

**RAJARSHI SHAHU MAHAVIDYALAYA (Autonomous),
LATUR**

DEPARTMENT OF BOTANY

Course Structure of M.Sc. Botany Syllabus (CBCS)

To be implemented from June 2017 (Semester I and II)

And from June 2018 (Semester III and IV)

M.Sc.-I

Semester	Course No.	Course Title	L/P	Marks			Credits
				Internal	External	Total	
I	BO 1.1	Instrumentation and Biostatistics	60	40	60	100	04
	BO 1.2	Diversity of Microbes and Cryptogams.	60	40	60	100	04
	BO 1.3	Plant Biochemistry	60	40	60	100	04
	BO 1.4	Plant Ecology and Evolution	60	40	60	100	04
	BOLC-I	Based on theory paper BO 1.1 and BO 1.2	15	40	60	100	04
	BOLC-II	Based on theory paper BO 1.3 and BO 1.4	15	40	60	100	04
		Students Seminars				25	01
				Total	625	25	
II	BO 2.1	Diversity of Pteridophytes, Gymnosperms and Fossil Plants.	60	40	60	100	04
	BO 2.2	Cell Biology	60	40	60	100	04
	BO 2.3	Plant Physiology and Metabolism	60	40	60	100	04
	BO 2.4	Plant Structure Development & Reproduction in Angiosperms	60	40	60	100	04
	BOLC-III	Based on theory paper BO 2.1 and BO 2.2	15	40	60	100	04
	BOLC-IV	Based on theory paper BO 2.3 and BO 2.4	15	40	60	100	04
		Students Seminars				25	01
				Total	625	25	
Total						1250	50

Grand Total of Marks and Credits -1250/50 BO=Botany, BOLC=Botany Laboratory Course,

L/P=Lectures / Practicals

M.Sc.-II

Semester	Course No.	Course Title	L/ P	Marks			Credits
				Internal	External	Total	
III	BO 3.1	Angiosperms Systematics	60	40	60	100	04
	BO 3.2	Molecular Biology	60	40	60	100	04
	BO 3.3	Plant Nanotechnology and Forensic Botany	60	40	60	100	04
	BO 3.4	Plant Pathology-I/ Genetics-I/ Plant Biotechnology- I	60	40	60	100	04
	BOLC-V	Based on theory paper BO 3.1 and BO 3.2	15	40	60	100	04
	BOLC-VI	Based on theory paper BO 3.3 and BO 3.4	15	40	60	100	04
		Students Seminars				25	01
					Total	625	25
IV	BO 4.1	Cytogenetics and Plant Breeding	60	40	60	100	04
	BO 4.2	Plant Biotechnology and Genetic Engineering	60	40	60	100	04
	BO 4.3	Plant Pathology-II / Genetics-II / Plant Biotechnology-II	60	40	60	100	04
	BO 4.4	Plant Pathology-III / Genetics -III/ Plant Biotechnology-III	60	40	60	100	04
	BOLC-VII	Based on theory paper BO 4.1 , BO 4.2 &BO 4.3 , BO4.4	15	40	60	100	04
	BOLC-VIII	Project / Dissertation				100	04
	Students Seminars				25	01	
				Total	625	25	
				Total	1250	50	

Grand Total of Marks and credit-1300/52

Total Marks of All Semesters -**2500**

Total Credits of All Semesters -**100** BO = Botany BOLC = Botany Laboratory Course L/P = Lectures/Practicals

Head

BO 3.1 Angiosperms Systematics

Credits : 4

Lectures : 60

Objectives :

1. To understand the complex optical devices, key concept and application.
3. To obtain most conclusive results.
4. To provide platform to develop computational biological methods.
5. Provide training in scientific and transferable skills through modular lecture courses.
6. Provide knowledge to distinguish species on morphology and anatomy basis.
7. They will be able to perform sectioning of various ovules.
9. Able to develop approach for embryology study.

