SHIV CHHATRAPATI SHIKSHAN SANSTHA'S

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR (AUTONOMOUS)

M.Sc. SECOND YEAR (CBCS)

BOTANY-CURRICULUM

UNDER ACADEMIC AUTONOMOUS STATUS

Syllabi Approved by the Board of Studies in Botany

w. e. f. JUNE, 2023

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RAJARSHI SHAHU MAHAVIDYALAYA, LATUR (AUTONOMOUS)

Department of Botany

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BOTANY-CURRICULUM STRUCTURE

SEMESTER-II

Course No.	Course code	Core Course Title	L/ P	Marks		Total	Credits
				Internal Evaluation	External Evaluation		
BOCC-9	P-ANS-372	Angiosperms Systematics	60	40	60	100	04
BOCC-10	P-MOB-373	Molecular Biology	60	40	60	100	04
BOCC-11	P-PBG-374	Plant Biotechnology and Genetic Engineering	60	40	60	100	04
BODSE-1	P-PLP-375	Plant Pathology-I/Genetics-I/Plant Biotechnology- I	60	40	60	100	04
BOLC-IX	P-LAC-376	Lab course on Angiosperms Systematics	15	20	30	50	02
BOLC-X	P-LAC-377	Lab course on Molecular Biology	15	20	30	50	02
BOLC-XI	P-LAC-378	Lab course on Plant Biotechnology and Genetic Engineering	15	20	30	50	02
BOLC-XII	P-LAC-379	Lab course on Plant Pathology-I/Genetics-I/Plant Biotechnology- I	15	20	30	50	02
	P-SEM-380	Students Seminars-III				25	01
					Total	**625**	**25**

SEMESTER-IV

Course No.	Course code	Core Course Title	L/P	Marks		Total	Credits
				Internal Evaluation	External Evaluation		
BOCC-13	P-CPB-468	Cytogenetics and Plant Breeding	60	40	60	100	04
BOCC-14	P-PLN-469	Immunology, Plant Nanotechnology and Forensic Botany	60	40	60	100	04
BODSE-2	P-PLP-470	Plant Pathology-II / Genetics-II / Plant Biotechnology-II	60	40	60	100	04
BODSE-3	P-PLP-471	Plant Pathology-III / Genetics - III/ Plant Biotechnology-III	60	40	60	100	04
BOLC-XIII	P-LAC-472	Lab course on Cytogenetics and Plant Breeding and Immunology, Plant Nanotechnology and Forensic Botany	15	20	30	50	02
BOLC-XIV	P-LAC-473	Lab course on Plant Pathology-II and Plant Pathology-III	15	20	30	50	02
PROJECT	P-PRW-474	Project (Dissertation/Review		40	**60**	100	04
	P-SEM-475	Students Seminars-IV				25	01
					Total	**625**	**25**
Grand Total of Marks and Units of all Semesters						**2500**	**100**

BOCC=Botany Core Course, BODSE-Botany Discipline Specific Elective, BOLC=Botany Laboratory Course, L/P=Lectures / Practical

S.N. Shinde
Chairman
Board of studies in Botany

M. Sc. Second Year
Semester-III
BOTANY
BOCC-IX: Angiosperms Systematics

Lectures: 60 Maximum Marks :100 Credits:04 Course Code: P-ANS-372

Learning Objectives:

1. To interpret aims, principles and practices in taxonomy.
2. To analyse the modern trends in Taxonomy.
3. To learn the morphology of Angiosperms
4. To distinguish species on the basis of morphological and anatomical features.
5. To know the Systematic position, general characters, floral formula, floral diagram and economic importance.

Course Outcomes:

The Students will be able to

1. Describe the modern trends in Taxonomy.
2. Discuss aims, principles and practices in taxonomy
3. Explain the morphology of Angiosperms
4. Describe general characters of Angiospermic plants.
5. Know the Systematic position, general characters, floral formula, floral diagram and economic importance

UNIT-I: MORPHOLOGY OF ANGIOSPERMS-I (15L)

1. Root and its modifications.
2. Stem and its modifications.
3. Leaf: Typical leaf (Hibiscus), Types, Phyllotaxy, Venation and modifications.
4. Inflorescence and its types.
5. Flower: Types of flower, Calyx, Corolla, Androecium and Gynoecium. Floral formula and Floral diagram.

UNIT-II: MODERN TRENDS IN TAXONOMY AND CLASSIFICATION (15L)

1. Aims, principles and practices in taxonomy. Botanical Nomenclature: Brief history, Scientific name ICN, Principles, Taxonomic hierarchy.
2. Taxonomy in relation to morphology and anatomy.
3. Overview of pre- and post-Darwinian systems of classification.
4. Artificial systems of classification - Linnaeus.
5. Natural system of classification - Bentham and Hooker.
6. Phylogenetic systems of classification – Takhtajan.

UNIT-III: STUDY OF FAMILIES-I (15L)

(Systematic position, general characters, distinguishing features, floral formula, floral diagram and economic importance).

A) Polypetalae:

1. Ranales -Annonaceae.
2. Malvales- Malvaceae.
3. Geraniales- Rutaceae.
4. Passiflorales- Cucurbitaceae

B) Gamopetalae:

1. Rubiales – Rubiaceae
2. Personales - Bignoniaceae.
3. Lamiales –Verbenaceae

UNIT-IV: STUDY OF FAMILIES-II (15L)

(Systematic position, general characters, distinguishing features, floral formula, floral diagram and economic importance).

A) Apetalae:

1. Curvembryae – Amarantaceae.
2. Unisexuales- Euphorbiaceae.

B) Monocotyledonae:

1. Microspermae- Orchidaceae.
2. Epigynae – Musaceae.
3. Coronarieae –Commelinaceae.
4. Nudiflorae – Typhaceae.

Reference Books:

1. Paleobotany- Agashe, S.N. 1995. Oxford and IBH Publ. Co. Pvt. Ltd, New Delhi.
2. Embryology of Angiosperms- Bhojwani, S.S. and Bhatnagar, S.P. 1984Vikas Publ. House, New Dehli.
3. Plant microevolution and Conservation in Human-influenced Ecosystems- Briggs, David. 2009 Cambridge University Press.
4. . The Flora of Presidency of Bombay Cooke-T. 1903-1908, Vol. I-III.
5. An Integrated System of Classification of Flowering Plants- Cronquist, A. 1981, Columbia University Press, New York.
6. The Evolution and Classification of Flowering Plants- Cronquist, A. 1988 (2nded.) Allen Press, U.S.A.
7. Principles of Angiosperm Taxonomy. Today and Tomorrow Davis, P. H. and V. H. Heywood 1991, Publications, New Delhi.
8. Morphology of Angiosperms, McGraw Hill Book Co. Eames A.J. 1961.
9. Pollen Morphology and Plant Taxonomy of Angiosperms (An introduction to Palynology I)- Erdtman, G. 1966. HafnerPub.Co. London.

