BOARD OF STUDIES
IN
B.Sc BOTANY

2022-2023

DEPARTMENT OF BOTANY

SYLLABUS FOR B.Sc BOTANY

PITHAPUR RAJAH'S GOVERNMENT COLLEGE

Autonomous and Accredited with 'A' Grade by NAAC (3.17 CGPA)

KAKINADA – 533 001, E G Dist., ANDHRA PRADESH

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc., -Botany- V Semester End (W.E.F. 2022-23)
CELL BIOLOGY, GENETICS AND PLANT BREEDING

Total hours of Teaching 40hrs @ 3 hrs/week Total Credits:03

UNIT – I: Cell Biology (12h)

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes**:** morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin, Special types of chromosomes- polythene, lampbrush, β chromosomes.

UNIT – II: Genetic Material: (12h)

1. DNA structure (Watson & Crick model) and replication of DNA (semi-conservative)
2. Types of RNA (mRNA, tRNA, rRNA), their structure and function.
3. Polymorphism of DNA.

UNIT – III: Mendelian Inheritance: (12h)

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcross and test cross.
2. Chromosomal mapping – 2-point & 3-point test cross.
3. Linkage: concept, complete and incomplete linkage, linkage mapping,
4. Crossing Over: concept & significance, Mitotic Crossing over.

UNIT – IV: Plant Breeding: (12h)

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).
3. Heterosis

UNIT – V: Breeding, Crop Improvement and Biotechnology: (12h)

1. Role of mutations in crop improvement.
2. Role of soma clonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

Suggested activity: Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

Books for Reference :

- Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation Blackwell Science, London
- Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.
- Lea, P.J. and Leegood R.C. 1999, Plant Biochemistry and Molecular Biology, John Wiley and Sons, London.
- Power C.B., 1984, Cell Biology, Himalaya Publishing Co. Mumbai
- De. Robertis and De Robertis, 1998, Cell and Molecular Biology, K.M. Varghese and Company
- Sinnott, E.W., L.C. Dunn & J. Dobshansky (1958): Principles of Genetics (5th Edition) McGraw Hill Publishing Co., N.Y. Toronto, London.
- Winchester, A.M. (1958): Genetics (3rd Edition) Oxford & IBH Publishing House, Calcutta, Bombay, New Delhi.
- Singleton, R. (1963): Elementary Genetics, D. Van Nostrand Co., Ltd., Inc., N.Y. & Affiliated East West Press (P) Ltd., New Delhi.
- Strickberger, M.W. (1976): Genetics (2nd Edition) MacMillan Publishing Co., Inc., N.Y., London
- Watson, J.D. (1977): Molecular Biology of the Gene, W.A. Benjamin, Inc., Menlo Park- California, Reading-Massachusetts, London, Amsterdam, Don Mills, Ontario, Sydney.
- Gardner,E.J & Snusted, D.P.(1984): Principles of Genetics (7thedition) John Wiley & Sons, N.Y. Chichester, Brisbane, Toronto, Singapore.
- Lewin, B. (1985) Genes VII Wiley Eastern Ltd., New Delhi, Bombay, Calcutta, Madras, Hyderabad.
- Allard R.W(1999): The Principles of Plant Breeding, John & Wiley and Sons.
- Poelman J.M: Breeding Field Crops, Springer.
- George Acquaah (2012): Principles of Plant Genetics & Breeding: Wiley-Blackwell.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc., BOTANY PRACTICAL PAPER – V PRACTICAL SYLLABUS

CELL BIOLOGY, GENETICS AND PLANT BREEDING

Total hours of laboratory Exercises 45 hrs @ 2hrs/week Total credits:02

PAPER – V PRACTICAL SYLLABUS

Suggested Laboratory Exercises:

1. Study of the structure of cell organelles through photomicrographs.
2. Study of structure of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips.
4. Study of effect of organic solvent on permeability of cell membrane.
5. Numerical problems solving Mendel' Laws of inheritance
6. Chromosome mapping using 3-point test cross data.
7. Hybridization techniques – emasculation, bagging (for demonstration only).
8. Field visit to a plant breeding research station.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc., Botany Practical Examinations at the End of Semester-V

(CELL BIOLOGY, GENETICS AND PLANT BREEDING)

Botany Practical Model Paper-V (w.e.f 2022-23)

Time: 2 hours **Max. Marks: 50**

Perform the Experiment **A. Perform** squash on onion root tip, prepare the slide, identify at least one division stage. Write the procedure and draw the diagram of reported stage.