Credit - I: Modern Trends in Taxonomy:

1. Aims, principles and practices in taxonomy. Botanical Nomenclature: Brief history, Scientific names, ICN, Principles, typification, Principle of priority, effective and valid publication, rank of taxa.
2. Tools of taxonomy: Floras, monographs, revisions, websites. Herbarium and botanical gardens, their role in teaching, research and conservation, important herbaria and botanic gardens of the World. Botanical Survey of India.
3. Floristics : Need and significance. History of botanical exploration in india and recent works with special emphasis on Maharashtra. Botanical Survey of India.
4. Morphological features used in identification. Artificial dichotomous keys.
5. Biodiversity, types, importance and methods of conservation.
6. Taxonomic Structure: Taxonomic hierarchy, The species concept, Categories and ranks Principles & methods of taxonomy:
7. Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms.
8. Taxonomy in relation to morphology and anatomy.

Credit- II: Classification System:

1. Importance and need for classification, hierarchical classification. Criteria used for classification;
Phases of plant classification. Overview on pre- and post-Darwinian systems of classification.
2. Artificial systems of classification - Theophrastus, Linnaeus.
3. Natural system of classification - Bentham and Hooker.
4. Phylogenetic systems of classification – Takhtajan.
5. APG system of classification, contributors, A .P.web.
6. Plant Speciation: Allopathic / Abrupt / Sympatric / Hybrid / Apomictic speciation, Isolating mechanisms.

Credit- III: Study of Families-I-Dicotyledons (Polypetalae & Gamopetalae):

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

Polypetalae:

1. Ranales – Magnoliaceae, Anonaceae.
2. Parietales – Papaveraceae, Cruciferae.
3. Malvales- Malvaceae, Tiliaceae.
4. Geraniales- Geraniaceae, Rutaceae.

Gamopetalae:

5. Rabiales – Rubiaceae, Caprifoliaceae.
6. Asterales – Asteraceae.
7. Personales- Acanthaceae ,Bignoniaceae.
8. Lamiales –Labiatae, Verbenaceae.

Credit - IV: Study of Families-II: Dicotyledons (Apetalae) & Monocotyledons:

(Systematic composition, general characters, distinguishing features. floral formula and diagram, economic importance) 8 families.

Apetalae:

1. Curvembryae – Amarantaceae, Chenopodiaceae.
2. Micrombryae – Piperaceae.
3. Unisexuales – Euphorbiaceae, Casuarinaceae.

Monocotyledonae:

4. Microspermae- Orchidaceae.
5. Epigynae – Scitamineae, Amaryllidaceae, Zingiberaceae.
6. Coronarieae – Liliaceae, Commelinaceae.
7. Nudiflorae – Typhaceae, Araceae.
8. Cyperales - Cyperaceae .

Reference Books:

1. Agashe, S.N. 1995. Paleobotany, Oxford and IBH Publ. Co. Pvt. Ltd, New Delhi.
2. Bhojwani, S.S. and Bhatnagar, S.P. 1984. Embryology of Angiosperms. Vikas Publ. House, New Delhi.
3. Briggs, David. 2009. Plant microevolution and Conservation in Human-influenced Ecosystems. Cambridge University Press.
4. Cooke, T. 1903-1908. The Flora of Presidency of Bombay, Vol. I-III.
5. Cronquist, A. 1981. An Integrated System of Classification of Flowering Plants. Columbia University Press, New York.
6. Cronquist, A. 1988. The Evolution and Classification of Flowering Plants (2nded.) Allen Press, U.S.A.
7. Davis, P. H. and V. H. Heywood 1991. Principles of Angiosperm Taxonomy. Today and Tomorrow Publications, New Delhi.
8. Eames A.J. 1961. Morphology of Angiosperms, McGraw Hill Book Co.
9. Erdtman, G. 1966. Pollen Morphology and Plant Taxonomy of Angiosperms (An introduction to Palynology I), Hafner Pub.Co. London.
10. Fahn, A. 1979. Plant Anatomy, Pergamon Press, London.

