SRI YN COLLEGE(A) NARSAPUR
(Affiliated to Adikavi Nannayya University)
Thrice Accredited by NAAC with 'A' Grade
Recognized by UGC as College with Potential for Excellence

I B.Sc BOTANY SEMESTER – I

PAPER – I - THEORY SYLLABUS

FUNDAMENTALS OF MICROBES AND NON – VASCULAR PLANTS

(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

(2020-23 Batch, with effect from 2020-21 onwards) CBCS Pattern

Learning Outcomes:

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

- Explain origin of life on the earth.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, lichens, algaeand bryophytes based on theirstructure, reproduction and life cycles.
- Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- Recall and explain theevolutionary trends among amphibians of plant kingdom for their shift to land habitat.
- Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

Unit – 1: Origin of life and Viruses

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker'
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prices and Viroids.
4. A general account of symptoms of plant diseases caused by viruses, Transmission of plant viruses and their control
5. Significance of viruses in vaccine production, bio – pesticides and as cloning vector

Unit - II: Special groups of Bacteria and Eubacteria

1. Brief account of Archaebacteria, Actinomycetes and cyanobacteria.
2. Cell structure and nutrition of Eubacteria.
3. Reproduction – Asexual (Binary fission and endospores) and bacterial recombination (conjugation, Transformation, Transduction).
4. Economic importance of bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

Unit – III: Fungi and Lichens

1. General characteristics of fungi and Ainsworth classification (up to classes).
2. Structure, reproduction and life history of (a)Rhizopus(Zygomycota) and (b) Puccinia (Basidiomycota).
3. Economic uses in fungi in food industry, pharmacy and agriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
5. Lichens – structure and reproductions; ecological and economical and economic importance.

Unit – IV: Algae

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (up to classes).
2. Thallus organization and life cycles in algae
3. Occurrence, structure, reproduction and life cycle of (a) Spirogyra (chlorophyceae) and (b) Polysiphonia (Rhodophyceae).
4. Economic importance of Algae.

Unit – V: Bryophytes

1. General characteristics of Bryophytes; classification up to classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) Marchantia (Hepaticopsida) and (b) Funaria (Bryopsida)
3. General account on evaluation of sporophytes in bryophyta

Text books:

- Botany – I (Vrukshasastram – I): Telugu Akademi, Hyderabad.
- Pandey, B.P. (2013) College Botany, Volume – I, S. Chand publishing, New Delhi.
- Hait, G., K. Bhattacharya &A.K.Ghosh (2011) A text book of Botany, volume – I, New Central book Agency Pvt. ltd., Kolkata.
- Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani publishers, New Delhi.

Books for reference:

- Dubey, R.C., &D.K. Maheswari (2013) A Text book of Microbiology, S. Chand & company ltd., New Delhi.
- Pelczar jr., M.J., E.C.N. Chan & N.R. Krieg (2001) Microbiology, Tata Mc Graw – Hill Co, New Delhi.
- Presscott, L. Harley, j. and Klein, D. (2005) Microbiology, 6th edition, McGraw – Hill Co, New Delhi.
- Alexopoulos, C.J., C.W. Mims & M. Blackwell (2007) Introductory Mycology, Wiley & sons, Inc., New York.

Books for Reference:

1.Steward. F.C (1964): Plants at Work (A summary of Plant Physiology) Addison-Wesley Publishing Co., Inc. Reading, Massachusetts, Palo alto, London.

2.Devlin, R.M. (1969) : Plant Physiology, Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi .

Noggle, R.& Fritz (1989):Introductory Plant Physiology Prentice Hall of India.

Lawlor.D.W. (1989): Photosynthesis, metabolism, Control & Physiology ELBS/Longmans-London.

Mayer, Anderson & Bonning(1965): Introduction to Plant Physiology D.Van Nostrand . Publishing Co., N.Y.

Mukherjee, S. A.K. Ghosh(1998) Plant Physiology ,Tata McGraw Hill. Publishers(P) Ltd., New Delhi.

7. Salisbury, F.B & C.W. Ross (1999): Plant Physiology CBS Publishers and Printers, New Delhi.

7. Plummer, D.(1989) Biochemistry–the Chemistry of life ,McGraw Hill Book Co., London, N.Y. New Delhi, Paris, Singapore, Tokyo.

9. Day, P.M.& Harborne, J.B. (Eds.,) (2000): Plant Biochemistry. . Harcourt Asia (P) Ltd., India & Academic Press, Singapore.

Blue Print (Guidelines to the Paper Setter)

Unit	Essay Questions	Short Note Questions
Unit –I	2	1
Unit – II	2	2
Unit –III	2	2
Unit –IV	2	1
Unit –V	2	2
Total	**10**	**8**

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I B.Sc BOTANY – SEMESTER – I - MODEL QUESTION PAPER

PAPER – I - FUNDAMENTALS OF MICROBES AND NON – VASCULAR PLANTS

(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

(for 2020-23 batch, With effect from 2020-21 onwards) CBCS Pattern

Time : 2Hrs **Max.Marks:75**

Note: Draw labeled diagrams whenever necessary for questions Part – I & II.
విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైన చోట భాగములు గుర్తించి పటములు వేయుము.

PART-I

Answer any FIVE of the following Questions. **5 x 5 = 25M**
ఈ క్రింది వానిలో ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.

1. Structure of TMV — TMV యొక్క నిర్మాణం
2. Cell structure of Eubacteria — యూబ్యాక్టీరియా కణ నిర్మాణం
3. Citrus Canker — సిట్రస్ కాంకర్
4. Rhizopus — రైజోఫస్
5. Types of Lichens — లైకెన్స్ రకాలు
6. General characteristics of Algae — ఆల్గే సాధారణ లక్షణాలు
7. Polysiphonia reproduction — పాలీసైఫోనియా ప్రత్యుత్పత్తి
8. Classification of Bryophytes — బ్రయోఫైట్ల వర్గీకరణ

PART-II

Answer any FIVE questions selecting atleast two questions from each section –A & B . **5 x 10 = 50M**
సెక్షన్ ఎ మరియు బి నుండి కనీసం రెండు ప్రశ్నలను ఎంచుకొని, మొత్తం ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.

