S.K.R & S.K.R GOVT. COLLEGE FOR WOMEN (A) - KADAPA

Re accredited by NAAC with "B" Grade

DEPARTMENT OF BOTANY- (BOS – 2021-2022)

CURRICULUM AND SYLLABI
CHOICE BASED CREDIT AND SEMESTER SYSTEM
(CBCS)
As per APSCHE Syllabus(w.e.f 2020-2023)

UNDERGRADUATE PROGRAMME IN BOTANY
(II B.Sc. BOTANY)
B.Z.C (Botany, Zoology, Chemistry) (TM&EM) &B.C.H (Botany, Chemistry, Horticulture) (E.M)
(III & IV Semesters)
w.e.f 2021-2022

BOARD OF STUDIES MEETING
ON
22-10-2021

Department of Botany

Nagarajet, Kadapa, Andhra Pradesh, India-516001

CONTENTS

S.K.R & S.K.R GOVT. COLLEGE FOR WOMEN (A) - KADAPA

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

Constitution of Board of Studies in Botany

This Board of Studies in Botany has been constituted by the Principal SKR&SKR Govt. College for Women (A), Kadapa, as per UGC Autonomous guidelines of XII plan (2012-2017)

S.No.	Category	Name and Designation	Chairperson/ Member
01	In charge of the Dept. of Botany	Smt. B. Yuga Vani Lecturer in Botany SKR&SKR Govt. College for Women (A)-Kadapa	Chairperson
2	Subject expert Nominated by the Vice-Chancellor from Y.V.U. Kadapa	Prof. P.S. Shavalli Khan Professor, Dept. of Botany Y.V.University, Kadapa. 9441079002	University Nominee
3	Faculty Member	Dr. P. Subramanyam Lect. In Botany SKR&SKR GCW(A)-Kadapa	Member
	Faculty Member	Smt. Y. Nagarathnamma Lect. in Botany SKR&SKR Govt. College for Women (Autonomous) - Kadapa	Member
4	Two Subject Experts from outside the college to be nominated by the Academic Council	Dr. P.V. Krishna Reddy Lecturer in Botany Govt. College for Men (A), Kadapa pattikrishnareddy@gmil.com	Subject Expert Member
		M. Sreekanth Reddy, Lect. In Botany, Govt. Degree College, Vempalli, Kadapa	Subject Expert Member
5	One Representative from Industry/ Corporate Sector/Allied Area Relating to Placement	Dr.B.V.Raghava Reddy,M.Sc,Ph.D Mythri Hybrid Seeds Producers & Marketers of all kinds of seeds,7/3,Korrapadu Road Proddatur 9966201778	Member
6	One P.G. Meritorious Alumnus	Smt. N. Rajani Krishna P.G.T. Botany, A.P. Model School & Junior College, Ramapuram, Kadapa(Dist) Cell No: 9550662976 Mail: nrkrishnamd@gmail.com	Member

Principal
SKR&SKR Govt. College for Women (A)
Kadapa

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

Dr. P. Subba Lakshumma. M.Com, M.Phil., Ph.D.,
Principal
Mail.kadapaw.jkc@gmail.com
Mobile No. 9951461047
Office. Ph.No:944165226

DATE: 22-10-2021

R. C. No. A-5/ GDCW (A)/BOS/Botany Syllabi & Regulations/2021

To
The Chairman/Members
Board of Studies in Botany

Dear Sir/Madam

Sub: SKR&SKR Govt. College for Women(A)-Kadapa, Conducting of Board of Studies Meeting in Department of Botany on 22-10-2021 at 09.00 A.M.- Acceptance req.,reg.,

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I am happy to invite the Chairman/Members of Board of Studies in Botany meeting to be held in the Department of Botany on 22-10-2021 at 09.00 A.M. to discuss the pattern of II Year B.Sc with Botany Curriculum, III & IV Semester wise syllabus, Question paper Pattern, Panel of Examiners (Examiners & Paper Setters), Skill Development Courses related with Botany Subject and other related issues.

