शहीद नंदकुमार पटेल विश्वविद्यालय,रायगढ़ (छ.ग.)

SEMESTER SYLLABUS
M.Sc. BOTANY

SCHEME OF EXAMINATION & DISTRIBUTION OF MARKS

SEMESTER - I

Paper No.	Title of the Paper (s)	Nature	Internal Assessment	Term end Exam	Total Marks
1.	Biology & Diversity of Virus Bacteria & Fungi	Theory	20	80	100
2.	Biology &Diversity Of Algae, Bryophytes And Pteridophytes	Theory	20	80	100
3.	Cell And Molecular Biology of Plants	Theory	20	80	100
4.	Taxonomy Of Angiosperms	Theory	20	80	100
Lab-1	Based On Paper I&II	Practical	-	-	100
Lab-2	Based On Paper III&IV	Practical	-	-	100
				Total	**600**

SEMESTER - II

Paper No.	Title of the Paper (s)	Nature	Internal Assessment	Term end Exam	Total Marks
1.	Cytology ,Genetics And Cytogenetics	Theory	20	80	100
2.	Biology & Diversity Of Gymnosperm species	Theory	20	80	100
3.	Plant Physiology	Theory	20	80	100
4.	Plant Biochemistry And Bioenergetics	Theory	20	80	100
Lab-1	Based On Paper I&II	Practical	-	-	100
Lab-2	Based On Paper III&IV	Practical	-	-	100
				Total	**600**

SEMESTER - III

Paper No.	Title of the Paper (s)	Nature	Internal Assessment	Term end Exam	Total Marks
1.	Plant Development	Theory	20	80	100
2.	Plant Reproduction	Theory	20	80	100
3.	Plant Ecology	Theory	20	80	100
4.	Elective Paper (A) Plant Pathology - I (B) Weed Biology- I	Theory	20	80	100
Lab-1	Based On Paper I&II	Practical	-	-	100
Lab-2	Based On Paper III&IV	Practical	-	-	100
				Total	**600**

SEMESTER SYLLABUS
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SEMESTER - IV

Paper No.	Title of the Paper (s)	Nature	Internal Assessment	Term end Exam	Total Marks
1.	Plant cell, Tissue and organ culture	Theory	20	80	100
2.	Plant Resource Utilization And Conservation	Theory	20	80	100
3.	Genetic Engineering Of Plant And Microbes &Biostatics	Theory	20	80	100
4.	Elective Paper (A) Plant Pathology –II (B) Weed Biology- II	Theory	20	80	100
Lab-1	Based On Paper I&II	Practical	-	-	100
Lab-2	Based On Paper III&IV	Practical	-	-	100
				Total	**600**
				GRAND TOTAL	**2400**

SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER- I
PAPER - III
CELL AND MOLECULAR BIOLOGY OF PLANTS

UNIT -1

The Dynamic Cell: Structural organization of plant cell, specialized plant cell types, chemical foundation and biochemical energetic.

Cell Wall: Structure and function, biogenesis and growth.

Plasma Membrane : Structure ,Models of plasma membrane ,function ,site of ATP aces ,ion carrier ,channels and pumps ,receptor s, plasmodesmata and its role in movement of molecules .

UNIT 2

Chloroplast: Structure, genomeorganization, geneexpression, nucleo- chloroplastic interaction.

Mitochondria: Structure, genomeorganization, biogenesis&function.

Other cell organelles: Structure and function of micro bodies, Golgiapparatus, endoplasmic reticulum and Lysosomes.

UNIT 3

Ribosomes: structure site of protein synthesis, mechanism of translation – initiation, elongation and termination.

Plant Vacuoles: Tonoplast, membrane ATPase, transporter, function as storage organelle.

Nucleus: Structure ,nuclear pore, nucleosome ,organization , DNA Structure, A, B&Z Forms of DNA ,DNA replication ,damage & repair ,transcription ,splicing of mRNA ,mRNA transport , nucleolus ,r RNA biosynthesis & Structure ,role of t RNA.

UNIT 4

Cell shape and Motility: The cytoskeleton, organization and role of microtubules and microfilament, motormovement, implications of flagellar and other movements.

Cell cycle and Apoptosis: Karyokinesis – mitosis and Meiosis, role of cyclins and cyclin dependent kinases, cytokinesis is and cell plate formation, mechanism of programmed cell death (PCD)

Suggested Reading:

1. Lewin ,B. (2005) Gene VIII oxford University Press , New york ,USA
2. Robertis, D. And Robertis ,D.cell Biology .
3. Wolfe, S.L. (1993) Molecular and Cellular Biology. Wadsworth Publishing Co, California, USA.
4. Gupta P.K. (2007) Cell and Molecular Biology, Rastogi Publication, Meerut, India.
5. Lodish H. Berk .A. Zipurski ,S.L. Matsudarria ,P. Baltimore ,D. and Dameli ,j(2000) Molecular cell Biology W.H. Freeman and co, New York ,USA.

Suggested Laboratory Exercise:

1. Isolation of mitochondria from plant Cells.
2. Measurements of activity of mitochondrial Marker enzyme succinate dehydrogenase.
3. Isolation of plant DNA.
4. Quantitative measurement of DNA by spectrophotometric method.
5. Techniques of differential staining methods of cell organelles.
6. Study of differentially stained plant cell.
7. Study of different stages of mitosis.
8. Preparation of Karyotype of Alium Cepa .
9. Study of different stages of meiosis.
10. Study of chiasmata frequency and terminalisation coefficient in A. cepa and Flox .