SECTION-A

9. Explain the different theories regarding evolution of life.
జీవ పరిణామాన్ని వివరించే వివిధ సిద్ధాంతాలను వివరింపుము.
10. Write an essay on transmission of viral diseases in plants.
మొక్కలలో వ్యాధికారక వైరస్‌ల వ్యాప్తిని గూర్చి ఒక వ్యాసము వ్రాయుము.
11. Write a brief account on Asexual reproduction in bacteria.
బ్యాక్టీరియాలో అలైంగిక ప్రత్యుత్పత్తిని గురించి వ్రాయుము.
12. Write an essay on economic importance of bacteria.
బ్యాక్టీరియా యొక్క ఆర్థిక ప్రాముఖ్యత గూర్చి ఒక వ్యాసము వ్రాయుము.
13. Write an essay about plant disease caused by fungi.
మొక్కలలో వ్యాధికారక శిలీంధ్రాల గురించి ఒక వ్యాసము వ్రాయుము.

SECTION-B

14. Describe the external characters and economic importance of Lichens.
లైకన్ల లక్షణములు మరియు ఆర్థిక ప్రాముఖ్యతను వర్ణింపుము.

15. Describe the Thallus organization in Algae.
శైవలాలలోని థాలస్ సంవిధానాన్ని వర్ణించండి.

16. Write an essay of Fritsch classification.
ఫ్రిట్స్ వర్గీకరణ విధానము గురించి వ్యాసము వ్రాయుము.

17. Describe the external and internal structure of the Thallus in Marchantia.
మార్కాంషియాలోని థాలస్ యొక్క బాహ్య మరియు అంతర నిర్మాణములను గురించి వివరింపుము.

18. Explain the theories regarding the evolution of Sporophytes in Bryophytes.
బ్రయోఫైట్లలోని సిద్ధబీజద పరిణామాన్ని వివరించే సిద్ధాంతాలను వివరించండి.

PRACTICAL SYLLABUS OF BOTANY - 1

Semester – I Fundamentals of Microbes and Non-vascular Plants (Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

Course Outcomes: On successful completion of this practical course, student shall be able to;

1. Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
2. Observe and identify microbes and lower groups of plants on their own.
3. Demonstrate the techniques of inoculation, preparation of media etc.
4. Identify the material in the permanent slides etc.

Practical Syllabus:

1. Knowledge of Microbiology laboratory practices and safety rules.
2. Knowledge of different equipment for Microbiology laboratory (Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, Laminar air flow chamber and Incubator) and their working principles. (In case of the non availability of the laboratory equipment the students can be taken to the local college/clinical lab. with required infrastructural facilities or they can enter a linkage with the college/lab for future developments and it will fetch credits during the accreditation by NAAC).
3. Demonstration of Gram's staining technique for Bacteria.
4. Study of Viruses (Corona, Gemini and TMV) using electron micrographs/ models.
5. Study of Archaebacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.
6. Study of Anabaena and Oscillatoriausing permanent/temporary slides.
7. Study of different bacteria (Cocci, Bacillus, Vibrio and Spirillum) using permanent or temporary slides/ electron micrographs/ diagrams.
8. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts :
   a. Fungi : Rhizopus,Penicillium and Puccinia
   b. Lichens: Crustose, foliose and fruiticose
   c. Algae :Volvox, Spirogyra, Ectocarpus and Polysiphonia
   d. Bryophyta : Marchantia and Funaria
9. Study of specimens of Tobacco mosaic disease, Citrus canker and Blast of Rice.

Model Question Paper for Practical Examination

Semester – I/ Botany Core Course – 1

Fundamentals of Microbes and Non-vascular Plants

(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

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

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1. Take the T.S. of material 'A' (Fungi), make a temporary mount and make comments about identification. 10 M
2. Identify any 2 algae from the mixture (material 'B') given with specific comments about identification. 10 M
3. Take the T.S. of material 'C' (Bryophyta), make a temporary mount and make comments about identification. 10 M
4. Identify the following with specific reasons. 4x 3 = 12 M
   D. A laboratory equipment of Microbiology
   E. Virus
   F. Archaebacteria /Ascomycete /Cyanobacteria/ Eu-Bacteria
   G. Lichen
5. Record + Viva-voce 5+3 = 8 M

Suggested co-curricular activities for Botany Core Course-1 in Semester-I:

A. Measurable :

a. Student seminars :

1. Baltimore classification of Viruses.
2. Lytic and lysogenic cycle of T- even Bacteriophages.
3. Viral diseases of humans and animals.
4. Retroviruses
5. Bacterial diseases of humans and animals.
6. Significance of Bacteria in Biotechnology and Genetic engineering.
7. Fungi responsible for major famines in the world.
8. Poisonous mushrooms (Toad stools).
9. Algae as Single Cell Proteins (SCPs)
10. Parasitic algae

11. Origin of Bryophytes through : Algae vsPteridophytes
12. Fossil Bryophytes
13. Evolution of gametophytes in Bryophyta.
14. Ecological and economic importance of Bryophytes.

b. Student Study Projects :

1. Isolation and identification of microbes from soil, water and air.
2. Collection and identification of algae from fresh /estuarine /marine water.
3. Collection and identification of fruiting bodies of Basidiomycetes and Ascomycetes.
4. Collection and identification of Lichens from their native localities.
5. Collection of diseased plants/parts and identification of symptoms.
6. Collection and identification of Bryophytes from their native localities.

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 Agriculture and/or Horticulture University/College/Research station to learn about microbial diseases of plants.
2. Visit to industries working on microbial, fungal and algal products.
3. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

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I BSc BOTANY SEMESTER – II -

PAPER – II - THEORY SYLLABUS

BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

(2020-23 Batch, with effect from 2020-21 onwards) CBCS Pattern

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Learning Outcomes:

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

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
- Justify evolutionary trends in tracheophytes to adopt for land habitat.
- Explain the process of fossilization and compare the characteristics of extinct and extant plants.
- Critically understand various taxonomial aids for identification of Angiosperms.
- Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.
- Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welare.
- Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.

Unit – I : Pteridophytes

1. General characteristics of Pteridophyta; classification of Smith (1955) upto divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium(Lycopsida) and (b) Marseliea (Filicopsida)
3. Stelar evolution in Pteridophytes.
4. Heterosporty and seed habit.

Unit – II : Gymnosperms

1. General characteristics of Gymnosperms; Sporne classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (development details are not needed) and life history of (a) Cycas (Cycadopsida) and (b) Gnetum (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on Cycadeoidea.