S.No.	Category	Name and Designation	Chairperson/ Member
01	In charge of the Dept. of Botany	Smt. B. Yuga Vani Lecturer in Botany SKR&SKR Govt. College for Women (A)-Kadapa	Chairperson
2	One Subject expert Nominated by the Vice-Chancellor, Y.V.University, Kadapa	Prof. P.S. Shavalli Khan, Professor, Dept. of Botany, Y.V.University, Kadapa 9441079002	University Nominee
3	Faculty Member	Dr. P. Subramanyam, Lect. in Botany SKR&SKR Govt. College for Women (A) - Kadapa	Faculty Member
		Smt Y. Naga Rathnamma, Lect. in Botany SKR&SKR Govt. College for Women (A) - Kadapa	Faculty Member
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Honorarium / Sitting Allowances will be paid to Board Members as per the norms precided by the college.

Principal
SKR&SKR Govt. College for Women (A), Kadapa

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

Agenda & Minutes of Board of Studies in Botany held on 22.10.2021

The Board of Studies meeting in Botany held on 22.10.2021 at 9.00 A.M in the Department of Botany, SKR & SKR Govt. College for Women (A), Kadapa to discuss the agenda mentioned below:

Agenda for Board of Studies in Botany

- To Discuss on III & IV Semesters of Botany syllabi for Second Year B.Sc. Courses with Botany B.Z.C English & Telugu Medium, B.C.H English Medium with CBCS Curriculum Structure based on APSCHE New Frame Work ((w.e.f. 2020–2023).

- To discuss any modification in present syllabus to be included .

- To Discuss on SDC for III Semester and IV Semester which are related to Dept. of Botany introduced for Second Year B.Sc. (BZC & BCH) with regard to CBCS Curriculum based on APSCHE New Frame Work ((w.e.f. 2020–2023)

- To Discuss Evaluation Procedure relevant to Assessment of Theory & Practical Examinations with following pattern……..

- Theory examination for 100 Marks, both External and Internal as Ratio of 75:25 (Approved in Academic Council meeting held on 26-03-2021 as per APSCHE , CCE,A.P on 2020-2021) and both are compulsory assessed for Minimum Pass Percentage as 30.
- Core Subject Botany Practical Examination for 50 Marks and Assessment for III Semester with internal and IV Semester with External examiners.
- Assessment of Theory examination for 50 Marks for Skill Development Courses, which is External only.
- To Discuss CIA Procedure for 25 Marks , which is approved in Academic Council Meeting for BOS, SKR & SKR Govt. College for Women(A), held on 26-03-2021

Written exam	15 Marks
Student Seminar(semester-III) / Study Project/Field Projects (Semester-IV)	5 Marks
Assignment/ Co & Extra Curricular Activities	5 Marks

- Note : Internal Assessment to be calculated by Average of III & IV Internal Marks

- To discuss the pattern of question paper model and allotment of credits for the Core Subject Botany and Two Skill Development Courses.
- Suggesting panel of names for appointment of paper setters and examiners
- Any other matter relating to CBCS System for Second Year B.Sc. Degree Courses

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

Minutes of Board of Studies in Botany held on 22.10.2021

The BOS members are thoroughly discussed and resolved to implement the following points to be considered-

- . The BOS committee discussed and approved the following courses with the combination of Botany

S.NO	Group	Medium
01	B.Z.C.(Botany, Zoology, Chemistry)	Telugu Medium
02	B.Z.C.(Botany, Zoology, Chemistry)	English Medium
03	B.C.H (Botany, Chemistry, Horticulture w.e.f 2020-2021)	English Medium

- The BOS committee also discussed and approved III & IV Semester Curriculam frame work for Botany.

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

Course Structure of B.Sc Botany for III&IV Semester under CBCS

S. No.	Semester	Title of the Course (Paper)	Hours /week	Max. Marks (SEE)	Marks in CIA	Credit s
1.	Sem.-III/ Course-3	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	04	75	25	04
	Course-3 Practical	Anatomy and Embryology of Angiosperms,Plant Ecology and Biodiversity	02	Max. Marks-50 Internal assessment at Semester end		01
2 .	Sem.-IV/ Course-4	Plant Physiology and Metabolism	04	75	25	04
	Course-4 Practical	Plant Physiology and Metabolism	02	Max. Marks-50 External assessment at Semester end		01

Note : Credits are calculated based on minimum hours allotted to the Subject (UGC-APSCHE 2020-21 CBCS Guidelines)

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

The following procedure is adopted for Internal Assessment Evaluation for II Year UG Programms for the Academic year 201-22.