SEMESTER SYLLABUS
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SEMESTER- I
PAPER - I
BIOLOGY AND DIVERSITY OF VIRUS, BACTERIA AND FUNGI

UNIT -1

Archaebacteria and Eubacteria : General account ,ultrastructure ,nutrition and reproduction ,biology and economic importance , cyanobacteria – salient feature and biological importance .

UNIT -2

Viruses: Characteristics and ultra structure of virions, isolation and purification of viruses, chemical nature, replication, transmission of viruses' economic importance.

Mycoplasma : General characteristics and role in causing plant diseases.

UNIT -3

Mycology

General characters of fungi ,cell ultra structure ,unicellular and multicellular organization ,cell wall component ,nutrition (Saprobic, biotrophic and symbiotic),reproduction (vegetative ,asexual, sexual) ,hetrothalism, haterokaryosis, parasexuality, recent trends in classification.

UNIT -4

Phylogeny of fungi ,general account of mastigomycotina, Zygomycotina, Ascomycotina ,Basidomycotina, Deuteromycotina ,fungi in industries ,medicine and as food fungal diseases in plant and humans, mycorrhyzae, fungi as biocontrol agent.

Suggested Reading

1. Pelczar, M.J. chan E.C.S. and krieg N.R. (2005) .Microbiology. Tata McGraw Hill, New Delhi.
2. Dubey R.C. and Maheshwari, D (2000) MicrobiologyS.Chand and Company Ltd Delhi.
3. Schelegel, H.G. (1995) General Microbiology .Cambridge university Press U.K.
4. Cliffton, A.(1958) .Introduction to Bacteria . McGraw Hill book co. New York.
5. Mandahar, C.C. (1978) Introduction to plant Viruses .S. Chand and Co.Ltd. Delhi
6. Allaxopoulus,C.jMims,C.W. and Blackwell,m(1996) Introductory Mycology,Johnwilley&sonsInc.Newyork.
7. Mehrotra R.S. and Aneja R.S. (1998) an Introduction to Mycology New age Intermediate Press, NewDelhi.
8. Webster, J. (1985) Introduction to Fungi Cambridge University Press, UK.

Suggested Laboratory Exercise :

- Morphological studies of representative of fungi –Perenospora ,Ablugo , Mucur ,Pilobolus Yeast , Emerciella, chaetomium ,Morchella ,Melampspora, polyporus , Drechslera ,phoma, Penicillium , Aspergillus, Collectotrichum .
- Identification of fungal culture –Rhizopus,penicilliumCurvularia, Fasarium ,.
- Study of different form of bacteria, gram staining of bacteria .
- Symptomology of some diseased specimen : White rust ,downy mildew , powdery mildew ,rusts , smuts , ergot, groundnut leaf spot or tikka disease ,red rot of sugarcane , wilts, paddy blasts ,citrus canker ,bacteria blight of paddy anular leaf spot of cotton ,tobacco mosaic ,title leaf of brinjal , seasamephyllody, mango malformation.

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SEMESTER- I
PAPER - II
BIOLOGY AND DIVERSITY OF ALGAE, BRYOPHYTES AND PTEREIDOPHYTES

UNIT -1

Phycology: Algae in diversified habitat (terrestrial ,fresh water ,marine) thallus organization ,cell structure reproduction (vegetative ,asexual ,sexual),criteria for classification of algae, Pigments, reserve food ,flagella ,classification.

UNIT -2

Salient feature of following division: Protochlorophyta, chlorophyta ,Xanthophyta, Bacilariophta, Phaeophyta, Rhodophyata , role of algae in algal blooms algal biofertilizers, algae as food ,feed and use in industries.

UNIT -3

Bryophyte : Morphology ,structure ,reproduction and life history , distribution , classification , general account of Marchantiales , Jungermaniales , Anthocerotales, Sphagnales, Funariales, polytrichales, economical and ecological importance of bryophytes .

UNIT -4

Pteridophytes : Morphology , structure anatomy and reproduction , classification ,evolution of stele , heterospory and origin of seed habit general account of fossil pteridophytes ,introduction to Psilopsida ,Lycopsida ,Sphenopsida and Pteropsida .

Suggested Reading

1. Kumar ,H.D. (1988) Introductory Phycology , affiliated East –West Press Ltd ,New Delhi.
2. Morris , (1986) an introduction to Algae . Cambridge Uni. Press, UK.
3. Puri ,P. (1980) Bryophytes . Atma Ram and Sons, Delhi.
4. Sporne, K.K. (1991) the Morphology of Pteridophytes .B.I. Publishing Pvt. Ltd. Bombay.
5. Stewart W.N. and Ruthwell, G.W. (1993) Paleobotany and the Evolution of Plants Cambridge Uni. Press UK.
6. Vashishtha, B.R. (2005) Pteridophytes S. Chand and Co. Delhi.
7. Vashishtha, B.R. (2005) Bryophytes S. Chand and Co. Delhi.