Unit – III : Basic aspects of Taxonomy

1. Aim and scope of taxonomy; species concept:Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN – rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families: (a)Annonaceae (b) Cucurbitaceae

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PAPER – II - THEORY SYLLABUS

BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

(2020-23 Batch, with effect from 2020-21 onwards) CBCS Pattern

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

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
- Justify evolutionary trends in tracheophytes to adopt for land habitat.
- Explain the process of fossilization and compare the characteristics of extinct and extant plants.
- Critically understand various taxonomial aids for identification of Angiosperms.
- Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.
- Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welare.
- Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.

Unit – I : Pteridophytes

1. General characteristics of Pteridophyta; classification of Smith (1955) upto divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium(Lycopsida) and (b) Marseliea (Filicopsida)
3. Stelar evolution in Pteridophytes.
4. Heterosporty and seed habit.

Unit – II : Gymnosperms

1. General characteristics of Gymnosperms; Sporne classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (development details are not needed) and life history of (a) Cycas (Cycadopsida) and (b) Gnetum (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on Cycadeoidea.

Unit – III : Basic aspects of Taxonomy

1. Aim and scope of taxonomy; species concept:Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN – rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families: (a)Annonaceae (b).Cucurbitaceae

Additional Inputs:- Economic Importance of Gymnosperms

Unit – IV: Systematic Taxonomy

1. Systematic description and economic importance of the following families:
   (a) Asteraceae (b) Asclepiadaceae (c) Amaranthaceae (d) Euphorbiaceae
   (e) Arecaceae and (f) Peaceae.

Unit – V : Phytogeography

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species).
2. Endemism – types and causes.
3. Phytogeographic regions of World.
4. Phytogeographic regions of India.
5. Vegetation types in Andhra Pradesh.

Text Books:

- Botany – I (Vrukshasastram - I) Telugu Academy, Hyderabad.
- Botany – II (Vrukshasastram - II) Telugu Academy, Hyderabad.
- Acharaya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi.
- Bhattacharya, K., G. Hait & Gosh, A.K.,(2011) A Text Book of Botany, Volume - II, New Central Book Agency Pvt. Ltd., Kolkata.
- Hait,G.., K.Bhattacharya & A.K.Ghosh (2011) A Text Book of Botany, Volume – I, New Central Book Agency Pvt. Ltd., Kolkata.
- Pandey, B.P., (2013) College Botany, Volume – I, S. Chand Publishing, New Delhi.
- Pandey, B.P., (2013) College Botany, Volume – II, S. Chand Publishing, New Delhi.

Books for Reference:

- Smith, G.M.(1971) Cryptogamic Botany Vol.II., Tata Mc Graw Hill, New Delhi.
- Sharma, O.P. (2012) Pteridophyta, Tata Mc Graw Hill, New Delhi.
- Kramer, K.U. & P.S. Green (1990) The Families and Genera of Vascular Plants, Vol – I: Pteridophytes and Gymnosperms (Ed.K.Kubitzki) Springe – Verlag, New York.
- Bhatnagar, S.P. & AlokMoitra (1996) Gymnosperms. New Age International, New Delhi.
- Coulter, J.M. & C.J Chamberlain (1910) Morphology of Gymnopserms, The University of Chicago Press, Chicago, Illinois.
- Govil, C.M (2007) Gymnosperms: Extinct and Extant. Krishna Prakashan Media (P) Ltd. Meerut & Delhi.
- Sporne, K.R.(1971) The Morphology of Gymnosperms. Hutchinsons Co. Ltd., London.
- Arnold, C.A., (1947) An introduction to Paleobotany Mc Graw Hill Book Company, INC, New York.
- Stewart, W.N., and G.W. Rothwell (2005) Paleobotany and the evolution of plants Cambridge University Press, New York.
- Lawrence, George H.M(1951) Taxonomy of Vascular Plants. The Mc Millan Co., New York.
- Heywood, V.H and D.M. Moore (1984) Currenct Concepts in Plant Taxonomy Academic Press, London.

- Jeffrey, C. (1982) An introduction to Plant Taxonomy. Cambridge University Press, Cambridge, London.
- Sambamurty, A.V.S.S (2005) Taxonomy of Angiosperms I.K. International Pvt. Ltd., New Delhi.
- Singh, G.(2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi.
- Simpson, M.G. (2006) Plant Systematics. Elsevier Academic Press, san Diego, CA, U.S.A.
- Cain, S.A. (1944) The Geography of flowering Plants (2nd Edn.) Longmans, green & Co., Inc., London & Applied Science Publishers, New Delhi.
- Mani, M.S(1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Haque.

Blue Print:

S.No	UNIT	SHORTS	ESSAYS
1	I	2	2
2	II	2	2
3	III	2	2
4	IV	1	2
5	V	1	2

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PAPER – II - BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY
(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)
(for 2020-23 batch, With effect from 2020-21 onwards) CBCS Pattern

Time : 2Hrs **Max.Marks:75**

Note: Draw labeled diagrams whenever necessary for questions Part – I & II.
విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైన చోట భాగములు గుర్తించి పటములు వేయుము.

PART-I

Answer any FIVE of the following Questions. **5 x 5 = 25M**
ఈ క్రింది వానిలో ఏవైనా ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.

1. Marsilea Sporocarp — మార్సీలియా స్పోరోకార్ప్
2. Lycopodium cone L.S — లైకోపోడియం శంకు నిలువుకోత
3. Gymnosperms general characters — వివృత బీజాల సాధారణ లక్షణాలు
4. Angiosperm characters in Gnetum — నీటమ్‌లో ఆవృత బీజ లక్షణాలు
5. Binomial Nomenclature — ద్వినామీకరణ
6. Essentials organs of Annonaceae. — అనోనేసిలో ఆవశ్యక అంగాలు
7. Safety mechanism in Asteraceae. — ఆస్టరేసిలో భద్రత యాంత్రికం
8. Endemism — స్థానీయత

PART-II

Answer any FIVE questions selecting atleast two questions from each section –A & B . **5 x 10 = 50M**
సెక్షన్ ఎ మరియు బి నుండి కనీసం రెండు ప్రశ్నలను ఎంచుకొని, మొత్తం ఐదు ప్రశ్నలకు సమాధానములు వ్రాయుము.