The committee also approved the External and Internal Evaluation Procedure with the ratio of 75 : 25 and Internal Marks allotment for CIA as follows:

Theory paper (External) : 75 Marks

Internal Marks : 25 Marks

Evaluation: In theory and Practical Examination the evaluation pattern will be as follows:

S.NO	Assemesment	Duration	Type	Marks
1.	Continuous Theory Internal	1 Hours	Internal	15
2.	Continuous Internal Practical Examinations for Odd Semester (I, III & V)	3 Hours	Internal	50
3.	Semester End Theory Examination	3 Hours	External	75
4.	Semester End Examination Practical Exam for Even Semester II, IV & VI	3 Hours	External	50

To Pass minimum score required in both Practical & theory is 40%

EXTERNAL EXAMINATION (75 MARKS)

With regard to the external **marks of 75** has been divided into two sections i.e., Section A and Section B. **Total Marks 75** and Duration of **Time 3.00 hours**.

Section A : Consists of 10 questions from 5 units (Each unit has 2 questions) .Out of which the student has to answer any 5 questions
Each question carries 5 marks. **(5X5=25 Marks**)

Section B : Section B covers 5 units. From each unit **2 questions** will be given with internal choice. Each question carries 10 marks. (**5x10=50 Marks**)

- The BOS committee also discussed and approved the curriculum structure for III &IV Semester of the Core Subject Botany, which consists of Five Units
- The BOS committee also discussed and approved the curriculum structure for Skill development courses which are related to Botany

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

II B.Sc., BOTANY

III Semester / Core Course -3

CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

(Total hours of teaching – 60 @ 04 Hrs./Week)

Theory Syllabus

Learning outcomes:

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

Understand on the organization of tissues and tissue systems in plants.
Illustrate and interpret various aspects of embryology.
Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities.
Appraise various qualitative and quantitative parameters to study the population and community ecology.
Correlate the importance of biodiversity and consequences due to its loss.
Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation.

Unit – 1: Anatomy of Angiosperms 12 Hrs.

1. Meristems- Definition, Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems–Epidermal, ground and vascular tissue systems .
3. Anomalous secondary growth in *Boerhavia* and *Dracaena.*
4. Study of timbers of economic importance - Teak, Red Sanders and Rosewood.

Unit – 2: Embryology of Angiosperms 12 Hrs.

1. Structure of anther, anther wall, types of tapetum. Microsporogenesis and development of male gametophyte.
2. Structure of ovule and Megasporogenesis : Monosporic (Eg: *Polygonum*), bisporic (Eg:*Allium*)and tetrasporic (Eg:*Peperomia*) types of embryo sacs.
3. Outlines of pollination, pollen – pistil interaction and fertilization.
4. Endosperm - Types and biological importance of Free nuclear, cellular, Helobial and ruminate endosperms.
5. Development of Dicot embryo (Eg: *Capsella bursa-pastoris*).

Unit – 3: Basics of Ecology 12 Hrs.

1. Ecology: definition, branches and significance of ecology.

2. Ecosystem: Concept and components (Physical, Chemical & Biological), energy flow, food chain, food web,ecological pyramids.

4. Plants and environment: Climatic Factors (light and temperature), Edaphic and Bioticfactors.

5. Ecological succession: Hydrosere and Xerosere

Unit – 4: Population, Community and Production Ecology 12 Hrs.

1. Population ecology: Natality, mortality, growth curves, ecotypes, ecads
2. Community ecology: Frequency, density, cover, life forms, biological spectrum
3. Concepts of productivity: Primary productivity , Types - GPP, NPP and Community Respiration
4. Secondary production, P/R ratio.

Unit – 5: Basics of Biodiversity 12 Hrs.

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity
3. Biodiversity Hot spots in India. Biodiversity in North Eastern Himalayas and Western Ghats.
4. Principles of Biodiversity conservation: IUCN threat-categories, RED data book
5. Role of NBPGR and NBA in the conservation of Biodiversity.