Suggested Laboratory Exercise :

- Morphological and anatomical study of representative members of the Algae, Bryophytes and Pteridophytes.
- Algae :Volvox , Hydrodictyon , Oedogonium ,Ulva , Pithophora, Stigeoclonium,Drapranladiopsis, Polysiphonia ,Sargassum ,Chara.
- Bryophyta :Marchantia ,Pellia ,Anthoceros ,Notothylus ,Funaria, Polytircum .
- Pteridophyta :Psilotum ,Lycopodium , Selaginella, Equisetum ,Gleichenia , Pteris , Ophioglossum, Isoetes .

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SEMESTER SYLLABUS
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SEMESTER- I
PAPER - IV
TAXONOMY OF ANGIOSPERMS

UNIT -1

Origin of Intra- Population Variation: Population & the environment, ecads & ecotypes, evolution & differentiation of species – various models.

The Species Concept: Taxonomic hierarchy ,species ,genus family & other categories , principles used in assessing relationship ,delimitations of taxa & attribution of rank salient feature of the international code of botanical nomenclature and salient features of Melbourne code

UNIT -2

Taxonomic Evidence: Morphology, anatomy, embryology, cytology, photochemistry, genome analysis & nucleic acid hybridization.

Taxonomy Tools: Herbarium, floras, histological photochemical cytology serological biochemical & molecular techniques, computers & GIS.

UNIT -3

System of Angiosperm Classification: Phonetic versus phylogenetic systems, cladistics taxonomy, relative merits & demerits of major system of classification, relevance of taxonomy to conservation, sustainable utilization of bio resource & ecosystem research.

UNIT -4

Concept of Phytogeography: Endemism, hot spots and hottest hot spots, plant exploration, invasion & introduction, local plant diversity and its socio-economic importance.

Suggested Readings:

1. Cole, A.J. ((1969) Numerical Taxonomy. academic Press London.
2. Devis ,P. H. And Heywood, V.H (1973) Principle of Angiosperm Taxonomy .Robert E. Kreiger .Pub. Co. New York.
3. Grant, V. (1971) plant Speciation .Columbia Univ.Press, New York.
4. Grant, W.F. (1984) Plant Biosystematics .Academic Press. London.
5. Heslop- Harrison, J/ (1976) Plant Taxonomy .English Language Book Assoc .and Edward Pub. Ltd. U.K.
6. Stace ,C.A. (1989)Plant Taxonomy and Biosystematic Edward Arnold Ltd.London .
7. Takhtajan, A.L. (1997) Diversity and classification of flowering plant Columbiauniv.Press.New York.
8. Woodland, D.W. (1991) Contemporary Plant Systematic. Prentice Hall new Jersey.
9. Sharma, A.K. and Sharma, R.(2007) Taxonomy .PragatiPrakashan Meerut .

Suggested Laboratory Exercise:

1. Description of specimen from representative locally available families .

2. Description of species based on various specimen to study Intraspecific various variation ,a collective exercise.
3. Field trip within and around the campus, comppation of field notes and preparation of herbarium sheets of such plant wild or cultivated as are abundant .
4. Training in using floras and herbaria for identification of Specimen described in the class.
5. Comparison of different species of genus and different genera of a family to Calculate Similarity Coefficient and Preparation of Dendrograms
6. Demonstration of the Utility of Secondary metabolites in the taxonomy of some appropriated genera.
7. Description of various species of a genus, study of key characters and preparation of keys at generic level.
8. Location of keys and use of key at family level

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SEMESTER SYLLABUS
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SEMESTER-II
PAPER –I
CYTOLOGY AND GENETICS

UNIT -1

Chromatin Organization: Chromosome structure and packing of DNA, molecular organization of centromere andtelomere, nucleolus and ribosomal RNA gene, euchromatin, karyotype analysis and karyotype evolution, specialized type of chromosome –polytene, lampbrush, B- chromosomes and sex chromosome.

Structure and Numerical Alterations in Chromosomes: Deletion ,duplication ,translocation and inversion –their origin ,occurrence and breeding behaviour , aneuploids and eupliods –origin and production of aneuploid ,allopolyploids – types genome constitution and analysis ,evolution of major crop plants.

UNIT-2

Genetics of Prokaryotes & Eukaryotic Organelles: Mapping the bacteriophage genome, Genetic recombination in phage, genetic transformation, Conjugation& transduction in bacteria cytoplasmic male sterility.

Gene Structure &Expression: Genetic fine structure, cis-trans test, introns & their significance, RNA splicing, regulation of gene expression in prokaryotes & eukaryotes

UNIT-3

Genetic Recombination & Genetic Mapping:Recombination, independent assortment & crossing over, role of rec A & Rec BCD enzyme in recombination, site specific recombination, chromosome mapping linkage groups genetic makers' correlation of genetic & physical maps.

Mutation: Spontaneous & induced mutation ,molecular basis of gene mutations, Transposable elements in Prokaryotes & eukaryotes, mutation induced by Transposons , site directed mutagenesis, DNA damage & repair mechanism ,inherited human disease & defects in DNA repair ,initiation of cancer at cellular level , Proto- oncogene& oncogenes.

UNIT -4

Cytogenetic of Aneuploidy & Heterozygotes : Effect of aneuploidy on phenotype in plant transmission of monosomics & trisomics & their use in chromosome mapping of diploid & polyploidy species , breeding behaviour ,complex translocation heterozygotes ,translocation tester set Robetsonian ,translocation ,B-A translocation .