SECTION-A

9. Describe the internal structure of Marsilea Rhizome.
   మార్సీలీయా కొమ్ము అంతర్నిర్మాణాన్ని వర్ణింపుము.
10. Explain the stelar evolution in Pteridophyta.
    టెరిడోఫైటాలోని ప్రసరణ స్తంభ పరిణామమును తెల్పండి.
11. Give an illustrated account of male and female strobili in Gnetum.
    నీటమ్‌లో పురుషశంకువు మరియు స్త్రీ శంకువుల నిర్మాణాన్ని పటముల సహాయంతో వివరించండి.
12. Give an account of Cycadeoidea.
    సైకడియాయిడియా గురించి వ్రాయండి.
13. Write an essay on International code of Botanical Nomenclature(ICBN) .
    అంతర్జాతీయ వృక్షనామీకరణ నియమావళి (ICBN) గూర్చి వ్యాసము వ్రాయండి

SECTION-B

14. Give an account of Bentham and Hooker's system of classification. Discuss its merits and demerits.
బెంథామ్ మరియు హూకర్‌ల వర్గీకరణ గూర్చి తెలిపి దాని ప్రతిభలను మరియు లోపాలను చర్చించుము.

15. Describe the salient features of Asclepiadaceae.
ఆస్క్లిపియడేసి కుటుంబ ముఖ్య లక్షణములు వర్ణింపుము.

16. Give a brief account on Euphorbiaceae family and their economic importance .
యూఫోర్బియేసి కుటుంబమును గూర్చి వ్రాసి, వాని మొక్కల ఆర్థిక ప్రాముఖ్యతను గూర్చి తెలపుము.

17. Give an account of Phytogeographic regions of World.
ప్రపంచంలోని వృక్ష భౌగోళిక మండలాలను గూర్చి వ్రాయుము.

18. Give an account of Phytogeographic regions of India.
భారతదేశంలోని వృక్ష భౌగోళిక మండలాలను గూర్చి వ్రాయండి.

PRACTICAL SYLLABUS OF BOTANY- SEMESTER – II
BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY
(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

Course Outcomes: On successful completion ofthiscourse students shall be able to:

1. Demonstrate the techniques of section cutting, preparing slides, identifying of the materialand drawing exact figures.
2. Compare and contrast the morphological, anatomical and reproductive features of vascular plants.
3. Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium.
4. Exhibit skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.
5. Prepare and preserve specimens of local wild plants using herbarium techniques.

Practical Syllabus:

1. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts :
   a. Pteridophyta : Lycopodium and Marselia
   b. Gymnosperms : Cycasand Gnetum
2. Study of fossil specimens of Cycadeoidea and Pentoxylon(photographs /diagrams can be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomicstudy of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets of wild plants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India

Additional Inputs :- Cycas - Coralloid roots

Model Question Paper for Practical Examination

Semester – II/ Botany Core Course – 2

Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

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

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1. Take T.S. of the material 'A' (Pteridophyta), make a temporary slide and justify the identification with apt points. 10 M
2. Take T.S. of the material 'B' (Gymnosperms), make a temporary slide and justify the identification with apt points. 10 M
3. Describe the vegetative and floral characters of the material 'C' (Taxonomy of Angiosperms) and derive its systematic position. 10 M
4. Identify the specimen 'D' (Fossil Gymnosperm) and give specific reasons. 5 M
5. Locate the specified phytogeographical regions,(2x2M) in the world / India (E) map supplied to you. 4 M
6. Record + Herbarium & Field note book + Viva-voce 5 +4+3 = 12 M

Suggested co-curricular activities for Botany Core Course-2 in Semester-II:

A. Measurable :

a. Student seminars :

1. Fossil Pteridophytes.
2. Aquatic ferns and tree ferns
3. Ecological and economic importance of Pteridophytes
4. Evolution of male and female gametophytes in Gymnosperms.
5. Endemic and endangered Gymnosperms.
6. Ecological and economic importance of Gymnosperms.
7. Floras and their importance: Flora of British India and Flora of Madras Presidency.
8. Botanical gardens and their importance:National Botanic garden and Royal Botanic garden.
9. Artificial, Natural and Phylogenetic classification systems.
10. Molecular markers used in APG system of classification.
11. Vessel less angiosperms.

12. Insectivorous plants.
13. Parasitic angiosperms.
14. Continental drift theory and species isolation.

b. Student Study Projects :

1. Collection and identification of Pteridophytes from their native locality/ making an album by collecting photographs of Pteridophytes.
2. Collection and identification of Gymnospermsfrom their native locality/ making an album by collecting photographs of Gymnosperms.
4. Collection of information on famous herbaria in the world and preparation of a report.
5. Collection of information on famous botanic gardens in the world and preparation of a report.
6. Collection of data on vegetables (leafy and fruity) plants in the market and and preparation of a report on their taxonomy.
7. Collection and identification of fresh and dry fruits plants in the market and and preparation of a report on their taxonomy.
7. Collection of data on plants of ethnic and ethnobotanical importance from theirnative locality.
9. Preparation of a local flora by enlisting the plants of their native place.

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 Botanic garden in a Research institute/University to see the live plants.
2. Virtual tour in websites for digital herbaria and botanic gardens.
3. Acquaint with standard floras like – Flora of Madras Presidency, Flora of their respective district in Andhra Pradesh.
4. Looking into vegetation of different phytogeographical regions using web resources.
5. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

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IIB.SC;IIISemester (2020-2023)

BOTANY PAPER -III

(Anatomy Embryology of Angiosperms, Plant Ecology and Biodiversity)

Theory:

Learning outcomes:

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

- Understand on the organization of tissuesand tissue systems in plants.
- Illustrate and interpret various aspects of embryology.
- Discuss the basic concepts of plant ecology, andevaluate the effects of environmental and biotic factors on plant communities.
- Appraise various qualitative and quantitative parameters to study the population and community ecology.
- Correlate theimportance of biodiversity and consequences due to its loss.
- Enlistthe 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. Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems–Epidermal, ground and vascular.
3. Anomalous secondary growth in Boerhaavia 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, megasporogenesis; monosporic (Polygonum), bisporic (Allium) and tetrasporic (Peperomia) types of embryo sacs.
3. Outlines of pollination, pollen – pistil interaction and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular,helobialand ruminate.
5. Development of Dicot (Capsella bursa-pastoris) embryo.