Text books:

- *Botany – III (Vrukshasastram-I) : Telugu Akademi, Hyderabad*
- *Botany – IV (Vrukshasastram-II) : Telugu Akademi, Hyderabad*
- *Pandey, B.P. (2013) College Botany, Volume-II, S. Chand Publishing, New Delhi*
- *Pandey, B.P. (2013) College Botany, Volume-III, S. Chand Publishing, New Delhi*
- *Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) A Text Book of Botany, Volume- II, New Central Book Agency Pvt. Ltd., Kolkata*

Books for Reference:

- *Esau, K. (1971)Anatomy of Seed Plants. John Wiley and Son, USA.*
- *Fahn, A. (1990)Plant Anatomy, Pergamon Press, Oxford.*
- *Cutler, D.F., T. Botha & D. Wm. Stevenson (2008)Plant Anatomy: An Applied Approach, Wiley, USA.*
- *Paula Rudall (1987)Anatomy of Flowering Plants: An Introduction to Structure and Development. Cambridge University Press, London*
- *Bhojwani, S. S. and S. P. Bhatnagar (2000)The Embryology of Angiosperms (4th Ed.),Vikas Publishing House, Delhi.*
- *Pandey, A. K. (2000) Introduction to Embryology of Angiosperms. CBS Publishers & Distributors Pvt. Ltd. , New Delhi*

- *Maheswari, P. (1971)An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.*
- *Johri, B.M. (2011)Embryology of Angiosperms. Springer-Verlag, Berlin*
- *Pandey, B.P. (2013)College Botany, Volume-III, S. Chand Publishing, New Delhi*
- *Bhattacharya, K., A. K. Ghosh, & G. Hait (2011) A Text Book of Botany, Volume- IV, New Central Book Agency Pvt. Ltd., Kolkata*
- *Kormondy, Edward J. (1996) Concepts of Ecology, Prentice-Hall of India Private Limited, New Delhi*
- *Begon, M., J.L. Harper & C.R. Townsend (2003) Ecology, Blackwell Science Ltd., U.S.A.*
- *Eugene P. Odum (1996)Fundamentals of Ecology, Natraj Publishers, Dehradun*
- *Sharma, P.D. (2012) Ecology and Environment. Rastogi Publications, Meerut, India.*
- *N.S.Subrahmanyam & A.V.S.S. Sambamurty (2008)Ecology Narosa Publishing House,*

New Delhi

- *A. K. Agrawal& P.P. Deo (2010) Plant Ecology, Agrobios (India), Jodhpur*
- *Kumar, H.D. (1992) Modern Concepts of Ecology (7th Edn.,)Vikas Publishing Co., New Delhi.*
- *Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher, U.K.*
- *Chapman, J.L&M.J. Reiss (1992): Ecology - Principles & Applications. Cambridge University Press, U.K.*
- *Kumar H.D. (2000)Biodiversity & Sustainable Conservation Oxford & IBH Publishing Co Ltd. New Delhi.*
- *U. Kumar (2007) Biodiversity : Principles & Conservation,Agrobios (India), Jodhpur*

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

II B.Sc. BOTANY

III Semester / Core Course -3

CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

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

Practical syllabus

Course Outcomes:

On successful completion of this practical course students shall be able to:
Get familiarized with techniques of section making, staining and microscopic studyof vegetative, anatomical and reproductive structure of plants.
Observe externally and under microscope, identify and draw exact diagrams of thematerial in the lab.
Demonstrate application of methods in plant ecology and conservation of biodiversity and qualitative and quantitative aspects related to populations andcommunities of plants.

Practical Syllabus

1. Tissue organization in root and shoot apices using permanent slides.
2. Anomalous secondary growth in stems of Boerhavia and Dracaena.
3. Study of anther and ovule using permanent slides/photographs.
4. Study of pollen germination and pollen viability.
5. Dissection and observation of Embryosac haustoria in Santalum or Argemone.
6. Structure of endosperm (nuclear and cellular) using permanent slides / Photographs.
7. Dissection and observation of Endosperm haustoria in Crotalaria or Coccinia.
8. Developmental stages of dicot and monocot embryos using permanent slides / photographs.
9. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, rain gauze, and lux meter. (visit to the nearest/local meteorology station where the data is being collected regularly and record the field visit summary for the submission in the practical).
10. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (02 each).
11. Quantitative analysis of herbaceous vegetation in the college campus for frequency, density and abundance.
12. Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law.
13. Find out the alpha-diversity of plants in the area
14. Mapping of biodiversity hotspots of the world and India