10. Plant Anatomy- Fahn, A. 1979, Pergamon Press, London.
11. The Cambridge Illustrated Glossary of Botanical Terms- Hickey, M. and King, C. 2000 Cambridge University Press, UK.
12. Families of Flowering plants- Hutchinson, J. 1959, Clarendon Press, Oxford.
13. Handbook of Field and Herbarium Methods- Jain S.K. and Rao R.R. 1976, Today and Tomorrow Publishers, New Delhi.
14. . Comparative embryology of Angiosperms- Johri, B. M. 1984, Ind. Nat. Sc. Acad. New Delhi.
15. Plant Systematics- Jones, S. B. and Luchinger A.E. 1986,2ndedn, McGraw Hill Book Co.
16. Plant Systematics- A Phylogenetic Approach- Judd Walter S., Campbell, C. S., Kellogg, E. A., Stevens, P.F. and M. J. Donoghue. 2008Sinauer Associates, INC, Publishers. Sunderland, Massachusetts, USA.
17. Flowering Plants Evolution and Classification of Higher Categories- Kubitzki, K. 1977, Plant Systematics – Evolution Supplement I.
18. The biology of parasitic flowering plants- Kuijt J. 1969. California University Press.
19. Taxonomy of Vascular Plants- Lawrence, G. H. M. 1951, Oxford and IBH Publ. Co. Pvt. Ltd. New Delhi.
20. The Plant Book- Mabberly, T. J. 1997, 2ndedn Cambridge University Press, Cambridge.
21. An Introduction to Embryology of Angiosperms- Maheshwari, P. 1985, Tata McGraw Hill, New Delhi.
22. Handbook of Taxonomic Training- Manilal, K. S. and M. S. Muktesh Kumar [ed.] 1998.A DST, New Delhi.
23. Taxonomy of Angiosperms- Naik, V. N. 1984, Tata McGraw-Hill, New Delhi.
24. Pollen morphology of Angiosperms- Nair, P.K.K. 1966, Periodical Expert Book Agency, New Delhi.
25. Modern Methods of Plant Analysis- Paech, K. and M.V. Tracey. 1956, Vol-I &II. Springer-Verlag.
26. Principles and Techniques of Contemporary Taxonomy- Quicke, Donald L. J. 1993, Blakie Academic & Professional, London.
27. Fundamentals of Plant Systematics- Radford A.E. 1986, Harper and Row N Y.
28. Chromosome Technique- Sharma A.K. and A. Sharma,1980Theory and Practices(3rded.) Butterworths, London.
29. Pollen Biology- Shivanna, K.R. and N.S. Rangaswamy.1992, A Laboratory Manual. Springer- Verlag.
30. Plant Systematics- Simpson, M.G. 2010, Elsevier, Amsterdam.
31. Plant Systematics- Singh G. 2004, 2ndedn, Oxford and IBH, New Delhi.
32. Introduction to Principles of Plant Taxonomy- Sivarajan, V.V. 1984, Oxford and IBH, New Delhi.
33. The Chemotaxonomy of Plants- Smith, P. M. 1976. Edward Arnold Pub. Ltd.
34. Morphology of Angiosperms- Sporne, K. R. 1974. Hutchinson University Library, London.

M. Sc. Second Year
Semester-III
BOTANY
BOCC-X: Molecular Biology

Lectures: 60 Maximum Marks: 100 Credits: 04 Course Code: P-MOB-373

Learning Objectives:

1. To study the detailed structure of nucleic acid.
2. To give information of DNA damage and repair mechanism.
3. To learn the molecular processes such as transcription and translation.
4. To understand gene expression and regulation of prokaryotes and eukaryotes.

Course Outcomes:

The students are able to**:**

1. Discuss the structural aspect of DNA and RNA.
2. Explain the mechanisms of DNA damage and repair mechanism.
3. Correlate the gene expression and regulation of prokaryotes and eukaryotes.
4. Describe the molecular processes such as transcription and translation.

UNIT- I: DNA STRUCTURES &TOPOLOGY (15L)

1. DNA structure Types of base pairing, unusual structures, topology, split gene. pseudogene, overlapping gene, cryptic gene Jumping gene (transposons).
2. Melting and renaturation of DNA, Cot curves and kinetic complexity of DNA. Organization of genomes (from whole genome sequences), repetitive and unique sequences, C-value paradox.
3. Chromosome organization, centromeres, telomeres, specialized chromosomes.
4. Initiation, elongation and termination of DNA replication, molecular machinery of DNA replication in Prokaryotes.
5. DNA damage and repair.

UNIT- II: RNA STRUCTURE AND PROCESSING (15L)

1. RNA structure – Modified bases, pairing, secondary structure.
2. Transcription units, RNA polymerases, initiation, elongation and termination of transcription in eukaryotes, proof reading.
3. RNA processing – Processing of t-RNA, r-RNA and m-RNA and m-RNA localization.
4. Non-coding RNAs, ribozymes and riboswitches.

UNIT-III: PROTEIN SYNTHESIS (15L)

1. Protein synthesis – The genetic code, t-RNA charging, ribosomal organization. Initiation, elongation and termination of protein synthesis in prokaryotes. Antibiotics used in inhibition of protein synthesis. Proof reading.
2. Post-translational processing of proteins, protein modifications.
3. Proteases. Ubiquitination and degradation of proteins by proteasomes.

UNIT-IV: REGULATION OF GENE EXPRESSION (15L)

1. Regulation of transcription – i) Operons, repressors and inducers (Catabolic and Anabolic)
   ii)positive and negative control.
   iii) regulation of lytic and lysogenic cycles in phages.
2. Regulation of gene expression at translational and post-translational level.