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

30. Simpson, M.G. 2010. Plant Systematics. Elsevier, Amsterdam.
31. Singh G. 2004. Plant Systematics, 2nd edn, Oxford and IBH, New Delhi.
32. Sivarajan, V.V. 1984. Introduction to Principles of Plant Taxonomy, Oxford and IBH, New Delhi.
33. Smith, P. M. 1976. The Chemotaxonomy of Plants, Edward Arnold Pub.Ltd.
34. Sporne, K. R. 1974. Morphology of Angiosperms, Hutchinson University Library, London.

B.O 3.2 Molecular Biology

Credit: 4

Lecture: 60

OBJECTIVES:

1. To acquire good knowledge about molecular biology
 2. To acquire good knowledge about chemistry of active constituents of medicinal plants.
 3. To know the techniques of Molecular biology.
 4. Develop understanding about inheritance Biology.
 5. Solve problems independently on Genetic disorder.
 6. To understand Gene related diseases & its control.
 7. To prepare karyotype and Idiogram and their significance.
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dit- I: DNA structures & topology:

1. DNA structure Types of base pairing, unusual structures, topology, split gene. pseudogene, overlapping gene, cryptic gene Jumping gene (transposons).
2. Melting and reassociation of DNA, Cot curves and kinetic complexity of DNA. Organization of genomes (from whole genome sequences), repetitive and unique sequences, C-value paradox, gene duplication and divergence. Number of genes, exons. Rot curves and gene expression.
3. Packaging of genomes in viruses, bacteria, organelles and nuclei. Structure of chromatin, nucleosome positioning. Histone modifications. Chromosome organization, centromeres, telomeres, specialized chromosomes.
4. Initiation, elongation and termination of DNA replication, molecular machinery of DNA replication in prokaryotes and eukaryotes.
5. DNA damage and repair.
6. Molecular mechanism of recombination and transposition.

Credit- II : RNA structure and processing:

1. RNA structure – Modified bases, pairing, secondary structure.
2. Transcription units, RNA polymerases, initiation, elongation and termination of transcription in

prokaryotes and eukaryotes, proof reading.

3. RNA processing – Processing of tRNA, rRNA and mRNA. mRNA localization.

4. Non-coding RNAs, ribozymes and riboswitches.

Credit- III : Protein Synthesis:

1. Protein synthesis – The genetic code ,t-RNA charging, ribosomal organisation. Initiation, elongation and termination of protein synthesis in prokaryotes and eukaryotes. Antibiotics used in inhibition of protein synthesis. Proof reading.

2. Post-translational processing of proteins, protein modifications. Chaperones and protein folding.

3. Proteases. Ubiquitination and degradation of proteins by proteasomes.

4. Targeting of organelle and secretory proteins. Localisation of membrane proteins.

5. Seed-storage proteins and their genes in cereals and legumes.

Credit - IV Regulation of gene expression:

1. Regulation of transcription - Operons, repressors and inducers, positive and negative control, regulation of lytic and lysogenic cycles in phages.

2. Transcription factors in eukaryotes, response elements. Post-transcriptional regulation.

3. Regulation of gene expression at higher levels of genome organization, chromatin remodeling, locus control regions, enhancers and insulators.

4. Regulation of protein synthesis, post-translational regulation, regulation of protein function.

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,

Garland Publishers, 1999.