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Model paper for Practical Examination

Semester – III/ Botany - Core Course – 3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Max. Time:3 Hrs. Max. Marks: 50

1. Take T.S. of the material 'A' (Anatomy), prepare a temporary slide and justify the identification with specific reasons. 10 M
2. Write the procedure for the experiment 'B' (Embryology) and demonstrate the same. 10 M
3. Take T.S. of the material 'C', prepare a temporary slide and justify the identification with specific reasons. 10 M
4. Identify the following with specific reasons. 4 x 3 = 12 M

   D. Anatomy/Embryology

   E. Ecology instrument

   F. Mapping of Biodiversity hot spot

   G. Endemic/endangered plant/animal
5. Record + Viva-voce 5 + 3 = 8 M

Suggested co-curricular activities for Botany CoreCourse-3 in Semester-III:

A. Measurable :

a. Student seminars :

1. Anatomy in relation to taxonomy of Angiosperms.
2. Nodal anatomy
3. Floral anatomy
4. Embryology in relation to taxonomy of Angiosperms.
5. Apomictics and polyembryony.
6. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.
7. Deforestation and Afforestation.
8. Green house effect and ocean acidification.
9. The Montreal protocol and the Kyoto protocol.
10. Productivity of aquatic ecosystems.
11. Mangrove ecosystems in India.
12. Kolleru lake – Ramsar site.
13. Biodiversity hotspots of the world.

14. Origin of Crop plants - Vavilov centers
15. Agro biodiversity
16. International organizations working on conservation of Biodiversity
17. Nagoya protocol – ABS system.
18. Endemic and endangered plants in Andhra Pradesh.

b. Student Study Projects :

1. Stomata structure in plants from college campus/ their native place.
2. Report on xylem elements in plants using maceration technique.
3. Collection of information on famous herbaria in the world and preparation of a report.
4. Microscopic observations on pollen morphology from plants in college Campus/ their native locality.
5. Study report on germination and viability of pollen in different plants.
6. Observation of anthesis time in different plants and their pollinators.
7. A report on autecology and synecology of some plants in college campus ortheir native place.
8. Collection of photos of endemic/endangered plant and animal species to Make an album.
9. Biodiversity of the college or their own residential/ native area.
10. Collection of seeds/vegetative organs of rare plant species from their localities and to raise/grow in college garden

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. Visit to an arboretum/silviculture station/Forest research institute to see the live timber yielding plants or to visit a local timber depot. to observe various woods.
2. Field visit to a nearby ecosystem to observe the abiotic-biotic relationships.
3. Visit to National park/Sanctuary/Biosphere reserve etc., to observe in-situ conservation of plants and animals.
4. Visit to a Botanical garden or Zoo to learn about ex-situ conservation of rare plants or animals.
5. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

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Model Question Paper for Theory Examinations

Semester III / Botany Core Course 3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Time: 3 Hours **Max Marks: 75 Marks**

Section-A

Answer any 5 questions. Each question carries 5 marks **5x5=25 Marks**

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

SECTION – B

Answer all questions. Draw the labelled diagram wherever necessary. Each question carries 10 marks. **5x10= 50 Marks**

11 a)

(OR)

b)

12 a)

(OR)

b)

13 a)

(OR)

b)

14 a)

(OR)

b)

15 a)

(OR)

b)

IV Semester /Botany /Core Course – 4

THEORY SYLLAUS

Plant Physiology and Metabolism

(Total hours of teaching – 60 @ 04 Hrs./Week)

Learning outcomes:

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

- Comprehend the importance of water in plant life and mechanisms for transport ofwater and solutes in plants.
- Evaluate the role of minerals in plant nutrition and their deficiency symptoms.
- Interpret the role of enzymes in plant metabolism.
- Critically understand the light reactions and carbon assimilation processes responsible for synthesis of food in plants.
- Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms.
- Evaluate the physiological factors that regulate growth and development in plants.
- Examine the role of light on flowering and explain physiology of plants under stress conditions.