Reference books:

1. Genes IX– Benjamin Lewin, Jones and Bartlett, 2008
2. Genes X– Benjamin Lewin, Jones and Bartlett, 2011
3. Molecular Biology of the Cell – Alberts, B, Bray, D, Raff, M, Roberts, K and Watson JD,
4. Garland Publishers, 1999.
5. Principles of Biochemistry – Lehninger, W.H. Freeman and Company, 2005
6. Cell and Molecular Biology- E.J. Dupraw – 1970,Academic Press, London
7. Cell and Molecular Biology - De Robertis and De Robertis -1997,(VIII); B.I.
8. Cytogenetics; Prentice- Waverly Pvt. Ltd., New Delhi C. P. Swanson, T. Merz, and W.J. Young – 1982, Hallof India Pvt. Ltd., New Delhi
9. The cell cycle- P. C.L. John (Ed.) – 1981, Cambridge University press
10. Genes - Benjamin Lewin VI, VII and VIII; Oxford Press.
11. Membrane proteins and their interactions with lipids - R. A. Chapoldi 1977,Marcel Dekker, inc. N. York
12. The enzymes of Biological Membrames- A. N. Mortonosi (Ed.) – 1985 Vol. I, II and III; Plenum press, New York
13. Molecular Biology of the gene - Watson and others – 2004,(V) pearses Educatias, Inc India.

M. Sc. Second Year
Semester-III
BOTANY
BOCC- XI: Plant Biotechnology Genetic Engineering

Lectures: 60 Maximum Marks: 100 Credits: 04 Course Code: P-PBG-374

Learning Objectives:

1. To analyse the molecular aspects of Genetic Engineering.
2. To interpret Agrobacterium mediated gene transfer.
3. To learn the DNA sequencing methods.
4. To know the concept of genomics and proteomics.
5. To apply the molecular markers and their applications.

Course Outcomes:

The Students will be able to:

1. Explain the steps involved in recombinant DNA technology.
2. Correlate the construction of the DNA and c-DNA library.
3. Discuss the principles of plant tissue culture.
4. Describe the clonal propagation of plants on a commercial scale.
6. Justify the molecular markers and their applications

UNIT-I: PLANT TISSUE CULTURE (15L)

1. History of plant tissue culture.
2. Laboratory condition requirement.
3. Tools and techniques for tissue culture.
4. Culture media and their constituents
5. Types of culture (Anther, callus, Micropropagation) and application of tissue culture.
6. Somaclonal variation and its significance.
7. Protoplast culture and somatic hybridization.
8. Cryopreservation.

UNIT-II: RECOMBINANT DNA TECHNOLOGY AND GENE CLONING (15L)

1. Introduction to recombinant DNA technology.
2. Enzymes used in recombinant DNA technology.
3. Recombinant technology and gene cloning.
4. Use of vectors in cloning- Plasmids, cosmids, BACs and YACs.
5. DNA Sequencing methods (Maxum Gillbert, Sangers, Pyrosequencing and Next generation sequencing).

UNIT-III: GENE LIBRARIES AND SCREENING OF RECOMBINANTS (15L)

1. Genomic and cDNA libraries – choice of vectors and construction.

2. RNA Interference mechanism, synthesis and its application. Virus Induced Gene Silencing(VIGS).

3. Concept of genomics and proteomics.

4. Concept of Human genome Project (HGP).

UNIT-IV: GENETIC TRANSFORMATION OF PLANT (15L)

1. Agrobacterium: Ti and Ri plasmids, transfer of DNA into host by Agrobacterium, mechanism of integration of DNA into plant genomes, vectors for chloroplast transformation, vectors for marker-free selection.
2. Transformation technique -Agrobacterium-mediated transformation, Factors affecting on Agrobacterium-mediated transformation.
3. Molecular markers and their applications.

Reference Book:

1. Recombinant DNA – Principles and Methodologies. Greene JJ and Rao VS, Marcel Dekker, New York, 1998.

2. Principles of gene manipulation. Primrose SB, Twyman RM and Old RW, 6th Edition, Blackwell Science, Oxford, 2001

3. Differentially expressed gene in plants. Hansen and Harper, Taylor and Francis Ltd. London, 1997.

4. Engineering plants for commercial products and applications. Eds. Collins GB and Shepherd RJ, NY Acad. Of Science Publishers 1996.

5. DNA markers. Eds. Caetano-Anolles and Gresshoff, Wiley-VCH Publishers, NY, 1998

6. Introduction to Bioinformatics. Attwood, T.K., Parry-Smith, DJ, Addison Wesley Longman, Harlow, Essex, 1999.

7. Bioinformatics. Westhead, DR, Parish JH and Twyman, RM, BIOS Scientific Publishers Ltd., Oxford, 2003

8. Bioinformatics – Sequence and genome analysis. D.W. Mount, CBS Publishers, New Delhi, 2003

9. Collins GB and Shepherd RJ Eds., 1996, Engineering plants for commercial products and application. , NY Acad. Of Science Publishers

10. Essentials of Genomics and Bioinformatics-Wiley-VCH Publishers, NY,

11. Secondary products from plant tissue culture- Charlwood B.V. and Rhodes MV Edt. 1999, Clarendon Press, Oxford.

12. Plant cell culture: Secondary metabolism towards industrial application- Dicosmo F and Misawa M, Edt 1996, CRC press, Boca Raton ,N.Y.

13. Biotechnology: Secondary metabolites- Ramawat K G and Merillon J M, Edt.,1999 Oxford IBH Publishing Co., New Delhi

14. Biochemistry and molecular biology of plants- Buchanan BB, Grussem Wand Jones RL, 2000. IK International Pvt Ltd. New Delhi.

M. Sc. Second Year
Semester –III
BOTANY
DSE-I: Plant Pathology-I

Lectures: 60 Maximum Marks: 100 Credits :04 Course Code: P-PLP-375

Learning Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To apply the principles and concept of plant pathology.
3. To analyse the relationships between host and pathogens.
4. To explain the concept of plant disease and disease pyramid.
5. To learn the plant disease management methods.

Course Outcomes:

The Students will be able to:

1. Explain the microbial world and the nature of plant diseases.
2. Describe the principles and concept of plant pathology
3. Identify the effective methods of disease management.
4. Correlate the relationships between host and pathogens.
5. Discuss the concept of plant disease and disease pyramid

UNIT- I: INTRODUCTION TO PLANT PATHOLOGY (15L)

1. Scope and Importance of Plant Pathology; Contributions of E. F. Smith E. J. Butler and K. C. Mehta, in the field of plant pathology.
2. Careers in Plant Pathology, The Practice and Practitioners of Plant Pathology. Certification of Professional Plant Pathologists.
3. Aerobiology: Scope and applications of aerobiology. Airborne pathogens, Methods for detection of Aerospora**.**
4. Methods in Plant Pathology

UNIT- II: DISEASES OF CROP PLANTS-I (15L)

History, symptomology, causal organism, etiology and management of:

1. Rice: - Blast disease.
2. Jowar: - Leaf Spot
3. Pigeon pea: - Leaf Spot
4. Tomato: - Early Blight.
5. Bhendi: Powdery Mildew
6. Brinjal: - Leaf Spot.