Principles of Biochemistry – Lehninger, W.H. Freeman and Company, 2005

B.O.3.3 Plant Nanotechnology and Forensic Botany

Credit : 4

Lecture : 60

OBJECTIVES :

1. Understand and appreciate the scope of forensic biology.
2. Understand and appreciate the scope, diversity and utility of a variety of DNA typing techniques.
3. Perform the primary technique used in Forensic DNA analysis: PCR.
4. To study Perform post-PCR Processing.
5. After studying this paper the students will know –. The significance of forensic science to human society.
6. To Study the fundamental principles and functions of forensic science.
7. TO know the divisions in a forensic science laboratory.
8. To know the working of the forensic establishments in India and abroad

Credit- I: Plant Nanotechnology and Its Concepts:

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-Nanotechniques for Plant Availability of Nutrients
5. Utilization of Nanoparticles for Plant Protection
6. Nanotechnology in Soil-Plant System

Credit - II : Bio-sensors & Biogenic Methods of Synthesis of Nanomaterials:

1. Nature in the construction of Nano-scale biosensor devices and motors: ATP synthesis is an anomotor with 100% thermodynamic efficiency., bacterial flagella & its energetic momentum.
2. DNA and protein's use as actuators, chips, sensors and electronic circuits.
3. Properties of living organisms such as to combat deleterious effect of heavy metals in high concentrations; resistance against metals by modulation of their transport, active efflux, redox changes and Sequestration and intracellular compartmentation into detoxified complexes, biogenic synthesis by (i) bacteria, (ii) fungi, (iii) algae and (iv) plants

Credit- III: Introduction to Forensic Botany:

1. Introduction to forensic botany. Botanical evidence on legal investigations. Legal plant definition. Botanical evidence in legal investigations
2. Introduction to Forensic Botany
3. The Use of Botanical Evidence in Criminal Investigations.

Credit- IV : Evidence collection and analysis:

1. Documentation of botanical evidence
2. How to have botanical evidence analyzed
3. Evidence analysis
4. Laboratory report
5. Collection information needed for each botanical sample
6. Evidence retention and disposition
7. Fundamentals of wildlife forensic. Significance of wildlife forensic. Protected and endangered species of plants.

Reference Books :

1. L. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, New York (1988).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry,
3. APPLETON & Lange, Norwalk (1993).
4. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
5. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jersey (1993).
6. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic
7. Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
8. Edelestein A.S and Cammarata RC, Nano materials synthesis, properties and applications:
9. Michael Kohler, Wolfgang Fritzsche, Michael Kohler, Wolfgang Fritzsche,
10. Nanotechnology-An Introduction to Nano structuring Techniques Wiley (Practical)
11. Brian Robinson, Self-Assembly,IOS Press
12. Tai Ran – Hsu, MEMS and Microsystems, Design, Manufacture and Nanoscale
13. Engineering, John Wiley & Sons, 2008.
14. M. Gentili, C. Giovannella, S. Selci, Nanolithography: A Borderland between STM, EB, IB
15. and X-Ray Lithographies (NATO ASI Series), Kluwer Academic Publishers, 1994.
16. Nicholas A. Kotov, Nanoparticle Assemblies and Superstructures, CRC, (2006).

17. Guozhong Cao, Nanostructures & Nanomaterials Synthesis, Properties G; Z, Applications, World Scientific Publishing Pvy. Ltd., Singapore 2004
18. Zheng Cui, Nanofabrication, Principles, Capabilities and Limits, Springer Science + business media, New York (2008).
19. Kostya (Ken) Ostrikov and Shuyan Xu, Plasma-Aided Nanofabrication: From Plasma Sources to Nanoassembly, WILEY-VCH Verlag GmbH & Co. KGaA (Weinheim) (2007)
20. H. Baltimore, WH Freeman, Cell & Molecular Biology
21. Kimball T.W., Cell Biology, Wesley Pub
22. Geoffrey M. Cooper, The Cell A Molecular Approach; 2nd Edition, ASM press, Sinauer Associates, Inc., Washington, (2000)
23. Harvey Lodish, Arnold Berk, S.L Zipursky, Paul Matsudaira, David Baltimore and James Daniell, Molecular Cell Biology; 4th Ed., W.H Freeman and company, (2000).
24. E.D.P. De Robertis, and E.M.F De Robertis, —Cell and Molecular Biology. 8th Ed., Lippincott Williams and Wilkins, (2001).
25. Alberts Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter, C. Bre´chignac P. Houdy M. Lahmani, Nanomaterials and Nanochemistry, Springer. Heidelberg, Germany (2006).
26. Kenneth J. Klabunde, Nanscale materials in chemistry, Wiley Interscience Publications (2001).
27. Hans Lautenshlager, Emulsions, Kosmetik International, (2002).
28. Roque Hidalgo-Alvarez, Structure and Functional properties of Colloids, CRC Pre