Unit – 3: Basics of Ecology 12 Hrs.

1. Ecology: definition, branches and significance of ecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web,

ecological pyramids.

4. Plants and environment: Climatic (light and temperature), edaphic and biotic factors.

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. Secondary production, P/R ratio & Ecosystem

3. Comnunity ecology : Frequency, Density, Cover, Life Forms, Biological Spectrum

4. Concepts of productivity: GPP, NPP & Community Respiration

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 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, Volumell, 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 (4thEd.),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. Halt (2011) A Text Book of Botany, Volumell, 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.

Additional Inputs : In Unit IV Rearrange Topics 1=1,2=3,3=4,4=2

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)EcologyNarosa 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 EcologyBlackwell 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

BLUE PRINT:

S.no	UNIT	SHORTS	ESSAYS
1	I	2	2
2	II	2	2
3	III	2	2
4	IV	1	2
5	V	1	2

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

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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. Kollerulake – Ramsar site.
13. Biodiversity hotspots of the world.
14. Origin of Crop plants - Vavilov centers
15. Agrobiodiversity
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 preparatic 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 or their native place.
8. Collection of photos of endemic/endangered plant and animal species to Makean 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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II B.Sc ; IV SEMESTER (2020 -2021

BOTANY PAPER - IV

UNIT I: 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 & Lateral Transport of water ; Ascent of Sap ,
Absorption of minerals ions ; Passive & Active Processes

3. Transpiration: stomata structure and mechanism of stomatal movements (K+ ion flux).

4. Mechanism of phloem transport; source-sink relationships.

UNIT II: Mineral nutrition, Enzymes and Respiration **14 Hrs.**

1. Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency

2. Characteristics, nomenclature and classification of Enzymes. Mechanism of enzyme action, enzyme kinetics.

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

UNIT III: Photosynthesis d 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 IV: Nitrogen and lipid metabolism **12 Hrs.**

1. Nitrogen metabolism: Biological nitrogen fixation – asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system.

Additional Inputs :- In Unit - II Topic 2 Merged In Unit - 1 in Topic 2

2. Lipid metabolism :Classification of Plant lipids, saturated and unsaturated fatty acids.

3. Anabolism of triglycerides, β-oxidation of fatty acids, Glyoxylate cycle.

UNIT V: 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.

5. Physiological changes during water stress

- Mehrotra, R.S. & K.R. Aneja (1990) An Introduction to Mycology, New age International publishers, New Delhi.
- Kevin Kavanagh (2005) Fungi; Biology and applications John Wiley & sons, Ltd., West Sussex, England.
- John Webster & R.W.S. Weber (2007) Introduction to Fungi, Cambridge university press, New York.
- Fritsch, F.E. (1945) The Structure & Reproduction of Algae (vol. I & vol. II) Cambridge, Cambridge University Press, New York.
- Bold, H.C.&M.J. Wynne (1984) Introduction to the Algae, prentice-Hall Inc., New Jersey.
- Robert Edward Lee (2008) phycology. Cambridge University Press, New York.
- Van Den Hoek, C., D.G. Mann & H.M. Johns (1996) Algae: An Introduction to phycology, Cambridge University Press, New York.
- Shaw, A.J & B. Goffinet (2000) Bryophyte Biology, Cambridge University Press, New York.

Blue Print:

S.No	UNIT	SHORTS	ESSAYS
1	I	1	2
2	II	2	2
3	III	2	2
4	IV	2	2
5	V	1	2

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II B.Sc ;IV Semester (2017-2020)

Botany Paper-IV

(Plant Physiology and Metabolism)

Date:
Time: Max.Marks:75
Duration: 3 Hrs

PART-I

NOTE: Draw neat labelled diagrams wherever necessary for questions in Part-I & II
విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైనచోట భాగములు గుర్తించిన పటములు వేయుము

Answer any FIVE of the following. Each one carries 5 Marks. 5 x 5=25M
ఈ క్రింది వాటిలో ఏవైనా ఐదింటికి సమాధానము వ్రాయుము. ప్రతి దానికి ఐదు మార్కులు.

1. Osmosis — ద్రవాభిసరణ
2. Transcription — అనులేఖనం
3. Lock and Key theory — తాళం కప్ప తాళం చెవి సిద్ధాంతం
4. Photosynthetic pigments — కిరణజన్యసంయోగక్రియ వర్ణద్రవ్యాలు
5. Source- sink relationship — సోర్స్ సిన్క్ సంబంధం
6. Anaerobic respiration — అవాయు శ్వాసక్రియ
7. ABA — అబ్‌ససిక్ ఆమ్లం
8. Vernalization — వెర్నలైజేషన్

PART-II

Answer any FIVE questions, choosing atleast TWO from each section. 5 x 10= 50M
ఏవేని ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము, ప్రతీ విభాగము నుండి కనీసం రెండు వ్రాయుము.

SECTION-A

9. Explain the theories of ascent of sap.
   ద్రవోధ్గమము ఎట్లా జరుగుతుందో వివరించే సిద్ధాంతాలను గురించి వ్రాయండి.
10. What is Transpiration? Describe the mechanism of closing and opening of stomata.
    భాష్పోత్సేకం అనగానేమి? పత్రరంధ్ర చలనాలను వివరించే యాంత్రిక విధానాలను వివరించండి.
11. What are Macronutrients? Explain their deficiency symptoms in plants.
    స్థూల పోషకాలు అనగానేమి? మొక్కలలో స్థూల పోషకాల లోప లక్షణాలను వివరింపుము
12. Explain the mechanism of Biological N2 fixation
    సజీవ నత్రజని స్థాపన యాంత్రికమును వివరింపుము
13. Explain the non Cyclic photophoshporylation.
    అచక్రియ పోటో పాస్పోరిలేషన్ వివరింపుము

SECTION-B

14. Describe Calvin's Cycle.
కాల్విన్ వలయమును వర్ణింపుము.

15. Give an account of reactions in Glycolysis
గ్లైకోలసిస్‌లోని చర్యలను వివరింపుము

16. Explain the reactions in Beta-oxidation.
బీటా ఆక్సీకరణంలోని చర్యలను వివరింపుము.

17. What are phytohormones? Explain the physiological effects of Auxins in plants?
ఫైటో హార్మోనులు అనగానేమి? మొక్కల శరీర ధర్మ క్రియలపై ఆక్సిన్ల ప్రభావమును విశదీకరించుము.

