



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory body of the Government of Andhra Pradesh)

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REVISED SYLLABUS OF BOTANY UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21

PROGRAMME: FOUR-YEAR UG HONOURS PROGRAMME

BOTANY

*(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities &
Model Q.P.)*

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

APSCHE/ REVISION OF C.B.C.S – BOTANY COURSE W.E.F.2020-21

S. No.	Semester	Title of the Course (Paper)	Hours /week	Max. Marks (SEE)	Marks in CIA	Credits
1.	Sem.-I/ Course-1	Fundamentals of Microbes and Non-vascular Plants	04	75	25	03
	Course-1 Practical	Fundamentals of Microbes and Non-vascular Plants	03	Max. Marks-50 Internal assessment at Semester end		02
2.	Sem.-II/ Course-2	Basics of Vascular plants and Phytogeography	04	75	25	03
	Course-2 Practical	Basics of Vascular plants and Phytogeography	03	Max. Marks-50 External assessment at Semester end		02
3.	Sem.-III/ Course-3	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	04	75	25	03
	Course-3 Practical	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	03	Max. Marks-50 Internal assessment at Semester end		02
4.	Sem.-IV Course-4	Plant Physiology and Metabolism	03	75	25	03
	Course-4 Practical	Plant Physiology and Metabolism	03	Max. Marks-50 External assessment at Semester end		02
5.	Sem.- IV Course- 5	Cell Biology, Genetics and Plant Breeding	04	75	25	03
	Course-5 Practical	Cell Biology, Genetics and Plant Breeding	03	Max. Marks-50 External assessment at Semester end		02
6.	Sem.– V Course – 6 & 7	Domain related Skill Enhancement Courses (02) - Three (3) pairs of courses (each pair has 2 related courses) will be offered, student has to choose a pair of courses.	03	75	25	03
			03	Max. Marks-50 Internal assessment at Semester end		02
			03	75	25	03
			03	Max. Marks-50 Internal assessment at Semester end		02

Unit – 3: Mendelian and Non-Mendelian genetics**14Hrs.**

1. Mendel's laws of inheritance. Incomplete dominance and co-dominance; Multiple allelism.
2. Complementary, supplementary and duplicate gene interactions (plant based examples are to be dealt).
3. A brief account of linkage and crossing over; Chromosomal mapping - 2 point and 3 point test cross.
4. Concept of maternal inheritance (Corren's experiment on *Mirabilis jalapa*); Mitochondrial DNA.

Unit – 4: Structure and functions of DNA**12 Hrs.**

1. Watson and Crick model of DNA. Brief account on DNA Replication (Semi-conservative method).
2. Brief account on Transcription, types and functions of RNA. Gene concept and genetic code and Translation.
3. Regulation of gene expression in prokaryotes - Lac Operon.

Unit – 5: Plant Breeding**12 Hrs.**

1. Plant Breeding and its scope; Genetic basis for plant breeding. Plant Introduction and acclimatization.
 2. Definition, procedure; applications and uses; advantages and limitations of : (a) Mass selection, (b) Pure line selection and (c) Clonal selection.
 3. Hybridization – schemes, and technique; Heterosis (hybrid vigour).
 4. A brief account on Molecular breeding – DNA markers in plant breeding. RAPD, RFLP.
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Text books :

- Botany – III (Vrukshasastram-I) : Telugu Akademi, Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-III*, S. Chand Publishing, New Delhi
- Ghosh, A.K., K.Bhattacharya & G. Hait (2011) *A Text Book of Botany, Volume-III*, New Central Book Agency Pvt. Ltd., Kolkata
- Chaudhary, R. C. (1996) *Introduction to Plant Breeding*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Books for Reference:

- S. C. Rastogi (2008) *Cell Biology*, New Age International (P) Ltd. Publishers, New Delhi
- P. K. Gupta (2002) *Cell and Molecular biology*, Rastogi Publications, New Delhi
- B. D. Singh (2008) *Genetics*, Kalyani Publishers, Ludhiana
- A.V.S.S. Sambamurty (2007) *Molecular Genetics*, Narosa Publishing House, New Delhi
- Cooper, G.M. & R.E. Hausman (2009) *The Cell – A Molecular Approach*, A.S.M. Press, Washington
- Becker, W.M., L.J. Kleinsmith & J. Hardin (2007) *The World of Cell*, Pearson Education, Inc., New York
- De Robertis, E.D.P. & E.M.F. De Robertis Jr. (2002) *Cell and Molecular Biology*, Lippincott Williams & Wilkins Publ., Philadelphia
- Robert H. Tamarin (2002) *Principles of Genetics*, Tata McGraw –Hill Publishing Company Limited, New Delhi.
- Gardner, E.J., M. J. Simmons & D.P. Snustad (2004) *Principles of Genetics*, John Wiley & Sons Inc., New York
- Micklos, D.A., G.A. Freyer & D.A. Cotty (2005) *DNA Science: A First Course*, I.K. International Pvt. Ltd., New Delhi
- Chaudhari, H.K. (1983) *Elementary Principles of Plant Breeding*, TMH publishers Co., New Delhi
- Sharma, J.R. (1994) *Principles and Practice of Plant Breeding*, Tata McGraw- Hill Publishers, New Delhi
- Singh, B.D. (2001) *Plant Breeding : Principles and Methods*, Kalyani Publishers, Ludhiana