Unit – 1: Plant-Water relations 10 Hrs.

1. Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis. Water potential, osmotic potential, pressure potential.
2. Absorption and lateral transport of water; Ascent of sap
3. Transpiration: stomata structure and mechanism of stomatal movements (K^+ ion flux).
4. Mechanism of phloem transport; source-sink relationships.

Unit – 2: Mineral nutrition, Enzymes and Respiration 14 Hrs.

1. Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency
2. Absorption of mineral ions; passive and active processes.
3. Characteristics, nomenclature and classification of Enzymes. Mechanism of enzyme action, enzyme kinetics.

4. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, Pentose Phosphate Pathway (HMP shunt).

Unit – 3: Photosynthesis and Photorespiration 12 Hrs.

1. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect
2. Concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation
3. Carbon assimilation pathways (C3,C4 and CAM);
4. Photorespiration - C2 pathway

Unit – 4: Nitrogen and lipid metabolism 12 Hrs.

1. Nitrogen metabolism: Biological nitrogen fixation – asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system.
2. Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fatty acids.
3. Anabolism of triglycerides, β-oxidation of fatty acids, Glyoxylate cycle.

Unit – 5: Plant growth - development and stress physiology 12 Hrs.

1. Growth and Development: Definition, phases and kinetics of growth.
2. Physiological effects of Plant Growth Regulators (PGRs) - auxins, gibberellins, cytokinins, ABA, ethylene and brassinosteroids.
3. Physiology of flowering : Photoperiodism, role of phytochrome in flowering.
4. Seed germination and senescence; physiological changes.

Text books:

- Botany – IV (Vrukshasastram-II) : 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

Books for Reference:

- Aravind Kumar & S.S. Purohit (1998) *Plant Physiology – Fundamentals and Applications,*AgroBotanica, Bikaner
- Datta, S.C. (2007) *Plant Physiology,*New Age International (P) Ltd., Publishers, New Delhi
- Hans Mohr & P. Schopfer (2006)*Plant Physiology*, Springer (India) Pvt. Ltd., New Delhi
- Hans-Walter heldt (2005) *Plant Biochemistry,*Academic Press, U.S.A.
- Hopkins, W.G. & N.P.A. Huner (2014)*Introduction to Plant Physiology,* Wiley India Pvt. Ltd., New Delhi
- Noggle Ray & J. Fritz (2013)*Introductory Plant Physiology*, Prentice Hall (India), New Delhi
- Pandey, S.M. &B.K.Sinha (2006)*Plant Physiology*, Vikas Publishing House, New Delhi
- Salisbury, Frank B. & Cleon W. Ross (2007)*Plant Physiology*, Thomsen & Wadsworth, Austalia&U.S.A
- Sinha, R.K. (2014) *Modern Plant Physiology*, Narosa Publishing House,New Delhi
- Taiz, L.&E. Zeiger (2003)*Plant Physiology*, Panima Publishers, New Delhi
- Verma, V.(2007)*Text Book of Plant Physiology,*Ane Books India, New Delhi

Practical Syllabus of Botany
Core Course – 4 / Semester – IV
Plant Physiology and Metabolism

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

Course outcomes: On successful completion of this practical course, students shall be able to:

1. Conduct lab and field experiments pertaining to Plant Physiology, that is, biophysical and biochemical processes using related glassware, equipment, chemicals and plant material.
2. Estimate the quantities and qualitative expressions using experimental results and calculations
3. Demonstrate the factors responsible for growth and development in plants.

Practical Syllabus

1. Determination of osmotic potential of plant cell sap by plasmolytic method using *Rhoeo*/ *Tradescantia* leaves.
2. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
3. Determination of rate of transpiration using Cobalt chloride method / Ganong's potometer (at least for a dicot and a monocot).
4. Effect of Temperature on membrane permeability by colorimetric method.
5. Study of mineral deficiency symptoms using plant material/photographs.
6. Demonstration of amylase enzyme activity and study the effect of substrate and Enzymeconcentration.
7. Separation of chloroplast pigments using paper chromatography technique.
8. Demonstration of Polyphenol oxidase enzyme activity (Potato tuber or Apple fruit)
9. Anatomy of C3, C4 and CAM leaves
10. Estimation of protein by biuret method/Lowry method
11. Minor experiments – Osmosis, Arc-auxonometer, ascent of sap through xylem, cytoplasmic streaming