18. What is Photoperiodism? Describe various aspects of Photoperiodism.
కాంతి కాలావధి అనగా నేమి? దీనికి సంబంధించిన వివిధ అంశాలను వివరించండి.

II B. Sc BOTANY SEMESTRE- IV, Paper–IV: PRACTICAL
SYLLABUS PAPER-IV: Plant Physiology and Metabolism

Suggested Laboratory Exercises:

1. Osmosis –by potato osmoscope experiment
2. Determination of osmotic potential of plant cell sap by plasmolytic method using leaves of *Rhoeo / Tradescantia.*
3. Structure of stomata (dicot & monocot)
4. Determination of rate of transpiration using cobalt chloride method.
5. Demonstration of transpiration by Ganongs
6. Demonstration of ascent of sap/Transpiration pull.
6. Effect of Temperature on membrane permeability by colorimetric method.
7. Study of mineral deficiency symptoms using plant material/photographs.
8. Separation of chloroplast pigments using paper chromatography technique.
9. Rate of photosynthesis under varying Co_2 concentrations.
10. Effect of light intensity on oxygen evolution in photosynthesis using Wilmott'. bubbler

II B. Sc –SEMESTER- IV, BOTANY PRACTICAL MODEL PAPER
PAPER- IV - Plant Physiology and Metabolism

1. Perform the Experiments A & B. Give the aim, principle, procedure and observation. Tabulate the results if any. Draw labeled diagram. 2 x 15= 30 marks

2. Give the protocol of the experiments C & D 2 x 5 -= 10 marks

3. Record & Viva 10 marks

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50 Marks

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III B. Sc - SEMESTER- V(2016-2019)

BOTANY PAPER – V

Cell Biology, Genetics and Plant Breeding

Total hours of teaching 60 hrs @ 3 hrs per week

UNIT – I Cell Biology: **(12hrs)**

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.

UNIT – II Genetic Material: **(12hrs)**

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

UNIT – III Mendelian Inheritance: **(12 hrs)**

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, coupling and repulsion
4. Crossing Over: concept & significance.

UNIT – IV Plant Breeding: **(12 hrs)**

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

UNIT – V Breeding, Crop Improvement and Biotechnology:- **(12 hrs)**

1. Role of mutations in crop improvement.
2. Role of somaclonal 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:

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

Blue Print (Guidelines to the Paper Setter)

Unit	Essay Questions	Short Note Questions
Unit –I	2	2
Unit – II	2	1
Unit –III	2	2
Unit –IV	2	1
Unit –V	2	2
Total	**10**	**8**

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III B.Sc ;V Semester (2016-2019)

Botany Paper-V

(Cell Biology, Genetics and Plant Breeding)

Date: Max.Marks:75
Time: Duration: 3 Hrs

PART-I

NOTE: Draw neat labelled diagrams wherever necessary for questions in Part-I & II
విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైనచోట భాగములు గుర్తించిన పటములు వేయుము

Answer any FIVE of the following. Each one carries 5 Marks. 5 x 5=25M
ఈ క్రింది వాటిలో ఏవైనా ఐదింటికి సమాధానము వ్రాయుము. ప్రతి దానికి ఐదు మార్కులు.

1. Chloroplast structure
   హరిత రేణువు నిర్మాణము
2. Differences between Euchromatin and Heterochromatin
   యూక్రోమాటిన్ మరియు హెటిరోక్రొమాటిన్ మధ్య భేధాలు
3. t RNA structure
   t RNA నిర్మాణం
4. Test Cross
   పరీక్షా సంకరణము
5. Significance of Crossing over
   వినిమయం యొక్క ప్రాముఖ్యత
6. Emasculation
   విపుంసీకరణ
7. Role of Somaclonal variations in crop improvement
   సస్యాభివృద్ధిలో శారీరక వైవిధ్యాల పాత్రను గూర్చి వ్రాయండి.
8. RFLP
   ఆర్. ఎఫ్. ఎల్. పి

PART-II

Answer any FIVE questions, choosing atleast TWO from each section. 5 x 10= 50M
ఏవేని ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము, ప్రతి విభాగము నుండి కనీసం రెండు వ్రాయుము.

SECTION-A

9. Describe the detailed Structure and functions of cell membrane
కణత్వచం విపుల నిర్మాణం మరియు విధులను వర్ణింపుము

10. What is Nucleosome? Give an account of Solenoid model of Chromosome
న్యూక్లియోజోం అనగానేమి? క్రోమోసోము యొక్క సోలినాయిడ్ నమునాను వర్ణించండి.

11. Explain the semiconservative DNA replication in Eukaryotes
నిజకేంద్రక జీవులలో DNA అర్ధ సంరక్షక ప్రతికృతిని వివరింపుము.

12. Write an essay on tyes of RNA structure and their functions.
వివిధ రకాలైన RNA నిర్మాణం మరియు విధులను గూర్చి వ్యాసము వ్రాయండి

13. Describe the Mendel's Laws of Inheritance
మెండల్ అనువంశిక సూత్రాలను వివరించండి.

SECTION-B

14. What is Linkage? Describe the various types in Linkages
సహలగ్నత అంటే ఏమిటి? సహలగ్నతలోని వివిధ రకాలను వివరింపుము.

15. Write an essay on Plant breeding.
వృక్ష ప్రజననము గూర్చి వ్యాసము వ్రాయండి.

16. What is Selection? Describe various types of Selection
వరణము అనగానేమి? వివిధ రకముల వరణములను వర్ణింపుము

17. Explain the role of Mutations in Crop Improvement
సస్యాభివృద్ధిలో ఉత్పరి వర్తనాల పాత్రను గూర్చి వివరించండి.

18. Write an essay on Molecular breeding.
అణుస్థాయి ప్రజననము గూర్చి వ్యాసం వ్రాయండి.

III B. Sc - BOTANY SYLLABUS SEMESTER- V

Practical Paper-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING

Total hours of teaching 30hrs @ 2hrs per week

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.