B.O.3.4 Plant Pathology-I

Credit : 4

Lecture : 60

Objectives:

1. To awaken the students about microbial world and the nature of diseases of plants.
 2. To understand the principles and concept in plant pathology.
 3. To understand the relationships between pathogens and plants.
 4. To become familiar with terms and references used to diagnose plant disease.
 5. To develop the awareness about the importance of plant disease in human life.
 6. To learn the basic biology of major groups of plant pathogens.
 7. To explain the concept of plant disease and disease pyramid.
 8. To describe main modes of plant disease transmission.
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Credit- I: Introduction to Plant Pathology:

1. Scope and Importance of Plant Pathology; Contributions of E.F .Smith E. C.S takman, S. D.Garrett, E. J. Butler, K.C.Mehta, M.J. Thirumalachar, in the field of plant pathology.
2. Development of Plant Pathology as a Profession , Careers in Plant Pathology The Practice and Practitioners of Plant Pathology. Certification of Professional Plant Pathologists . Plant Pathology as a Part of Plant Medicine; the Doctor of Plant Medicine Program.
3. Aerobiology: Scope and applications of aerobiology. Air borne pathogens, Methods for detection of Aerospora.

Credit- II :Host resistance, Disease management and control of diseases:

1. Plant defenses: Non-host and host resistance.
2. Pre-existing and induced structural and chemical defenses.
3. Defense signaling network: R genes, role MAPK cascade, Transcription factors and PRPs.
4. Pathogenicity genes, avirulence genes, effector molecules.
5. Diagnostic methods for detecting pathogens.
6. Control of disease using fungicides and other chemicals .
7. Biocontrol agents for controlling disease.

8. Disease control using biological and chemical activators of resistance.

Credit - III : Diseases of crop plants – I:

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

1. Rice:- Blast disease .
2. Jowar :- downy mildew, Leaf Spot
3. Wheat:- Yellow Rust
4. Bajra:- Brown Rust, Covered Smut
5. Pigeonpea :- Leaf Spot
6. Tomato :- Early Blight.
7. Bhendi :- Powdery Mildew
8. Brinjal :- Leaf Spot.
9. Chilly :- Anthracnose, Fruit Rot.
10. Onion :- Smut.
11. Potato :- Wart Disease .
12. Gram :- Blight disease.

Credit- IV: Disease of crop plants – II:

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

1. Banana :- Panama disease, Leaf Spot Disease.
2. Grapes :- Powdery Mildew.
3. Coconut :- Bud Rot, Root Wilt.
4. Papaya :- Stem rot, Damping off.
5. Citrus :- Greening disease.
6. Sugarcane :- Grassy Shoot, Ring spot
7. Cotton :- Root rot.
8. Sunflower :- Rust.
9. Groundnut :- Rust
10. Sesamum :- Blight, Leaf Spot
11. Mango :- Bacterial leaf spot

Reference Books:

1. Agrios, G. N. 2006: Plant Pathology, 5th Edition
2. Aneja, K. R. 1993. : Experiments in Microbiology, plant pathology and Tissue culture
3. Cooke, A. A. 1981. Diseases of Tropical and Subtropical field, Fiber and oil plants
4. Gangopadhyay , S. 2004: Clinical Plant Pathology