7. Chilly: - Anthracnose.
8. Bean Mosaic
9. Tomato: Mottle –virus
10. *Soybean Cyst Nematode: Heterodera glycines*
11. Cucumber - Annular Leaf Spot - Bacteria *Pseudomonas*
12. Corn: Stunt Disease of Caused by Mollicutes

UNIT- III: DISEASE OF CROP PLANTS – II (15L)

(History, symptomology, causal organism, etiology and management of)

1. Banana: - Panama disease.
2. Grapes: - Powdery Mildew.
3. Sugarcane: - Grassy Shoot.
4. Sunflower: - Rust.
5. Groundnut: - Rust
6. Sesamum: - Leaf Spot.
7. Green gram: - Powdery mildew.
8. Rose: Powdery Mildew -Fungus *Podosphaera pannosa*.
9. Corn: Stewarts Wilt -Bacterial *Pantoea stewarfii subsp. Stewarfii (syn. Erwinia stewarfii)*
10. Tomato: Speck -Bacterial

UNIT-IV: HOST RESISTANCE, DISEASE MANAGEMENT AND CONTROL OF DISEASE (15L)

1. Plant defenses: Non-host and host resistance.
2. Pre-existing and induced structural and chemical defenses.
3. Pathogenicity genes, a virulence genes, effector molecules.
4. Control of disease using fungicides.
5. Biocontrol agents for controlling disease.

Reference Books:

1. Plant Pathology- Agrios, G. N. 2006, 5th Edition
2. Experiments in Microbiology, plant pathology and Tissue culture - Aneja, K. R. 1993
3. Diseases of Tropical and Subtropical field, Fiber and oil plants- Cooke, A. A. 1981
4. Clinical Plant Pathology- Gangopadhyay , S. 2004
5. The Biology of parasitic flowering plants- Kuijit, J. 1969
6. Methods in physiological plant pathology- Mahadevan, A. and R. Shridhar, 1982.
7. Plant Pathology- Agarwal A. and Mehrotra, R. S. 2012

8. Field Crop Diseases Handbook- Nyvall, R. F. 1979

9. Pathological Problems of Economic crop plants and their management - Paul Khurama, S. M. 1998

10. Disease Resistance in plants- Planke, J. E. ander, 1968

11. Plant Diseases Epidemics and control- Planke, J. E. Vander. 1963

12. Diseases of crop plants in India- Rangaswami, G. 1979

13. Plant Diseases- Singh, R. S. 2009, 9th Edition

14. Indian journal of phytopathology III. Journal of Mycology and plant pathology

M. Sc. Second Year
Semester-III
BOTANY
Lab course IX
Based on BOCC- Angiosperms Systematics

Lectures :48 Maximum Marks: 50 Credits:02 Course Code: P-LAC-376

Learning Objectives:

1. To analyse plant morphology and identify plant up to species level.
2. To learn the pollen morphology of different family members.
3. To study pollen viability, self and crosspollination.
4. To provide lab-based training and writing short species description and illustrations

Course Outcomes:

The Students will be able to:

1. Describe the plant morphology and identify plant up to species level.
2. Provide lab-based training and writing short species description and illustrations.
3. Correlate pollen morphology of different family members.
4. Explain the pollen viability, self and crosspollination.

Practical 1-8. Study of at least 16 locally available families of flowering plants of genus and species family.

Practical 9. Identification of genus and species of locally available wild plants.

Practical 10. Comparative account of karyotypic analysis.

Practical 11. To study of pollen morphology of different family.

Practical 12. Study of fossil angiosperms of India with the help of slides and specimens.

Practical 13-16. Study of floral biology, visitations by pollinators, pollen viability, self and crosspollination, seed set of any two species.

Practical 17. Atleast two short excursion of one two days each and one long excursion of five

N.B: 1) Any ten Practicals
2) Several Short Excursions and at least one Long Excursion
3) Each short excursion corresponds to two practicals and one long excursion 6 practicals

M. Sc. Second Year
Semester-III
BOTANY
Laboratory Course X
Based on BOCC- Molecular Biology

Practical's :15 Maximum Marks :50 Credits:02 Course Code: P-LAC-377

Learning Objective:

1. To apply the techniques of Molecular biology.
2. To learn electrophoretic separation of plasmid DNA.
3. To analyse the effect of temperature and alkali on hyperchromicity.
4. To isolate the nucleic acid from plants sources.

Course Outcomes:

The Students will be able to:

1. Describe the techniques of Molecular biology.
2. Explain electrophoretic separation of plasmid DNA.
3. Isolate the nucleic acid from plants sources.
4. Correlate the effect of temperature and alkali on hyperchromicity

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Practical 1. Isolation of plasmid DNA and quantification.

Practical 2. Electrophoretic separation of plasmid isoforms.

Practical 3. Restriction digestion of plasmid DNA, electrophoresis and molecular weight determination of DNA fragments.

Practical 4. Isolation of plant genomic DNA and quantification.

Practical 5. Effect of temperature and alkali on absorbance of DNA – hyperchromicity.

Practical 6. Separation of SSP from leguminous seed &quantitation of each fraction.

Practical 7. SDS-PAGE separation of seed storage proteins from legumes.

Practical 8. Determination of molecular sizes of the globulin subunits.

Practical 9. Isolation of DNA from plants and Estimation by DPA method.

Practical 10. Isolation of RNA and Estimation of RNA by orcinol method.

Practical 11. Visit to Biotechnology Research center.

Practical 12. solation of DNA from various sources.

Practical 13. Determination of Electrical conduction of DNA.

Practical 14. Isolation and separation of cell organelles.

Practical 15. 2D- Electrophoresis technique for separation of proteins.

Practical 16. Synthesis of Gold Nanoparticles by biogenic methods.

Practical 17. Synthesis of Silver Nanoparticles by biogenic methods.

Practical 18. Isolation of enzymes involved in biosynthesis of nanomaterials.

N.B: 1) Any Fifteen Practicals
2) Several Short Excursions and at least one Long Excursion

M. Sc. Second Year
Semester –III
BOTANY
Laboratory Course XI
Based on BOCC- Plant Biotechnology & Genetic Engineering

Practical's: 15 Maximum Marks: 50 Credits:02 Course Code: P-LAC-378

Course Objectives

1. To apply the molecular aspect genetic engineering.
2. To analyse various surface sterilizing reagents.
3. To study the Sterilization Techniques.
4. To prepare the Synthetic seeds.

Course Outcomes:

The Students will be able to:

1. Describe the molecular aspect genetic engineering.
2. Identify the various surface sterilizing reagents.
3. Explain different Sterilization Techniques.
4. Performs experiments on prepare the Synthetic seeds.