III B. Sc – SEMESTER- V, BOTANY PRACTICAL MODEL PAPER
PAPER-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING

1. 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

2. Describe the procedure of Hybridization technique **B** 1 x 10 = 10 marks

3. Solving numerical problems on Mendelian in heritance **C,D** 2x 7 1/2 =15 marks

1. Record & Viva = 10 marks

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50 marks

A-Onion root squash technique
B- Emasculation & Bagging
C&D Numerical problems on Mendelian Inheritance.

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III B. Sc - SEMESTER- V (2016-2019)

BOTANY PAPER-VI

Plant Ecology& Phytogeography

Total hours of teaching 60 hrs @ 3 hrs per week

UNIT – I. Elements of Ecology **(12 hrs)**

1. Ecology: definition, branches and significance of ecology
2. Climatic Factors: Light, Temperature
3. Edaphic Factor: Origin, formation, composition and soil profile.
4. Biotic Factor: Interactions between plants and animals.

UNIT– II. Ecosystem Ecology **(12 hrs)**

1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecological pyramids
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

UNIT –III Population &Community Ecology **(12 hrs)**

1. Population -definition, characteristics and importance, outlines –ecotypes.
2. Plant communities- characters of a community, outlines – Frequency, density, cover, life forms, competition.
3. Interaction between plants growing in a community.

UNIT – IV Phytogeography **(12 hrs)**

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes

UNIT- V: Plant Biodiversity and its importance **(12 hrs)**

1. Definition, levels of biodiversity-genetic, species and ecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
4. Seed banks - conservation of genetic resources and their importance

Suggested activity :Collection of different soils, studying their texture, observing polluted water bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity and report writing; to study Honey Bees and plants yielding honey.

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III B.Sc ;V Semester (2016-2019)

Botany Paper-VI

(Plant Ecology and Phytogeography)

Date: Max.Marks:75
Time: Duration: 3 Hrs

PART-I

NOTE: Draw neat labelled diagrams wherever necessary for questions in Part-I & II
విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైనచోట భాగములు గుర్తించిన పటములు వేయుము

Answer any FIVE of the following. Each one carries 5 Marks. 5 x 5=25M
ఈ క్రింది వాటిలో ఏవైనా ఐదింటికి సమాధానము వ్రాయుము. ప్రతి దానికి ఐదు మార్కులు.

1. Soil profile — మృత్తిక పార్శ్వరేఖ
2. Food Web — ఆహారపు వల
3. Secondary productivity — ద్వితీయ ఉత్పాదకత
4. Biological Spectrum — జీవ సంబంధ వర్గపటం
5. Endemism — స్థానీయత
6. Savanna Grass lands — సవన్నాగడ్డి భూములు
7. Seed banks — విత్తన బ్యాంకులు
8. Western ghats — పశ్చిమ కనుమలు

PART-II

Answer any FIVE questions, choosing atleast TWO from each section. 5 x 10= 50M
ఏవేవి ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము, ప్రతీ విభాగము నుండి కనీసం రెండు వ్రాయుము.

SECTION-A

9. Give an account of role of light factor on plants
మొక్కలలో కాంతి కారకము యొక్క పాత్రను గురించి వ్రాయండి.
10. Write an essay on Biotic factors.
జీవ సంబంధ కారకాలపై ఒక వ్యాసము వ్రాయండి.
11. Give an account of energy flow in an ecosystem.
ఆవరణ వ్యవస్థలో శక్తి ప్రవాహం జరిగే విధానం తెలుపుము.

12. Write an essay on Nitrogen cycle.
నత్రజనీ వలయం గూర్చి వ్యాసము వ్రాయుము.

13. Define population. Discuss briefly the various characteristics that are shown by population.
జనాభా నిర్వచించండి. జనాభా చూపించే వివిధ లక్షణాలను చర్చించుము.

SECTION-B

14. Describe the hydrosere type of succession.
జల అనుక్రమము గురించి వివరించండి.

15. Give an account of phytogeographic regions of world.
ప్రపంచంలోని వృక్ష భౌగోళిక మండలాలను గూర్చి వ్రాయండి.

16. Give an account of phytogeographic regions of India.
భారతదేశంలోని వృక్ష భౌగోళిక మండలాలను గూర్చి వ్రాయండి

17. What is Biodiversity ? Explain the types of Bio diversity.
జీవ వైవిధ్యం అనగానేమి? జీవ వైవిధ్యం రకాలను వివరించండి.

18. Write an essay on conservation methods of biodiversity.
జీవ వైవిధ్యాన్ని సంరక్షించే వివిధ పద్ధతులను గూర్చి వ్యాసం వ్రాయండి.

III B. Sc - SEMESTER- V: BOTANY PRACTICAL
PRACTICAL PAPER-VI: PLANT ECOLOGY& PHYTOGEOGRAPHY

1. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, rain gauze, and lux meter.
2. Permeability (percolation; total capacity as well as rate of movement) of different soil samples.
3. Determination of soil pH
4. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (4 each)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method
6. Study of Phytoplankton and macrophytes from water bodies.
7. To study field vegetation with respect to stratification, canopy cover and composition.
8. Study of plants included in agro forestry and social forestry.
9. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.
10. SSSThe following practical should be conducted in the Field/lab with the help of photographs, herbarium, Floras, Red data book- Study of endangered plants species, critically endangered plants species, vulnerable plant species and monotypic endemic genera of India.

III B. Sc - SEMESTER- V:-BOTANY PRACTICAL MODEL PAPER
PAPER–VI: PLANT ECOLOGY & PHYTOGEOGRAPHY

1. Study Project under supervision	= 15 Marks
2. Record & Viva-Voce	= 10 Marks
3. ExperimentA	= 10 Marks
4. Anatomical adaptations of B (Section cutting)	= 10 Marks
5. Spotters C&D (2x2 1/2)	= 5 Marks
	Total = 50 Marks

1. Study Project of a surrounding Ecosystem (terrestrial or aquatic)(plant diversity, animal diversity, human activity, pollution levels, restoration efforts under supervision.
2. Presentation of the project work in Q & A session.
3. A -determination of soil porosity/PH/percolation/retaining capacity.
4. B- Xerophyte/Hydrophyte anatomical adaptations.
5. C & D-anemometer/rain gauze/lux meter.