5. Kuijtt, J. 1969: The Biology of parasitic flowering plants.
6. Mahadevan, A. and R. Shridhar, 1982. Methods in physiological plant pathology
7. Agarwal A. and Mehrotra, R. S. 2012: Plant Pathology
8. Nyvall, R. F. 1979 : Field Crop Diseases Handbook
9. Paul Khurama, S. M. 1998: Pathological Problems of Economic crop plants and their management
10. Planke, J. E. ander, 1968: Disease Resistance in plants.
11. Planke, J. E. Vander. 1963: Plant Diseases Epidemics and control
12. Rangaswami, G. 1979: Diseases of crop plants in India
13. Singh, R. S. 2009: Plant Diseases, 9th Edition
14. Current and back – Volumes of following periodicals:
 - I. Journal of phytopathology
 - II. Indian journal of phytopathology
 - III. Journal of Mycology and plant pathology
 - IV. Annual review of plant pathology.

PRACTICAL

Lab course – V: Based on theory paper BO 3.1 and BO 3.2

PRACTICALS : Based on BO 3.1

- 1-8. Study of at least 16 locally available families of flowering plants of genus and species family.
9. Identification of genus and species of locally available wild plants.
10. Comparative account of karyotypic analysis.
11. To study of pollen morphophytes of different family.
12. Study of fossil angiosperms of India with the help of slides and specimens.
- 13-16. Study of floral biology, visitations by pollinators, pollen viability, self and cross pollination, seed set of any two species.
17. Atleast two short excursion of one two days each and one long excursion of five days. (N.B. Each short excursion corresponds to two practicals and one long excursion 6 practicals).

(Any Ten Practical)

PRACTICALS : Based on BO 3.2

1. Isolation of plasmid DNA and quantification
2. Electrophoretic separation of plasmid isoforms
3. Restriction digestion of plasmid DNA, electrophoresis and molecular weight determination of DNA fragments.
4. Isolation of plant genomic DNA and quantification
5. Effect of temperature and alkali on absorbance of DNA – hyperchromicity
6. Separation of SSP from leguminous seed & quantitation of each fraction
7. SDS-PAGE separation of seed storage proteins from legumes.
8. Determination of molecular sizes of the globulin subunits.
9. Isolation of DNA from plants and Estimation by DPA method
10. Isolation of RNA and Estimation of RNA by orcinol method
11. Visit to Biotechnology Research center.
12. Isolation of DNA from various sources
13. Determination of Electrical conduction of DNA

14. Isolation and separation of cell organelles
15. 2D- Electrophoresis technique for separation of proteins
16. Synthesis of Gold Nanoparticles by biogenic methods
17. Synthesis of Silver Nanoparticles by biogenic methods
18. Isolation of enzymes involved in biosynthesis of nanomaterials

(Any Ten Practicals)

PRACTICALS: lab course –VI Based on theory paper BO 3.3 and BO 3.4

(Practicals Based on theory paper BO 3.3)

1. Synthesis of micelles and inverse micelles.
2. Synthesis of dendrimers.
3. Preparation of thiolated silver nanoparticles
4. Synthesis of Gold Nanoparticles by chemical and biogenic methods
5. Zinc selenide quantum dot preparation.
6. Synthesis of Iron Oxide Nanoparticle
7. Thin film preparation by spin coating technique.
8. Synthesis of Nickel metal nanoparticle by urea decomposition method
9. Synthesis of Zinc Oxide nanoparticle
10. Preparation of nanoparticles by using Ball milling
11. To carry out microscopic examination of pollen grains.
12. To carry out microscopic examination of diatoms.
12. To cite a crime case in which diatoms have served as forensic evidence.

(Any Ten Practicals)

(Practicals: Based on theory paper BO 3.3)

- 1-15 practicals based on credit III & IV
- 16-18 Estimation of chlorophylls, sugars and polyphenols from healthy and infected leaves.
19. Isolation and identification of plant pathogens from air over infected field
20. Use of Aerobiological technique to study fungal flora of different localities by Tilak air Sampler
21. Study of rhizosphere mycoflora from different soil samples of infected and healthy plants by serial dilution technique

22. Effect of temperature on growth of plant pathogenic fungi

23. Effect of pH on growth of plant pathogenic fungi

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

(Any Ten Practicals)