Practical 1. Sterilization Techniques.

Practical 2. Preparation of stock solutions.

Practical 3. Preparation of Media MS Medium.

Practical 4. Surface sterilization of explants.

Practical 5. Characterization of Callus.

Practical 6. Protoplast isolation.

Practical 7. Preparation of Synthetic seeds.

Practical 8. Growth characteristics of E. coli using platting & turbidiometric method.

Practical 9. To detect mutants variant of a given platting techniques.

Practical 10. Isolation of plasmid from E. coli by enzymatic method.

Practical 11. Effect of temperature and alkali on absorption of DNA: hyperchromicity

Practical 12. Isolation of RNA and its quantification.

Practical 13. Visit to Plant tissue culture laboratory.

N.B: 1) Any Fifteen Practicals.
2) Several Short Excursions and at least one Long Excursion.

M. Sc. Second Year
Semester –III
BOTANY
Laboratory Course-XII
Practical's based on Plant Pathology

Practicals:15 Maximum Marks: 50 Credits:02 Course Code: P-LAC-379

Learning Objectives:

1. To apply the principles and concept in plant pathology.
2. To interpret the relationships between pathogens and plants.
3. To create the awareness about the effect of plant diseases in human life.
4. To analyses the plant diseases, disease pyramid and management of disease.
5. To identify causal organism on the basis of symptoms.

Course Outcomes:

The students will be able to:

1) Correlate the relationships between host and pathogens and disease-causing agents.
2) Describe the principles and concept in plant pathology.
3) Discuss the plant diseases, disease pyramid and management of disease.
4) Create the awareness about the effect of plant diseases and economic impact.
5) Identify causal organism on the basis of symptoms.

Practical 1. Study of different equipment's for sterilization (Autoclave, Laminar air flow, Incubator and Oven).

Practical 2-4. To study different staining methods.

Practical 5-18. Symptomology, histopathology of disease given in theory

Practical 19-20. Estimation of chlorophylls, sugars and polyphenols from healthy and infected leaves.

Practical 21. Isolation and identification of plant pathogens from air over infected field

Practical 22. Use of Aerobiological technique to study fungal flora of different localities by Tilak air Sampler

Practical 23. Study of rhizosphere mycoflora from different soil samples of infected and healthy plants by serial dilution technique

Practical 24. Effect of temperature on growth of plant pathogenic fungi

Practical 25. Effect of pH on growth of plant pathogenic fungi

Practical 26. Study of Phyllosphere mycoflora of infected and healthy plants by leaf print method.

(N.B.): 1) Any Fifteen Practicals
2) Several Short Excursions and at least one Long Excursion.

M. Sc. Second Year
Semester –IV
BOTANY
Theory Paper XIII: Cytogenetics and Plant Breeding

Lectures: 60 Maximum Marks: 100 Credits: 04 Course Code: P-CPB-468

Learning Objectives:

1. To analyse the cell structure, function and different cytological aspects.
2. To create new variety of crop by using Plant Breeding.
3. To interpret chromosomal abbreviation.
4. To analyse the genetic syndromes and disorders on the basis of their symptoms
5. To provide knowledge about linkage, crossing over and mapping.

Course Outcomes:

1. Explain the cell structure, function and different cytological aspects.
2. Create new variety of crop by using Plant Breeding techniques.
3. Describe chromosomal alteration
4. Correlate the genetic syndromes and disorders on the basis of their symptoms.
5. Discuss about linkage, crossing over and mapping.

UNIT: I -Cytogenetics-I (15L)

1. Cell division: Mitosis and Meiosis.
2. Concept of Gene: Allele, Multiple allele, Pseudoallele, Complementation test.
3. Mendelian Principles: Dominance, Segregation and Independent assortment.
4. Extensions of Mendelian Principles: Codominance, Incomplete dominance,
5. Gene interactions (Epistatic and Non Epistatic)
6. Pleiotropy, Genomic imprinting, Penetrance, Expressivity and Phenocopy.

UNIT-II: Cytogenetics-II (15L)

1.Microbial genetics: Mapping of bacterial genome by interrupted mating.
2. Linkage and mapping in eukaryotes: Linkage and crossing over, Sex linkage, Sex limited and sex influenced characters.
3. Recombination: Homologous and Non-homologous including transportation.
4. Linkage maps, Lods score for linkage testing, Mapping by 3-point test cross
5. Mapping by tetrad analysis in Yeast and Neurospora, mapping with molecular Markers.

UNIT III: Cytogenetics-III (15L)

1. Extra chromosomal inheritance: Inheritance of mitochondria and chloroplast genes, Maternal inheritance and its effect.
2. Quantitative genetics- Introduction to complex traits, Polygenic inheritance. Heritability & its measurement, QTL Mapping.

3. Karyotypes and genetic disorders.
4. Structural alterations of chromosomes: Deletion, Duplication, Inversion, Translocation, Complex translocation heterozygotes, Robertsonian translocations, BA translocations and their genetic implications.
5. Numerical alterations of chromosomes: Euploidy and aneuploidy and their genetic implications.

UNIT-IV: PLANT BREEDING (15L)

1. Plant Breeding- Introduction, Defination, History (phases), Objectives.
2. Hybridization methods in plants.
3. Mutation breeding: Types, Mutagens: Physical and chemical mutagens, Mutant types, Role of mutation in breeding.
4. Induction of polyploidy, in plant.
5. Methods of Breeding for Biotic stress (Disease resistance) and abiotic stress resistance (drought resistance).
6. Procedure for of new variety.

Reference Book :

1. The science of genetics- Atherly, A.G., Girton, J.R. and Mcdonald, J. F. (1999) Sauders College Pub. Fort Worth USA.
2. Disscussions in cytogenetics- Burnham, C.R.(1962) ,Burgess Pub. Co., Minnesota.
3. Genetics: Principle and analysis- Hartl, D.L., Jones E.W.(2001), (4th edn) Jones and Barlett Pub., USA.
4. Cytogenetics of Aneuploids- Khush, G S (1973) ,Academic press New York, London.
5. Lewin, B. Genes VIII. Oxford, University press. New York, USA.
6. Genetics- Russel, P.J. 1998, (5th edn).The Benjamin/ Cummins Pub. Co., Inc. USA.
7. Principles of genetics- Snustad, D.P. and Simmons, M.J. 2000 ,(4th edn). John Wiley and Sons, Inc., USA.
8. Microbial Genetics- Freifelder, D. (1987)
9. Genetics- Strickberger, M.W, (4th edn). Mcmillan Publishing company, New York.
10. Modern genetic analysis- Griffiths, A.J.F. and Gilbert, W.M (2nd edn) W.H. Freeman and Company, New york.
11. Plant breeding: principles and methods- Singh, B.D.(2005), 7th edn. Allard, R.W.(1960).
12. Principles of plant breeding.John Wiley and sons, Inc., New York.
13. Plant breeding: Theory and practice- Chopra, V.L. (2000) 2nd edn. Oxford & IBH Pub., Co., Ltd. New Delhi.
14. Plant breeding: Mendelian to molecular Approaches- Jain, H.K. and Kharwal, M.C. (2003), Navrosa Publishing House Pvt. Ltd., New Delhi.
15. Advances in Plant breeding. Vol 1 and 2, CBS Pub.& distributors.
16. Principles and practices of Plant Breeding -Sharma, J.R. 1994. -Mandal, A.K. Ganguli, P.K., Banergee, S.P. (1991), Tata Mcgraw Hill.Pub. Co. Ltd. New Delhi.
17. Principles of crop improvement- Simmonds, N.W.1979 Longman, London and New York.