Molecular Cytogenetic : Nuclear DNA content ,C- value paradox ,Cot curve & its significance , restriction mapping ,in situ hybridization ,physical mapping of genes on Chromosomes , micro cloning

Alien Gene Transfer Through Chromosome Manipulation: Transfer of wholegenome, example from triticum, Arachis & Brassica , method for detecting alien chromatic production ,characterization & utility of alien genetics basis of inbreeding & haterosis , exploitation of hybrid vigor .

Suggested Reading:

1. Albert, B. Bray, D. Lewis .J. Raff, M. Robert, K. and Watson, J.D. (1981).Molecular Biology of cell .Garland Publishing Inc, New York USA.
2. Karp ,G, (1999) Cell & Molecular Biology : Concept & Experiments .John Willey and Sons Inc.USA.
3. Kush, G.S. (1973) Cytogenetic of Aneuploids.Academic Press New York ,London
4. Lewin , B. (2005) Gene VIII Oxford Univ. Press New York USA.
5. Russel P.J. (1998) Genetic .The Benjamin Cummings Publishing Company .Inc USA.
6. Snustand D.P. and Simons ,M.J. (2000) .Principles of Genetics John Willey and Sons. Inc.USA.

Suggested Laboratory Exercise:

1. Linear differentiation of chromosome through G-Banding and C-Banding .
2. Orcein and Feulgen staining of salivary chromosomes of chironomas and Drosophila.
3. Characterization of B- chromosome in maize .
4. Study of effect of monosomy and trisomy on phenotype of plants.
5. Introduction of polyploidy using colchicine .
6. Isolation of Chlorophyll mutant through irradiation and chemical mutagenes.
7. Isolation of DNA form prokaryotic cell s.
8. Isolation of DNA form eukaryotic cells.
9. Estimation of nuclear DNA through spectrophotometric method.

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SEMESTER SYLLABUS
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SEMESTER-II
PAPER -II
BIOLOGY AND DIVERSITY OF GYMNOSPERMS

UNIT -1

Introduction : Gymnosperms the vessel less & fruitless seed plants varying in the structure of their sperms, pollen grain ,pollen germination & complexity of their female gametophyte ,evolution of gymnosperms .

UNIT-2

Classification of Gymnosperms & their Distribution in India:

Brief Account of the families of Pteridospermales: (Lyginopteridaceae ,Medullosaceae , Cytoniaceae & Glossopteridaceae)

UNIT -3

General account comparative structure and Reproduction in Cycadeoidales Cordaitales , Cycadales and Ginkgoales.

UNIT-4

General account comparative structure and Reproduction in Cycadales ,Ginkgoales , Coniferals ,Ephedrales ,Welwithschiales and Gnetales .

Suggested Reading:

1. Bhatnagar ,S.P . andMoitra ,A. (1996) Gymnosperms . New Age international Pvt. Ltd. New Delhi .
2. Sprone ,K.K. (1991) The Morphology of Gymnosperms .B.I. Publishing Pvt. Ltd. Bombay.
3. Steward , W.N. and Ruthwell ,G.W. (1993) Paleobatony and Evolution of plants .Cambridge University Press U.K.
4. Vashishta ,P.C. and Sinha ,A.K. (2005) Gymnosperms .S.Chand Publishing Company. Delhi.
5. Singh ,H. (1978) Embryology of Gymnosperms : Encyclopaedia of plant anatomy X. GebruderBortraeger ,Berlin

Suggested Laboratory Exercise :

- Comparative Study of the anatomy of vegetative and reproduction parts of Cycas ,Ginkgo, Cedrus , Abies, Picea, Cupressus , Araucaria ,Cryptomeria ,Taxodium , Podocarpus Agathis Taxus Ephedra and Gnetum.
- Study of important fossil gymnosperm through prepared slide and specimens .
- Collection of various Gymnospermic plant materials.

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SEMESTER-II
PAPER -IV
PLANT PHYSIOLOGY

UNIT -1

Membrane Transport and Translocation of Water and Solute : Plant –Water relations , mechanism of water transport through xylem ,root microbe interaction in facilitating nutrient uptake , comparison of xylem and phloem transport ,phloem loading and unloading ,active and passive solute transport ,membrane transport protein s.

UNIT -2

Nitrogen Fixation, Nitrogen and sulphur Metabolism: Overview biological nitrogen fixation, root nodules formation and **nod** mechanism of nitrate uptake and reduction ammonium assimilalation, sulphate uptake transport and assimilation.

Signal Transduction : Overview ,receptors and G-protein ,phospholipids signalling ,role of cyclin nucleotides calcium calmodulin cascade diversity in protein kinesis and phosphatases , specific signalling mechanism ,example two component senor-regulator system in bacteria and plant ,source sensing mechanism .

UNIT -3

Photochemistry and Photosynthesis : General concept and historical background ,evolution of photosynthesis ,apparatus ,photosynthetic pigment and light harvesting complexes , photo –oxidation of water mechanism of electron and proton transport carbon assimilation the Calvin cycle ,Photorespiration and its signification the C4 cycle CAM pathway , biosynthesis of starch and sucrose ,physiological and ecological consideration .

UNIT -4

Street Physiology : plant response to biotic and abiotic stress mechanism ,of biotic and abiotic stress tolerance ,HR and SAR water deficit and drought resistance salinity stress, metal toxicity ,freezing heat stress ,oxidative stress .