	1 x 15 =	**15Marks**
Describe the procedure of Hybridization technique **B**	1 x 10 =	**10Marks**
Solving numerical problems on Mendelian in heritance **C, D**	2 x 7.5 =	**15Marks**
Record & Viva	=	**10Marks**
		50 Marks

A-Onion root squash technique

B- Emasculation & Bagging

C&D Numerical problems on Mendelian Inheritance.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc., Degree Examinations at V Semester End

Botany Paper V: CELL BIOLOGY GENETICS AND PLANT BREEDING

(Course: BO5207 Model Paper w.e.f. 2022-23)

Time: 2Hrs. **Max. Marks: 50**

SECTION – A 3×10 =30M

Answer any **THREE** of the following by choosing atleast one question from each Part., draw neat and labeled diagrams wherever necessary.

PART – I

1. a) Give an account on Ultra structure and functions of cell membrane

   OR

   b)Give a detailed note on Organization of DNA in chromosome
2. a) Illustrate Watson & Crick model of DNA (OR) Explain about secondary structure of DNA

   OR

   b) Give a note on Replication of DNA especially Semiconservative model
3. a) Chromosome mapping (OR) 3 Point test cross

   OR

   b) Linkage concept and significance

PART – II

4. a) write about Methods of crop improvement

   OR

   b) Essay on Introduction and objectives of plant breeding
5. a) Explain the Role of Soma clonal variations

   OR

   b) Write an essay on Role of Mutations in crop improvement
6. a)Describe the ultra structure and functions of cell wall

   OR

   b)Write an essay on Molecular Breeding.

SECTION – B 4×5=20M

Answer any **FOUR** of the following Questions, Draw neat and labeled diagrams wherever necessary.

1. Difference between Prokaryotic and Eukaryotic cell
2. Euchromatin, Heterochromatin
3. m-RNA Structure and Functions
4. Test Cross
5. Crossing Over theories
6. Selection in Plant breeding

BLUE PRINT FOR QUESTION SETTER

UNIT NO/ TITLE	LAQ	SAQ	MARKS ALLOTED TO THE MODULE
UNIT-I: CELL BIOLOGY	**3**	**2**	**40**
UNIT-II : GENETIC MATERIAL	**2**	**1**	**25**
UNIT-III: MENDELIAN INHERITANCE	**2**	**1**	**25**
UNIT-IV : PLANT BREEDING	**2**	**1**	**25**
UNIT-V: BREEDING, CROP IMPROVEMENT AND BIOTECHNOLOGY	**3**	**1**	**35**
Total marks alloted to all questions including choice			**150**

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

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III B.Sc., -Botany-V / V Semester End (W.E.F. 2022-23)
CELL BIOLOGY, GENETICS AND PLANT BREEDING
III B.Sc., -Botany-5 / V Semester Question Bank

UNIT – I: CELL BIOLOGY

Essay Questions-

1. Describe the ultra structure and functions of cell wall?
2. Explain the organization of DNA in chromosome
3. Describe ultra structure and functions of cell membrane

Short Answer Questions

1. Cell theory
2. Difference between Prokaryotic and Eukaryotic cell
3. Fluid mosaic model of cell membrane
4. Euchromatin & Heterochromatin

UNIT – II: GENETIC MATERIAL

Essay Questions-

1. Watson & Crick model of DNA (OR) Explain about secondary structure of DNA
2. Replication of DNA especially Semiconservative model

Short Answer Questions

1. m-RNA Structure and Functions
2. t-RNA structure and Functions

UNIT – III: MENDELIAN INHERITANCE

Essay Questions-

1. Expain the Chromosome mapping (OR) 3 Point test cross
2. Linkage concept and significance

Short Answer Questions

1. Back cross
2. Test cross
3. Crossing Over theories

UNIT – IV: PLANT BREEDING

Essay Questions-

1. Methods of crop improvement
2. Essay on Introduction and objectives of plant breeding

Short Answer Questions

1. Objectives of Plant breeding
2. Selection in Plant breeding

UNIT – V: BREEDING, CROP IMPROVEMENT AND BIOTECHNOLOGY

Essay Questions-

1. Essay on Role of Mutations in crop improvement
2. Expain the Role of Somaclonal variations
3. Essay on Molecular Breeding

Short Answer Questions

1. RFLP/Restriction Fragment Length Polymorphism
2. RAPD/ Rapid Amplified Polymorphic DNA
3. Hybridization of plant breeding
4. Significance of Mutations in Plant breeding