M. Sc. Second Year
Semester-IV
BOTANY
Paper-XI: Immunology, Plant Nanotechnology and Forensic Botany

Lectures: 60 Maximum Marks: 100 Credits: 04 Course Code: P- -374

Learning Objectives:

1. To analyse the scope, principles and functions of forensic Botany.
2. To create the primary technique used in Forensic DNA analysis
3. To study physicochemical properties of nanoparticles.
4. To interpret the innate and adaptive immunity.
5. To create awareness of immunization and different vaccine.
6. To apply basic techniques for identifying antigen antibody interactions.

Course Outcomes

The students will be able to:

1. Describe the scope, principles and functions of forensic Botany
2. Explain the basic techniques for identifying antigen antibody interactions.
3. Correlate the immunization and different vaccination.
4. Identify the different physicochemical properties of nanoparticles.
5. Discuss basic techniques for identifying antigen antibody interactions.

UNIT- I: PLANT NANOTECHNOLOGY AND ITS CONCEPTS (15L)

1. Plant Nanotechnology: An Overview on Concepts, Strategies, and Tools
2. Physical and Chemical Nature of Nanoparticles.
3. Effects of Nanoparticles on Plant Growth and Development
4. Agri-Nano techniques for Plant Availability of Nutrients
5. Utilization of Nanoparticles for Plant Protection
6. Nanotechnology in Soil-Plant System

UNIT-II: INTRODUCTION TO FORENSIC BOTANY (15L)

1. Introduction to forensic botany. Botanical evidence on legal investigations. Legal plant definition. Botanical evidence in legal investigations
2. The Use of Botanical Evidence in Criminal Investigations.
3. Evidence collection and analysis:
   - **i.** Documentation of botanical evidence
   - **ii.** Collection information needed for each botanical sample
   - **iii.** How to have botanical evidence analyzed
   - **iv.** Evidence analysis
   - **v.** Laboratory report
4. Fundamentals of wildlife forensic. Significance of wildlife forensic.

UNIT-III: IMMUNOLOGY-I (15L)

1. Cells and molecules involved in innate and adaptive immunity.
2. antigens, antigenicity and immunogenicity
3. B and T cell epitope, structure and function of antibody molecules.
4. Generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen antibody interaction MHC molecules.
5. Antigen processing and presentation, activation and differentiation of B and T cells.

UNIT-IV: IMMUNOLOGY-II (15L)

1. B and T cell receptors, humoral and cell mediated immune responses, primary and secondary immune responses.
2. The complement system.
3. Toll-like receptors, cell mediated effector functions, inflammation, hypersensitivity and autoimmunity,
4. Immune response during bacterial (tuberculosis), Parasitic (malaria) and viral (HIV) infections congenital and acquired immunodeficiencies,
5. Vaccines.

Reference Books:

1. Biochemistry- L. Stryer, 3rd Edition, W.H. Freeman and Company, New York (1988).
2. Biochemistry- R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's
3. Forensic Biology- S. Chowdhuri, BPRD, New Delhi (1971).
4. Forensic Science Handbook- R. Saferstein ,Vol. III, Prentice Hall, New Jersey (1993).
5. Serology and DNA typing in, Introduction to Forensic Sciences, G.T. Duncan and M.I. Tracey, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
6. Nano materials synthesis, properties and applications- Edelestein A.S and Cammarata RC
7. Nanotechnology-An Introduction to Nano structuring Techniques Wiley (Practical), Michael Kohler, Wolfgang Fritzsche, Michael Kohler
8. MEMS and Microsystems, Design, Manufacture and Nanoscale Engineering- Tai Ran – Hsu, John Wiley & Sons, 2008.
9. Nanolithography: A Borderland between STM, EB, IB and X-Ray Lithographies (NATO ASI Series)- M. Gentili, C. Giovannella, S. Selci, Kluwer Academic Publishers, 1994.
10. Nanoparticle Assemblies and Superstructures‖- Nicholas A. Kotov, CRC, (2006).
11. Nanostructures &Nanomaterials Synthesis, Properties G; Z, Applications- Guozhong Cao, World Scientific Publishing Pvy. Ltd., Singapore 2004
12. Nanofabrication, Principles, Capabilities and Limits- Zheng Cui ,Springer Science business media, New York (2008).
13. Kostya (Ken) Ostrikov and ShuyanXu, Plasma-Aided Nanofabrication: From Plasma
14. Sources to Nanoassembly, WILEY-VCH Verlag GmbH & Co. KGaA (Weinheim) (2007)
15. Cell & Molecular Biology- H. Baltimore, WH Freeman

16. The Cell A Molecular Approach‖-Geoffrey M. Copper, 2nd Edition, ASM press, Sinauer Associates, Inc., Washington, (2000)

17. Daniel, Molecular Cell Biology‖- Harvey Lodish, Arnold Berk, S.L Zipursky, Paul Matsudaira, David Baltimore and James 4th Ed., W.H Freeman and company, (2000).

18. Cell and Molecular Biology- E.D.P. De Robertis, and E.M.F De Robertis,. 8th Ed, Lippincott Williams and Wilkins, (2001).

19. Albert Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter.

M. Sc. Second Year
Semester-IV
BOTANY
DSE: II Plant Pathology-II

Lectures: 60 Maximum Marks: 100 Credits: 04 Course Code: P-PLP-470

Leering Objectives:

1. To analyse symptoms caused by Fungi, Bacteria, Viruses, Mycoplasma and Nematodes
2. To interpret mode of dissemination of plant pathogens.
3. To accesses the pathogenesis and disease forecasting.
4. To study the effects of infection on the host.