Suggested Reading

1. Salisbury, F.B. and Ross C.W. (1992) Plant physiology. Wadsworth Publishing Co, California USA.
2. Dennis D.T. Turpin, D.H. Lefebvre, D.D. and layzell D.B. (1997) plant Metabolism . Longman, Essex England .
3. Taiz, L .andZeiger ,E. (1998) plant physiology . Sinaver Associated Inc. Publishers Massachusetts USA.
4. Moore T.C. (1989) Biochemistry and physiology of plant Hormone .Springer Verlog ,New York.
5. Noble ,P.S. (1999) Physiochemical and Environmental plant Physiology Academic Press ,San Diego ,USA.
6. Thamas ,B. And Vince –Prue (1997) Photoperiodism in plant Academic Press ,san Diego ,USA.

Suggested Laboratory Exercise

1. Measurement of catalytic activity of catalyse and diastase in germinating seeds.
2. Effect of time in Enzyme concentration on the rate of reaction of Enzyme action ,
3. Study of R.Q. value for different respiratory substrate carbohydrate ,protein and fats through respirometer .
4. Study of cassulacean Acid Metabolism (CAM) in succulants.
5. Separation of protein by PAGE
6. Separation of Iso –enzyme of esterases and peraoxidases by PAGE.
7. Study of effect of auxins on apical dominance .
8. Study of seed dormancy in Lathyrusseed .
9. Effect of external factors on seed dormancy .
10. Effect of different measures for removal of seed dormancy .
11. Study of phototropic and geotropic movement in plant .

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SEMESTER SYLLABUS
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SEMESTER-II
PAPER -IV
PLANT BIOCHEMISTRYAND BIOENERGETICS

UNIT -1

Energy Flow: Principles of thermodynamics, free energy and chemical potential, redox reaction structure and function of ATP.

Respiration and lipid Metabolism : Overview of plant respiration ,glycolysis ,the TCA cycle , electron transport and ATP synthesis , pentose Phosphate pathway glyoxylate cycle , alternative oxidase system ,structure and function of lipids ,fatty acid biosynthesis synthesis of membrane lipids ,structure lipid and Storage lipids and their catabolism .

UNIT -2

Fundamentals of Enzymology: General aspect, allosteric, mechanism, regulatory and active sites isoenzymes, kinetic of enzymatic catalysis Michaelis- Manton equation and its significance.

Sensory Photobiology: History and discovery of phytochromes and cryptochrosomes photochemical and biological property, photo physiology of light induced responses cellular localization, molecular mechanism of action of photo-morphogenic receptorssignalling and gene expression.

UNIT -3

Plant Growth Regulators and Elicitors: Physiological effects and mechanism of auxinsgibberllins , ethylene ,abscisic acid brassinosteroids , polyamines ,Jasmonic acid and salicylic acid ,hormone receptors , signal transduction and gene expression.

UNIT -4

The Flowering Process: Photoperiodism and its significane, endogenous clock and its regulation, photochrome, floral induction and development genetic and molecular analysis, role of vernalization.

Suggested Reading

1. Galston ,A.W. (1989) Life Processes in Plants .Scientific American Library Springer Verlag New York USA.
2. Hopkins ,W,G. (1995) Introduction to plant Physiology .John Willey and Sons Inc.New York, USA.
3. Salisbury ,F.B. and Ross, C.W. (1992) Plant Physiology Wadsworth Publishing Co. California ,USA.
4. Dennis ,D.T. Turpin ,D.H. Lefebvre ,D.D. and Layzeel ,D.B. (1997) Plant Metabolism . Longman ,Essex, England.
5. Taiz ,L. And Zeiger ,E, (1998) Plant Physiology .Sinaver Association ,Inc. Publishers Massachusetts ,USA.

Suggested Laboratory Exercise:

1. Demonstration of plasmolysis and deplasmolysis in plant cell .
2. Demonstration of transpiration.
3. Measurement of transpiration rate photometer.
4. Study of inter-relationship between transpiration and absorption and by T/A apparatus.
5. Extraction of chloroplast pigment from green leaves.
6. Separation of chloroplast pigment through paper chromatography.
7. Separation of chloroplast pigment through solvent method.
8. Preparation of absorption spectrum of chlorophyll -a
9. Determination of chlorophyll a/ chlorophyll-b ratio in C_3 and C_4 plants.
10. Extraction of seed proteins depending upon solubility.
11. Fractionation of proteins using gel filtration chromatography using sephadex G-100 or sephadex G-200 .
12. Principal of colorimetry spectrometry and fluorimerty

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SEMESTER SYLLABUS
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SEMESTER-III
PAPER – 1
PLANT DEVELOPMENT

UNIT – 1

Introduction – Unique features of plant development, differences between plant and animal development.

Seed Germination and seedling Growth: Metabolism of nucleic acid, protein and mobilization of food reserve, tropism, hormonal control of seedling growth, gene expression use of mutants in understanding seedling development

UNIT – 2

Shoot development : Organization of shoot apical meristem (SAM), cytological and molecular analysis of SAM, control of cell division and cell communication, control of tissue differentiation especially xylem and phloem, secretary ducts and lactifers, wood development in relation to environmental factors.

UNIT – 3

Root development: Organization of rootapical meristem (RAM), cell fates and lineages, vascular tissue differentiation, lateral tissue, hairs, root- microbe interaction.

