeding.	U, A
CO4	Differentiate between cell division types	U, A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100 (Min. Passing Marks: 35)**
Practical	2	40	60	**100 (Min. Passing Marks: 35)**
Total	6			**200**

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	2 Internal Exams (20 Marks) + Attendance of 10 Marks (During the Semester) (Both will be taken + Attendance)	1 External Exams (At the End of Semester)

11/09/25

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Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week **Maximum Marks:** 60

Total No. of Lectures: 45 Hrs.

Unit	Part B- Content of the course Topics	No. of Lectures 45
1	**1. Cytology** 1.1 Definition and scope 1.2 The cell theory 1.3 Structure of prokaryotic and Eukaryotic cell, 2. Cell Envelops 2.1 Cell membrane: Composition, models and function 2.2 Plant cell wall structure and function	12
2	**1. Cell organelles structures and function:** 1.1 Endoplasmic reticulum, Golgi body 1.2 Mitochondria, Plastid-types and chloroplast, 1.3 Nucleus-Nuclear membrane, nucleoplasm, nuclear pore, nucleolus, chromatin material 1.4 Lysosome, peroxisomes, vacuole, 1.5 Cytoskeleton-microtubules and macro filaments, **1.6** Ergastic substance (such as starch grains, crystals, gums, resin and other compounds)	12
3.	**1. Chromosomal organization:** 1.1 Structure, types and functions 1.2 Ultrastructure of Chromosomes 1.3 Karyotype and Idiograms 1.4 Nucleosome model 1.5 Special types of chromosomes 2. Variations I chromosome structure: 2.1 Structural change- deletion, duplication, translocation and inversion. 2.2 Variation in chromosome number-euploidy, Aneuploidy 3. Cell cycle and cell division- Mitosis and Meiosis.	12
4.	**Plant Breeding –** 1.1 Introduction and goals 1.2 Principles and techniques: classical (conventional) hybridization 1.3 Hybrid vigor and heterosis 1.4 Modern techniques-production of genetic variation, technique at plant level, cell/tissue level, at DNA level. 1.5 Significance and limitations of plant breeding. 2.Plant breeding programs in India-Rice, Wheat, Sugarcane and Cotton. 2.1 Important National and International Institutes	12

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5.	1. Biotechnology: 1.1 History, definition and scope 1.2Basic aspects of plant tissue culture and Totipotency. 1.3 Important achievements in crop biotechnology, 2. Genetic Engineering: 1.1 Tools and techniques of Recombinant DNA technology. 1.2 Types of cloning vectors Biology of Agrobacterium, vector for gene delivery and marker gene. 1.4 Genomic and cDNA library. 1.5 PCR and DNA fingerprinting.	12

PART C- Learning Resources

Text Books, Reference Books, Other resources

1. P. K. Gupta . A text book of cell and Molecular biology, Rastogi Publication, Meerut, India (1999)
2. P.K. Gupta, Genetics, Rastogi Publication, Meerut, India, (1999)
3. Albersts,B., Bray, D., Lewis, J., Ratf, M., Roberts, K., and Watson, J.D. Molecular Biology of the Cell, Garland publishinginc., New York.
4. Wolfe, S.L. Molecular and Cellular biology, Wadsworth Publishing Co., California,USA (1993)
5. Rost, T. et. Al. Plant Biology, Wadsworth Publishing Co., Calofornia, U.S.A. (1998)
6. Krishanmurthy K.V. Methods in Cell wall Cytochemistry, CRC press, Boca Raton, Florida, U.S.A. (2000)
7. Buchanan, B.B. Groissem, W, and Jones, RL. Biochemistry and Molecular biology of plants, American Society of Plant Physiologists, Maryland, USA (2000)
8. Roy Satyesh Chandra and Kalyan Kumar De Cell Biology, New Central Book Agency (P) Ltd., Calcutta (2001)
9. Singh B.D. Biotechnolgy, Kalyan Publishers, N. Delhi, (2004)
10. Singh R.P. Introductory Biotechnology, Central book Depot. Allahabad (1992)
11. Soni., K.C. Biotechnology IV, College book Centre, Jaipur (2006)

Suggested equivalent online course:- www.eshiksha.mp.gov.in

Part D- Assessment and Evaluation

Suggested Continuous Evaluation Methods:
MaximumMarks:100
Continuous Comprehensive Evaluation (CCE):40 Marks University Exam (UE):60Marks

Internal Assessment : Continuous Comprehensive Evaluation(CCE)	Class Test Assignment/Presentation objective.	**40**
External Assessment: University Exam Section Time: 03.00 Hours	Section(A): Questions Section(B): Short Questions Section (C): Long Questions	**60**
	40+60=100	

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