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

Model Question Paper for **Practical Examination**

Semester – IV/ Botany Core Course – 4

Plant Physiology and Metabolism

Max. Time: 3 Hrs. Max. Marks: 50

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1. Conduct the experiment 'A' (Major experiment), write aim, principle, material and apparatus/equipment, procedure, tabulate results and make conclusion. 20 M
2. Demonstrate the experiment 'B' (Minor experiment), write the principle, procedure and give inference. 10 M
3. Identify the following with apt reasons. 3 x 4 = 12 M

   C. Plant water relations / Mineral nutrition

   D. Plant metabolism

   E. Plant growth and development
4. Record + Viva-voce 5 + 3 = 8 M

Suggested co-curricular activities for Botany Core Course-4 in Semester-IV:

A. Measurable :

a. Student seminars :

1. Antitranspirants and their significance in crop physiology and horticulture.
2. Natural chelating agents in plants.
3. Criteria of essentiality of elements and beneficial elements.
4. Hydroponics, aquaponics and aeroponics.
5. Mycorrhizal association and mineral nutrition in plants.
6. Non-proteinaceous enzymes.
7. Respiratory inhibitors.
8. Structure of ATPase and Chemi osmotic hypothesis.
9. Transpiration and photosynthesis – a compromise.
10. Amphibolic pathways and bypass pathways in plants.
11. Non-biological nitrogen fixation.
12. Role of Hydrogenase in nitrogen fixation.
13. Plant lectins – their role in plants and use in medicine and medical research.

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Model Question Paper for Theory Examinations

Semester IV / Botany Core Course 4

Plant Physiology and Metabolism

Time: 3 Hours **Max Marks: 75 Marks**

Section-A

Answer any 5 questions. Each question carries 5 marks **5x5=25 Marks**

1.
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SECTION – B

Answer all questions. Draw the labelled diagram wherever necessary. Each question carries 10 marks. **5x10= 50 Marks**

11 a)

(OR)

b)

12 a)

(OR)

b)

13 a)

(OR)

b)

14 a)

(OR)

b)

15 a)

(OR)

b)

IV Semester / Botany - Core Course –5

(Total hours of teaching – 60 @ 04 Hrs./Week)

THEORY SYLLABUS

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

- Distinguish prokaryotic and eukaryotic cells and design the model of a cell.
- Explain the organization of a eukaryotic chromosome and the structure of geneticmaterial.
- Demonstrate techniques to observe the cell and its components under amicroscope.
- Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.
- Elucidate the role of extra-chromosomal genetic material for inheritance of characters.
- Evaluate the structure, function and regulation of genetic material.
- Understand the application of principles and modern techniques inplant breeding.
- Explain the procedures of selection and hybridization for improvement of crops.

Unit – 1: The Cell **12 Hrs.**

1. Cell theory; prokaryotic vs eukaryotic cell; animal vs plant cell; a brief account on ultra-structure of a plant cell.
2. Ultra-structure of cell wall.
3. Ultra-structure of plasma membrane and various theories on its organization.
4. Polymorphic cell organelles (Plastids); ultra structure of chloroplast. Plastid DNA.

Unit – 2: Chromosomes **12 Hrs.**

1. Prokaryotic vs eukaryotic chromosome. Morphology of a eukayotic chromosome.
2. Euchromatin and Heterochromatin; Karyotype and ideogram.
3. Brief account of chromosomal aberrations - structural and numerical changes
4. Organization of DNA in a chromosome (solenoid and nucleosome models).

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.

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*, TMHpublishers 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, Ludhian

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Model Question Paper for Theory Examinations

Semester IV / Botany Core Course 5

Cell Biology, Genetics and Plant Breeding

Time: 3 Hours **Max Marks: 75 Marks**

Section-A

Answer any 5 questions. Each question carries 5 marks **5x5=25 Marks**

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10.