Leaf Growth and differentiation: determination, phyllotaxy, control of leaf formation, differentiation of epidermis (with reference to stomata and trichomes), mesophyll.

UNIT – 4

Plant Tissues: Meristem and permanent tissues, parenchyma, cholenchyma, sclerenchyma sclerids and fibres, xylem and phloem, structure, origin and differentiation.

Secondary Growth: Structure, function and origin of cambium and cork cambium, ray and fusiform cells, secondary growth in dicot stem and root, abnormal secondary growth in monocot and dicot stem in various plants

Suggested Readings

1. Atwell B.J. kriedrmann, P.E. and Jumbull, C.G. N. (1999) plant in action adaptation in nature, performance in cultivation. Macmillan education Sydney Australia
2. Bewley ,J.D. and Black ,M. (1994)Seeds: physiology of Development and Germination .Plenum, Press New York.
3. Fahn ,A. (1982) Plant Anatomy .Pergamon Press ,Oxford.
4. Fosket ,D.E. (1994) plant Growth and Development : A Molecular Approach. Academic Press ,San Diego.
5. Howell ,S.H. (1998) Molecular Genetics of plant Development .Cambridge Univ. Press, Cambridge, U.K.
6. Lyndon ,R.F. (1990) Plant Development – the cellular Basics, unnin Hyman ,London
7. Raghavan ,V. (1990) Developmental Biology of flowering plants Springer –Verlog ,New York .
8. Steeves ,T.A. and Sussex ,I.M. (1989) Patterns in plants development ,Cambridge Uni. Press ,Cambridge ,UK.

Suggested Laboratory Exercise

1. Effect of gravity, unilateral light and plant growth regulators on the growth of young seeding.
2. Effect of dark, red light and far red light on expansion of cotyledons and epicotylar hook opening inpeas.
3. Study of living shoot apices by dissection of aquatic plants like Hydrilla and Ceratophyllum.
4. Study of cytohistological zonation in shoot apical meristem (SAM) in sectioned and double stained permanent slides of a suitable plant like Coleus kalanchoe, tobacco.
5. Study of shoot apices monocot in T.S. and L.S. to show the origin and arrangement of leaf primordial.
6. Study of different type of phyllotaxy –distichous alternate, opposite and whorled.
7. Microscopic examination of vertical section of leaves such as Cannabis, TobaccoNerium, Maize and wheat.
8. Study of epidermal peels of leaves of Coccinia, Gaillardia, Tradescantia, Notonea etc.
9. External study of whole root in monocot and dicots.
10. Study of L.S. of dicots and monocots root form permanent and temporary double stained slides.
11. Study of different types of plant tissue –parenchyma, Colenchymaand sclerenchyma.
12. Study of normal and abnormal secondary growth in various dicots and monocot plants.

SEMESTER SYLLABUS
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SEMESTER-III
PAPER II
PLANT REPRUDCTION

UNIT -1

Reproduction: Vegetative option and sexual reproduction flower structure and development, genetics of floral organ differentiation, sex determination plant.

Male Gametophytes : Structure of anther ,micro-sporogenesis ,role of tepetum ,pollen development and gene expression ,male sterility sperm dimorphism and hybrid seed production ,pollen germination ,pollen tube growth and guidance ,pollen storage ,pollen allergy ,pollen embroys.

UNIT-2

Female Gametophytes: Ovule development, mega-sporogenesis, organization of the embryo sac, structure of embryo sac

Pollination ,Pollen-pistil Interaction and Fertilization : Floral characteristic ,pollination mechanism and vectors ,breeding system ,commercial consideration ,structure of pistil ,pollen-stigma interaction ,sporophytic And gametophyticself incompatibility (cytological biochemical and molecular aspect),double fertilization ,in vitro fertilization .

UNIT-3

Seed Development and Fruit Growth : Endosperm development during early ,maturation and desiccation stages, embryogenesis, ultra structure and nuclear cytology and cell lineages during late embryo development storage protein of endosperm and embryo ,polyembryo ,apomixes embryo culture, dynamics of fruit growth, biochemistry and molecules bio logy of fruit maturation

UNIT-4

.Senescence and Programmed Cell Death (PCD) : Basic Concept ,type of cell death ,PCD in the life cycle of plants ,metabolic change associated with senescence and its regulation , influence of hormone and environmental factors an senescence .

Suggested Reading

1. Bhojwani ,S.S. and Bhatnagar ,S.P. (2000) the Embryology of angiosperm . Vikas Publishing House ,New Delhi.
2. Proctor,M. And Yeo ,P. (1973) the pollination of Flower . William Collins Sons, London.
3. Raghavan ,V. (1997) Molecular Embryology of flowering plants Cambridge Uni. Press ,Cambridge ,U.K.
4. sedgely ,M. And Griffn ,A,.R. (1989) Sexual Reproduction of tree Crop. Academic Press ,London.
5. Shivanna ,K.R. and Sawhney ,V.K. (1997) Pollen Biotechnology for Crop Production and Improvemgt. Cambridge Uni. Press ,Cambridge .