- Pundhan Singh (2015) *Plant Breeding for Undergraduate Students*, Kalyani Publishers, Ludhiana
- Gupta, S.K. (2010) *Plant Breeding : Theory and Techniques*, Agrobios (India), Jodhpur
- Hayes, H.K., F.R. Immer & D.C. Smith (2009) *Methods of Plant Breeding*, Biotech Books, Delhi

Practical Syllabus of Botany Core Course – 5/IVSemester

Cell Biology, Genetics and Plant Breeding

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

Course Outcomes: After successful completion of this practical course the student shall be able to:

1. Show the understanding of techniques of demonstrating Mitosis and Meiosis in the laboratory and identify different stages of cell division.
2. Identify and explain with diagram the cellular parts of a cell from a model or picture and prepare models
3. Solve the problems related to crosses and gene interactions.
4. Demonstrate plant breeding techniques such as emasculation and bagging

Practical Syllabus:

1. Study of ultra structure of plant cell and its organelles using Electron microscopic Photographs/models.
2. Demonstration of Mitosis in *Allium cepa*/*Aloe vera* roots using squash technique; observation of various stages of mitosis in permanent slides.
4. Demonstration of Meiosis in P.M.C.s of *Allium cepa* flower buds using squash technique; observation of various stages of meiosis in permanent slides.
4. Study of structure of DNA and RNA molecules using models.
5. Solving problems monohybrid, dihybrid, back and test crosses.
6. Solving problems on gene interactions (at least one problem for each of the gene interactions in the syllabus).
7. Chromosome mapping using 3- point test cross data.
8. Demonstration of emasculation, bagging, artificial pollination techniques for hybridization.

Model paper for Practical Examination
Semester-IV / Botany Core Course – 5
Cell Biology, Genetics and Plant Breeding

Max. Time: 3 Hrs.

Max. Marks: 50

1. Make a cytological preparation of given material 'A' (mitosis or meiosis in Onion) by squash technique, report any two stages, draw labeled diagrams and write the reasons.

15 M

2. Solve the given Genetic problem (Dihybrid cross/ Interaction of genes/ 3-point test cross) 'B' and write the conclusions.

15 M

3. Identify the following and justify with apt reasons.

3 x 4 = 12 M

C. Cell Biology (Cell organelle)

D. Genetics (DNA/RNA)

E. Plant Breeding

4. Record + Viva-voce

5 + 3 = 8 M

Suggested co-curricular activities for Botany Core Course- 5 in Semester-IV:

A. Measurable :

a. Student seminars :

1. Light microscopy : bright field and dark field microscopy.
2. Scanning Electron Microscopy (SEM).
3. Transmission Electron Microscopy (TEM).
4. Mitosis and Meiosis
5. Cell cycle and its regulation.
6. Cell organelles bounded by single membrane.
7. Prokaryotic chromosomes
8. Special types of chromosomes :Polytene, Lampbrush and B-chromosomes.
9. Different forms of DNA.
10. Gene mutations.
11. DNA damage and repair mechanisms.
12. Reverse transcription.
13. Protein structure.

14. Modes of reproduction in plants.

15. Modes of pollination in plants

b. Student Study Projects :

1. Study of mitotic cell cycle in roots of *Allium cepa*

2. Study of mitotic cell cycle in roots of *Aloe vera*

3. Observation of chromosomal aberrations in *Allium cepa* root cells exposed to industrial effluent(s).

4. Observation of chromosomal aberrations in *Allium cepa* root cells exposed to heavy metal(s).

5. Observation of polyembryony in *Citrus* spp. and *Mangifera indica*.

c. Assignments: Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Field visit to Agriculture/Horticulture University/ Research station to observe Plant breeding methods.

2. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

RECOMMENDED ASSESSMENT OF STUDENTS:

Recommended continuous assessment methods for all courses:

Some of the following suggested assessment methodologies could be adopted. Formal assessment for awarding marks for Internal Assessment in theory.

(a) Formal:

1. The oral and written examinations (Scheduled and surprise tests),
2. Simple, medium and Critical Assignments and Problem-solving exercises,
3. Practical assignments and laboratory reports,
4. Assessment of practical skills,
5. Individual and group project reports,
6. Seminar presentations,
7. Viva voce interviews.

(b) Informal:

1. Computerized adaptive testing, literature surveys and evaluations,
2. Peers and self-assessment, outputs from individual and collaborative work
3. Closed-book and open-book tests,