SECTION – B

Answer all questions. Draw the labelled diagram wherever necessary. Each question carries 10 marks. **5x10= 50 Marks**

11 a)

(OR)

b)

12 a)

(OR)

b)

13 a)

(OR)

b)

14 a)

(OR)

b)

15 a)

(OR)

b)

& & &

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DEPARTMENT OF BOTANY- (BOS – 2021-2022)

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 shallbe 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.
3. 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.

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Model paper for Practical Examination

Semester-IV / Botany Core Course – 5

Cell Biology, Genetics and Plant Breeding

Max. Time: 3 Hrs. Max. Marks: 50

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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

   A. Cell Biology (Cell organelle)

   B. Genetics (DNA/RNA)

   C. 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.

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LIST OF THE PAPER SETTERS

Board of Studies Meeting in Botany

S.No.	Name of the Lecturer	Institutional Address	Mobile No.	Mail address
01	Dr. LMd. Bakshu Lect. in Botany	PVKN GDC(A) Chittoor	9985415439	bakshu@yahoo.com
02	Dr. P. Sujana Lect.in Botany	PVKN GDC(A) Chittoor	9490108622	sujanapapani@gmail.com
03	Dr. E. Sree Devi Lect. In Botany	Govt. Degree College Tadipatri	9441165268	bot.sreedevi@gmail.com
04	Dr. C.Aruna Lect. In Botany	Govt. Degree College, Peleru.	9963379681	Aruchittamuri@gmail.com
05	Dr. B. Manohar Reddy Lect. In Botany	Govt. Degree College (A), ATP	9908323948	bmreddythanuj@gmail.com
06	Dr.P.Prayaga Murthy	Govt. Degree College, Yeleswaram	9885852068	Pragada007@gmail.com
07	Dr. P.Madhu sudan	Govt. College for Men, Kurnool	9949301100	botanymadhu@gmail.com

LIST OF THE EXAMINERS

Boards of Studies Meeting in Botany

S.No	Name of the Lecturer	Institutional Address	Mobile No.
01	Dr.P.V. Krishna Reddy	Govt. College for Men(A)Kadapa	9493369454
02	Dr.S. Khadar Basha	Govt. College for Men(A)-Kadapa	9959348678
03	M. Sreekanth Reddy	Govt. Degree College, Vempalli -Kadapa	9490606317
04	K. Ramesh	Govt. Degree College, Rajampet	9966791906
05	Dr. M.V. Suresh	Govt. Degree College, Rajampet	9966791906
06	Dr. B. Adinarayana	Govt. Degree College, Rajampet	9866894845
06	N. Rajasekhar Reddy	Govt. College for Men(A)-Kadapa	9440590805
07	Dr.K.Venkatarami Reddy	Govt.Degree College,Porumamilla	9440226020
08	Smt. N. Suguna	Govt. Degree College, Proddutur.	6300373750

Approved by

S.No.	Category	Name and Designation	Chairperson/ Member	Signature
01	In charge of the Dept. of Botany	Smt. B. Yuga Vani, Lect in Botany SKR&SKR Govt. College for Women (A)-Kadapa	Chairperson	

2	One expert Nominated by the Vice-Chancellor Y.V.U. Kadapa	Prof.P.S. Shavalli Khan Professor, Dept. of Botany Y.V.University, Kadapa. 9441079002	University Nominee	
3	Faculty Member	Dr. P. Subramanyam Lect. In Botany SKR&SKR GCW(A)-KDP	Member	
		Smt. Y. Nagarathnamma Lect. in Botany (G) SKR&SKR GCW(A)-KDP	Member	
4	Two Experts from outside the college College to be nominated by the Academic Council	Dr. P.V. Krishna Reddy Asst. Professor in Botany Govt. College for Men (A), Kadapa pattikrishnareddy@gmil.com	Subject Expert Member	
		M. Sreekanth Reddy, Lect. In Botany, Govt. Degree College, Vempalli, Kadapa	Subject Expert Member	
5	One Representative from Industry/ Corporate Sector	SJ Singh Kadapa Fertilizers Pvt ltd Kadapa	Member	
6	One P.G. Meritorious Alumnus	Smt. N. Rajani Krishna P.G.T. Botany, A.P. Model School & Junior College, Ramapuram, Kadapa(Dist) Cell No: 9550662976 Mail: nrkrishnamd@gmail.com	Member	

Principal
SKR&SKR GCW(A),KADAPA