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III B.Sc ; SEMESTER-VI (2016-2019)

BOTANY PAPER-VII (C) ELECTIVE

(Plant tissue culture and its biotechnological applications)

UNIT I: PLANT TISSUE CULTURE – 1 (12hrs)

1. History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation.
2. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/ clonal propagation ofornamental and horticulturally important plants.
3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

UNIT-II: PLANT TISSUE CULTURE -2 (12hrs)

1. Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique.
2. Production of secondary metabolites.
3. Cryopreservation; Germplasm conservation.

UNIT III: RECOMBINANT DNA TECHNOLOGY (12hrs)

1. Restriction Endonucleases (history, types I-IV, biological role and application); concepts of restriction mapping.
2. Cloning Vectors: Prokaryotic (pUC 18, pBR322,Ti plasmid and Lambda phage. Eukaryotic Vectors (YAC and briefly PAC)
3. Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning)
4. Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

UNIT IV: METHODS OF GENE TRANSFER (12hrs)

1. Methods of gene transfer- Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

UNIT V: APPLICATIONS OF BIOTECHNOLOGY (12 hrs)

1. Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance.
2. Genetic modification – transgenic plants for pest resistant (Bt-cotton);

   Herbicide resistance (Round Up Ready soybean);
   Improved agronomic traits –(flavrSavr tomato,Golden rice);
   Improved horticultural varieties (Moon dust carnations)

Books for Reference:

1. Pullaiah. T. and M.V.Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
4. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.
5. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K. 5th edition.
6. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

Suggested Activities: In vitro initiation of callus on artificial medium, seminars on utilization of rDNA technology, debates on applications of Biotechnology (whether it is a boon or bane to the society) studying growth patterns, vegetative characteristics of Bt.cotton and identifying the features of its pest resistance

Blue Print (Guidelines to the Paper Setter)

Unit	Essay Questions	Short Note Questions
Unit –I	2	2
Unit – II	2	1
Unit –III	2	2
Unit –IV	2	1
Unit –V	2	2
	10	8

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III B.Sc ; SEMESTER –VI(2016-2019)

BOTANY PAPER-VIIC(ELECTIVE)

(Plant Tissue Culture and its biotechnological applications)

Date: Max.Marks:75

Time: Duration: 3 Hrs

PART-I

NOTE: Draw neat labelled diagrams wherever necessary for questions in Part-I & II

విభాగము I మరియు II లోని ప్రశ్నలకు అవసరమైనచోట భాగములు గుర్తించిన పటములు వేయుము

Answer any FIVE of the following. Each one carries 5 Marks. 5 x 5=25M

ఈ క్రింది వాటిలో ఏవైనా ఐదింటికి సమాధానము వ్రాయుము. ప్రతి దానికి ఐదు మార్కులు.

1. M.S Medium	M.S యానకం
2. Somatic embryogenesis	శాఖీయ పిండాభివృద్ధి
3. Cryopreservation	క్రయోప్రిజర్వేషన్
4. Restriction Endonucleases	రిష్ట్రిక్షన్ ఎండోన్యూక్లియేజ్‌లు
5. c DNA Libraries	c DNA లైబ్రెరీలు
6. Agrobacterium	ఆగ్రో బాక్టీరియా
7. Crop improvement	సస్యాభివృద్ధి
8. Golden rice.	బంగారు వరి

PART-II

Answer any FIVE questions, choosing atleast TWO from each section. 5 x 10= 50M

ఏవేవి ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము, ప్రతీ విభాగము నుండి కనీసం రెండు వ్రాయుము.

SECTION-A

9. Write an essay on different aspects coming across in Tissue Culture.
   కణజాల వర్ధనములోని వివిధ అంశములపై వ్యాసము వ్రాయుము.
10. Write an essay on Callus culture.
    కాలస్ వర్ధనం పై ఒక వ్యాసము వ్రాయుము.
11. Describe the various steps in embryo culture.
    పిండ వర్ధనంలోని వివిధ దశలను వివరింపుము.

12. Write an essay on production of secondary metabolites.
ద్వితీయా జీవక్రియా ఉత్పన్నాల యొక్క ఉత్పత్తి పై వ్యాసము వ్రాయుము.

13. Explain the different types of cloning vectors.
వివిధ రకముల క్లోనింగ్ వాహకాలను గూర్చి వివరింపుము.

SECTION-B

14. Describe the process of Gene cloning.
జన్యు క్లోనింగ్ విధానమును వర్ణింపుము.

15. Explain the gene transfer mehtods.
జన్యు బదిలీ పద్ధతులను గూర్చి వివరింపుము.

16. Write an essay on role of selectable markers in selection of transgenics.
జన్యు పరివర్తితాలను గుర్తించుటలో ఎంచుకోబడిన మార్కర్‌ల యొక్క పాత్రను గూర్చి వ్యాసము వ్రాయుము.

17. Explain the applications of biotechnology in various fields.
వివిధ రంగములలో జీవ సాంకేతిక శాస్త్ర అనువర్తనాలను గూర్చి వివరింపుము.

18. What are transgenic plants? Write about any four transgenic plants.
జన్యు పరివర్తిత మొక్కలు అనగానేమి? ఏవైనా నాలుగు జన్యు పరివర్తత మొక్కలను గూర్చి వ్రాయుము.

III B. Sc – BOTANY PRACTICALSYLLABUS
SEMESTER- VI
Practical Paper VII-(C): Plant Tissue Culture &Plant Biotechnology
Total hours of teaching 30hrs @ 2hrs per week

1. (a) Preparation of MS medium.
   (b) Demonstration of in vitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco/ Datura/ Brassica etc.
2. Study of embryo and culture, micro propagation of Banana, somatic embryogenesis, artificial seeds through photographs.
3. Construction of restriction map of circular and linear DNA from the data provided.
4. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer byelectroporation, microinjection, and micro projectile bombardment.
5. Different steps involved in genetic engineering for production of Bt. cotton, Goldenrice, Flaver saver tomato through photographs.
7. Isolation of plasmid DNA.
8. Restriction digestion and gel electrophoresis of plasmid DNA (optional)
9. Field visit to a lab involved in tissue culture
10. Study project under supervision of lecturer – tissue culture/ genetic engineering

PRACTICAL MODEL PAPER

Paper-VII-(C) : Plant Tissue Culture &Plant Biotechnology

1.Project work	15 M
Viva voice on study project	05M
2. DNA isolation tecnque / Synthetic seeds procedure	08M
3.Identify and write notes on A,B, C	3*4=12M
4.Field report	05M
5. Record	05M