6. Shivanna ,K. And John B.M. (1985) The Angiosperm pollen : structure and function . Willey Eastern Limited ,New York .
7. Shivana,k.R and Sawhney,v,k (1997)pollen Biotechnology For crop Production and Improvement Cambridge unvi. Press Cambridge

Suggested Laboratory Exercise

1. Study of ontogeny of floral part s by cutting L.S. of buds of various size in different plants.
2. Study of microsporogenesis andgematogenesis in section of anther .
3. Study of mode anther dehiscence in various plants.
4. Collection and microscopic examination of microspores form various platns like maize ,grasses ,Cannabis sativa, Crotolaria, Tradescantia,Brassica .Petunia ,Solanummelangena, Lycopersicumescuantumatc.
5. Test of pollen viability using stain s and in –vitro germination .
6. Study of pollen germination by suspension culture and surface culture .
7. Study of pollanium in callotropisprocera.
8. Study of pollen tube growth in stigma of Dutura alba
9. Study of internal structure of ovules in permanent slide .
10. Study of monosporic and bisporic and tetrasporic embryo sac development in ovules through permanent slides.
11. Study of external structure of different types of ovules in locally available flowers.
12. Field study of different type of pollination mechanism (Wind ,Bee/Butterfly, bird pollination)
13. Study of Cleistogamous flower and their adaptations .
14. Emasculation ,bagging ,tagging and hand pollination .
15. Study of nuclear and cellular endosperm through dissection and staining .
16. Isolation of zygotic embryo at globular , heart shaped ,torpedo stage and mature embryos by dissection.

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SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-III
PAPER –III
PLANT ECOLOGY
(CLIMATE, VEGETATION AND ECOSYSTEM)

UNIT -1

Ecological Factors : Climatic –light ,temperature , air and water topographic ,edaphic ,soil formation ,soil textrue ,type of soil profile ,classification ,physio-chemical properties , soil organic matter , biotic factor , interrelationships ,major soil type of the world .

Ecosystem Organization : Structure and function primary production (methods of measurements ,global pattern, controlling factors) energy dynamics ,tropic organization ,energy flow pathways ecological efficiencies ,letter fall and decomposition – mechanism , substrate quality and climatic factors ,global biochemical cycle of C,N,P,S minerals cycle – pathway processes budgets in terrestrial and aquatic ecosystems.

UNIT -2

Vegetation Organization: life zone major biomes and vegetation of the world concept of community, and continuum analysis of communities (analytic and synthetic character)community coefficients, inter specific associated ordination concept of ecological niche.

Vegetation Development: Temporal change (Cyclic and non –cyclic), mechanism of ecological succession (relay floristic and initial floristic Composition, facilitation, tolerance and inhibition modal), changes in ecosystem properties during succession.

UNIT -3

Air Water and Soil Pollution: Kinds, source, quality parameters, effect on plant and ecosystem.

Climate Change : Green house gases (CO_2,CH_4,N_2O ,CFCs) sources ,trend and role ,ozone layer and ozone hole consequences of climate changes ,(CO_2fertilization ,global warning ,sea level rise UV radiation)

UNIT -4

Ecological Stability: Concept (resistance and resilience), ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystem, ecology of plant invasion environmental impact assessment, ecosystem restoration

Ecological management: Concepts, Sustainable. Development, Sustainability indicators

Suggested Reading

1. Brady , N.C. (1990) The Nature and Properties of Soil . MacMillan ,Sydney Australia .
2. Begon ,M. Harper ,J.L. and Townsend ,C.R. (1996) Ecology : Blackwell Science ,Cambridge USA.
3. Chapman J.L. and Raiss ,M.L. (1988) Ecology : Principal and applications Cambridge Uni. Press ,Cambridge UK

4. Kumar , H.D. (1986) Modern Concept of Ecology . Vikas Publishing House Privet Ltd New Delhi .
5. Hill M.K.(1997) Understanding Environmental Pollution . Cambridge Uni. Press, , Cambridge UK.
6. Odum ,E.P. (1971) Fundamental of Ecology .,Saunders ,Philadelphia .
7. Odum ,E.P. (1983) Basic Ecology .,Saunders ,Philadelphia
8.

Suggested Laboratory Exercise

1. To calculate mean , variance ,standard deviation ,standard error ,coefficient of variation and use of t-test for comparing ecological data .
2. To determine minimum size and number of quadrates required for reliable estimate of biomass in Grassland ecosystem.
3. To study of frequency, abundance and density of dominant plants in the local ecosystem by quadrate method.
4. To determine gross and net productivity by light and dark bottle method.
5. To determine soil moisture content, porosity and bulk density of soil collected from different location.
6. To determine percent organic carbon and organic matter in soil of grass land cropland and forests.
7. To determine the water holding capacity of various soil.

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SEMESTER SYLLABUS

M.Sc. BOTANY

SEMESTER-III

PAPER –IV ELECTIVE -1 (A)

Microbial Characters, Symptoms, Pathogeneity and Host Parasite Relation

UNIT -1

General Introduction : Nature and Concept of diseases in plant ,importance of plant diseases and their effect on human affairs , definition and terms in plant pathology history and development of plant pathology ,contribution of plant pathology in India and aboard ,pathology and trends in 21st century .

UNIT -2

Cause of Plant Diseases: Symptomatology of parasitic and non –parasitic diseases, classification of plant diseases.

Methods of studying Plant Diseases: Airborne, soil borne and seed borne diseases.

UNIT -3

General Characteristics: Fungi, bacteria and viruses, their heterotraction behavior with emphasis on parasitism, parasitic ability and virulence.

Pathogenicity: Distribution on plant pathogens, mode of infection ,inoculums and inoculums potential ,Koch's postulates .