Course Outcomes:

The students will be able to:

1) Explain symptoms caused by Fungi, Bacteria, Viruses, Mycoplasma and Nematodes.
2) Discuss the mode of dissemination of plant pathogens.
3) Describe the pathogenesis and disease forecasting.
4) Identify the effects of infection on the host.

UNIT-I: INTRODUCTION TO PLANT PATHOLOGY (15L)

1. History: Beginning of modern plant pathology; Contribution of Anton De Bray; Benedict Prevost; J.C. Kuhn; Paul Neergaard, P.H. Geregory.History of the development of plant pathology in India; plant disease clinics.

2. Disease inciting agents:

i) Biotic agents: Bacteria, viruses, fungi, Mycoplasma, nematodes.
ii) Abiotic agents: Air pollution; mineral elements, temperature, toxic effects of improperly used chemicals.
iii) Symptoms of plant diseases: Symptoms caused by Fungi, Bacteria, Viruses, Mycoplasma and Nematodes.

4 Dissemination of plant pathogen: Dissemination by Air, Water, Buds, Insects, Man and transmission of plant viruses.

5 Economic importance of plant diseases.

UNIT-II: DISEASES OF CROP PLANT- I (15L)

Symptomology, causal organism, etiology and control measures of: -

1. Wheat: Stem rust.
2. Jowar: Head smut.
3. Arhar: Wilt.
4. Potato: Leaf spot (Cercospora).
5. Groundnut: Tikka.

6. Gram: Blight Disease.
7. Tomato: Broom rape (Orobanche).
8. Radish: Mosaic.
9. Citrus: Canker

UNIT-III: DISEASES OF CROP PLANTS II (15L)

Symptomology, causal organism, etiology and control measures of

1. Mango: Anthracnose.
2. Pea: Rust.
3. Sugarcane: Wilt.
4. Sugarcane: Whip Smut
5. Chilly: Leaf curl.
6. Mustard: White Rust
7. Crucifers: Black rot
8. Cucurbits: Fruit rot
9. Sugarcane: Gummosis
10. Giant mistletoes (Loranthus) – Mango

UNIT-IV: **EPIDEMIOLOGY AND FORECASTING OF PLANT DISEASES (15L)**

1. Epidemiology and forms of epidemics:

i) Compound interest diseases, simple interest, diseases slow and rapid epiphytotic.

ii) Essential conditions of epidemics, decline of epidemics.

iii) Disease measurement, disease severity, analysis of epidemics.

2.Disease assessment and forecasting.

3.Pathogenesis**:** Penetration and entry by plant pathogen; Pre-penetration; Entry through natural opening; Direct penetration; Entry through wounds, root hairs and buds**.**

4. Survivals of plant pathogen.

5. Effects of infection on the host:

i. Tissue disintegration.
ii. Effect on growth of host.
iii. Effect on reproduction
iv. Effect on uptake and translocation of water and nutrient
v. Effect on respiration of host.

Reference Book:

1. Plant Pathology- Agrios, G.N. (1969), Academic Press, New York.

2. Disease of crop plants in India- Rangaswami, G. and A. Mahadevan (2001) Printic Hall of India, Pvt. Ltd., New Delhi.

3. Disease of vegetable crops- Gupta, V.K. and V.S. Paul (2001), Kalyani Publ. Ludhiana,

4. Disease of fruit crops- Gupta, V.K. and S.K. Sharma (2000), Malyani Publ. Ludhiana.

5. Virus and Mycoplasma disease of plants in India- Raychaudhari, S.P. and T.K. Nariani (1977), Oxford and IBK Publ. Corp., New Delhi.

6. Plant viruses, unique and intriguing pathogens- Bos L. (1999), Backhugs Publ. Leiden.

7. Bacterial plant pathology Rangaswami, G. and S. Rajagopalan (1973), T.N. Agri. Uni.Coimbatore.

M. Sc. Second Year
BOTANY
Semester-IV
DSE III: Plant Pathology-III

Lectures :60 Maximum Marks: 100 Credits: 04 Course Code: P-PLP-471

Learning Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To analyse the effect of environment on pathogenesis.
3. To study the effect of toxins on plant tissues.
4. To interpret the genetic variability in plant pathogens.
5. To access genetics and molecular basis of host parasite interaction.

Course Outcomes:

The students will be able to:

1. Describe the genetic variability in plant pathogens.
2. Discuss the effect of environment on pathogenesis.
3. Explain the effect of toxins on plant tissues.
4. Explain genetics and molecular basis of host parasite interaction.

UNIT-I: EFFECT OF ENVIRONMENT ON PATHOGENESIS (15L)

1. Effect of environment, temperature, moisture, humidity, shade, wind, light, pH, O_2 and CO_2 concentration.

2. Role of Toxins in Plant pathogenesis: Pathotoxins, Vivo toxins and Phyto toxins.

3. Effect of toxins on plant tissues: Selective and non-selective toxins.

4. Seed Pathology: Scope and importance; seed health testing; methods and procedures; detection of seed borne-fungi, Bacteria and viruses. Seed bio deterioration: Biochemical changes, Morphological abnormalities, loss in germinability. Mycotoxins, fusarium toxin and aflatoxin. Control of Post-harvest spoilage of grains.

UNIT-II: DISEASES OF CROP PLANTS-I (15L)

Symptomology, causal organism and control measures of:

1. Sorghum: Long Smut.

2. Chilly: Die back.

3. Soyabean: Charcoal rot.

4. Potato: Stem canker.

5. Tomato: Fusarium Wilt

6. Wheat: Loose Smut

7. Sugarcane: Red Rot

8. Papaya: Leaf Curl

9. Potato: Black Heart.

10. Potato/Flax: Dodder or Cuscuta.

UNIT-III: DISEASES OF CROP PLANTS-II (15L)

Symptomology, causal organism and control measures of:

1. Crucifers: Black spot.
2. Sorghum: Loose smut.
3. Bean: Rust
4. Wheat: Brown Rust.
5. Cucurbits: Powdery mildew.
6. Grapes: Downy mildew.
7. Potato: Late Blight
8. Wheat: Ear cockles.
9. Sugarcane: Mosaic
10. Sandal: Spike.

UNIT- IV: GENETIC VARIABILITY (15L)

1. Genetic Variability in plant pathogen:
- **i** Genetic Variability in viruses
- **ii** Genetic Variability in Fungi
- **iii** Level of variability in pathogen
- **iv** Loss of virulence

2. Genetics and molecular basis of host parasite interaction:
- **i.** Evolution of parasitism.
- **ii.** Genetics of host parasite interaction.
- **iii.** Gene for gene relationship.
- **iv.** Criteria for gene for gene relationship.
- **v.** Molecular basis of host parasitic interaction.

3. Physiologic specialization: General accounts.

Reference Book:

1. Recent advances in plant pathology- Chandnivala, M. (1955). Amol Publication, Pvt. Ltd.,
2. Pollution and their ecotoxicological significance- Nurenburg, H.W. (1985), John Wiley and Sons, New York.
3. Plant Pathology- Mehrotra, R.S. Tata McGraw Hill Publication Co., Ltd., New Delhi.
4. Plant Pathology- Agrisos, G.N., Academic Press, New York and London.
5. A text book of Modem plant pathology- Bilgrami, K.S. and H.C. Dubey, Vikas Publishing House, New Delhi.
6. Fungicides in plant disease control - Nene, Y. and P.N. Thaphyal II lidiv Oxford and IBH Publishing Co., New Delhi
7. Systemic fungicides- Vyas, S.C. Vol. 1 - 3, Tata Mc(Jrnw Hill Publishing Co., Ltd., New Delhi.
8. Pesticides and crop plant in India- Gangawane, L.V. and Jayashree Deshpande,Ajay Prakashan, Aurangabad.

M. Sc. Second Year
Semester –IV
BOTANY
Lab course –XIII

(Based on Paper XIII and XIV)

Periods – 48 Maximum Marks – 50 Credits: 02 **Course Code: P-LAC-472**

Learning Objectives:

1. To analyse the effect of mutagens on crop plants of M1 and M2 population.
2. To interpret the linear differentiation of chromosomes through banding techniques.
3. To prepare the Synthetic seeds.
4. To know the various techniques involved tissue culture.

Course Outcomes:

The students will be able to:

1 Describe the effect of mutagens on crop plants of M1 and M2 population.
2 Explain the linear differentiation of chromosomes through banding techniques
3 Prepare the Synthetic seeds.
4 Discuss the various techniques involved tissue culture.

Paper-XII PRACTICALS:

1.Preparation of stains, Fixatives, preservatives and pretreatments to plant material.
2.Problems on determination of blood grouping
3.Problems based on Multiple alleles.
4.Problems based on Gene mapping.
5.Problems based on linkage.
6.Study of meiotic configuration from suitable plant material.
7.Study of chromosomal aberrations in irradiated plant material.
8.Study of Polygenic inheritance.
9.Problems of Mendelian inheritance and estimation of gene frequencies and heterozygotic frequencies, population genetics and Linkage.
10.Neurospora tetrad analysis.
11.Linear differentiation of chromosomes through banding techniques such as C-Banding,G-Banding and Q-Banding.
12.Floral Biology, study of Pollen Viability, germination in vitro and staining of any two major crops.
13.Study of monohybrid and dihybrid crosses and interactions.
14.Study of quality traits in rice, cotton/wheat/soybean/Brassica.
15.Use of Colchicine for induction of polyploidy in appropriate plant material.
16.Demonstration of techniques of hybridization.
17.Effect of physical or chemical mutagens on crop plants of M1 and M2 population.

18.Visit to research institutes / Biotechnology/ Tissue culture laboratories / Agriculture Universities.

Paper XIV Plant Biotechnology & Genetic Engineering

1. Sterilization Techniques.
2. Preparation of stock solutions.
3. Preparation of Media MS Medium.
4. Surface sterilization of explants.
5. Characterization of Callus.
6. Protoplast isolation.
7. Preparation of Synthetic seeds.
8. Growth characteristics of E. coli using platting & turbidiometric method.
9. To detect mutants variant of a given platting techniques.
10. Isolation of plasmid from E. coli by enzymatic method.
11. Effect of temperature and alkali on absorption of DNA: hyperchromicity
12. Isolation of RNA and its quantification.
13. Visit to Plant tissue culture laboratory.

N.B: 1) Any ten Practical's.
2) Several Short Excursions and at least one Long Excursion

M. Sc. Second Year
Semester –IV
BOTANY
Lab course – XIV (Based on theory paper XV and XVI)

Periods – 48 Maximum Marks – 50 Credits: 02 **Course Code: P-LAC-473**

Learning Objectives:

1. To analyse the symptoms of different plant pathogens.
2. To interpret the relationships between plant host and pathogens.
3. To detect the different seed born plant pathogens.
4. To access macerating enzymes.

Course Outcomes

1) Describe the symptoms of different plant pathogens.
2) Explain the seed born different plant pathogens.
3) Discuss the relationships between plant host and pathogens.
4) Identify the macerating enzymes.

Practicals: Based on theory paper XV Plant Pathology-II

1. Extraction and estimation of pigments in healthy and diseased plants.
2. Detection of sugars from healthy and infected leaves by paper chromatography.
3. Production and assay of macerating enzymes.
4. Production and assay of polygalacturonate, cellulolytic enzymes, amylase.
5. Estimation of plant pigment from diseased and healthy plants
6. Detection of sugars from healthy and diseased leaves by paper chromatography.
7. Estimation of total phenol from diseased plant part.
8. Extraction and separation of alpha toxins

9-20. Symptomology, histopathology of disease given in theory.

21. Visits to fields for study of diseases.

Practicals: Based on theory paper XVI Plant Pathology-III

1. Detection of seed borne-fungi and Bacteria.
2. Evaluation of fungicide against plant pathogenic fungi.
3. Evaluation of Bioagents against plant pathogenic fungi
4. Evaluation of antibiotics against pathogenic bacteria.
5. Extraction and estimation of pigments in healthy and diseased plants.
6. Isolation of plant pathogen from infected plant parts.
7. Preparation of nutrient agar medium and PDA.
8. Study of common effect of pollutants –So2, No and NH3 on leaves of common crop plants.
9. Estimation of protein from infected seeds.

10-20. Symptomology, histopathology of disease given in theory.

21. Visits to fields for study of diseases.

N.B: 1) Any ten Practicals
2) Several Short Excursions and at least one Long Excursion.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

M.Sc. II

Semester End Examination

Skeleton of Question Paper

Botany Theory Paper- (Sem III and IV)

Time: 02.30 Hours **Maximum Marks: 60**

Note: **i)** Attempt all questions.
ii) Draw neat and well labeled diagrams wherever necessary.

Q1. Attempt any FOUR of the following (Each 5 marks) **20**
(At least 1 question on each unit)

a)
b)
c)
d)
e)

Q2. Attempt any TWO of the following **20**
(2 questions on unit 1 &2)

a)
b)
c)
d)

Q3. Attempt any TWO of the following **20**
(Questions on unit 3 & 4)

a)
b)
c)

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