UNIT -4

Host Parasite Relation: Parturition of infection, role of enzyme and toxicity pathogenesis, defence of plant against pathogens, resistance and susceptibility by Para sensitive reaction phytoalexis diseasessyndrome.

Suggested Reading :

1. Agrios ,U.N. (1997) Plant Pathology Academic Press ,London.
2. Bridges ,P. (1998) Molecular Variability of Fungal Pathogens .CAB International U.K.
3. Bilgrami K.S. and Dubey ,H.C. (1985) Plant Pathology . Vikas Publ. House Sahibabad , U.P.
4. Ali , S.S. and Kulshreshta ,P. (1986) plant Pathology .Adeeb Education ,Raipur .
5. Singh ,R.S. (1980) Plant Pathology . Oxford IBL Publ. Co. New Delhi .

Suggested Laboratory Exercise :

1. Calibration of microscope .
2. Determination of dimension of pathogenic determinants bacteria ,fungal spore and mycelium by micro slide and camera Lucida .
3. Isolation of Micro- organism from soil,water and air on artificially prepared medium .
4. Study of symptoms of various plant diseases caused by viruses bacteria and fungi .
5. Demonstration of the effect of various bio pesticide (essential oils ,neem turmeric and garlic) against microbes /pathogens.
6. Culture of plant pathogen like (Fusarium , Colletotricum, Alternaria)on culture medium.
7. Study of artificial pathogenesis induced by Fusarium, Colletotricum ,Alternaria on specific host.

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SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-III
DETAILED CURRICULUM OF ELECTIVE PAPER IV (B)
WEED BIOLOGY

UNIT -1

Introduction to Weed

Definition and distribution of weed .Worldwide distribution and importance of weed Ideal characters of weed . Classification of weed. Weed menace in agriculture, aquatic ecosystems.

UNIT -2

Relationship and interactions among weed and crops Suitability of succession to crops Pattern of Evolutionary Development.

Concept of r and K selection . Weeds as strategists – competitive Ruderals and stress Tolerant Weeds.

UNIT -3

Morphology, Reproduction, Propagation, Dispersal and Survival of Weeds.

The Diversity of Weeds of different habitates – Terrestrial and aquatic weeds.

UNIT -4

Weed Competition –Nature of Competition ,Method to study Competition ,critical period for competition, Allelopathy, Weed and crop density effect.

PRACTICALS –

1. Exercises on survey of Weed Flora of
   a. Agriculture field
   b. Vegetable Orchards
   c. Forests
   d. Roadsides
   e. Aquatic Ecosystems
2. Identification of Weeds and preparation of Herbarium of weed of different habitats
3. Exercises of Phytosociology Weeds
   - Determination of minimal size of the quadrate for sampling maximum number of weeds using species / area curve.
   - Determination of Density and Abundance of Weed populations
   - Determination of Frequency of weed populations.
   - Determination f Basal Area / Cover of weed populations.
   - Determination of IVI of different weed populations
4. Exercise on Weed Seed Technology –
   - Measurement of Seed size and shape.
   - Determination of seed weight.
   - Determination of seed outputs and reproductive capacity
   - Determination of seed viability.
   - Determination of percentage germination.

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SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-IV
PAPER I
PLANT CELL, TUSSE AND ORGAN CULTURE

UNIT -1

Biotechnology: Basic concept, principal and scope

Plant cell And Tissue Culture: General introduction, history, scope, concept of cellular differentiation, tot potency.

UNIT -2

Organogenesis and Adventive Embryogenesis: Fundamental aspects morphogenesis somatic embryogenesis and androgenizes, mechanism, techniques and utility.

Somatic Hybridization: Protoplast isolation fusion and culture hybrid selection and regeneration, possibilities achievements and limitations of protoplast research.

UNIT -3

Application of Plant Tissue Culture: Clonal propagation, artificial seed, production of hybrids and soma clones and production of secondary metabolites /natural products, cryopreservation and germ plasma storage.

UNIT -4

Biostatistics: Definition and importance of Biostatistics scope, Measurement of central tendencies –mean mode and median.

Suggested Reading :

1. Bhojwani, S.S. and Razdan ,N.K. (1996) plant Tissue Culture : Theory and Practice Elservier Science Publishers New York ,USA.
2. Collin H.A. and Edwards ,S. (1998) plant cell Culture Bios .Scientific Publishers Oxford ,U.K.
3. Kartha ,K.K. (1985) Cryopreservation of plant cells and Organs CRC Press ,Boca Raton ,Florida USA.
4. Vasil, I.K. and Thorbe ,T.A.(1994) Plant cell and tissue culture . Kluwer Academic Publishers ,Netherlands.
5. Smith R.H. (200) Plant Tissue Culture : Techniques and Experiment ,Academic Ness ,New York.

Suggested Laboratory Exercise :

1. Preparation of Tissue culture (ms) medium .
2. Study technique s of tissue culture : sterilization of glass wares and plant materials transfer of explants on culture media ,incubation .
3. Isolation of plant protoplast by mechanical and enzymatic method.
4. Counting of protoplast in the suspension by haemocytometer method.

5. Effect of physical (example, temperature) and chemical (e.g. osmoticum) .factors on protoplast yield .
6. Demonstration of protoplast fusion employing PEG.
7. Initiation of organogenesis and embryogenesis using appropriate explants.

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SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-IV
PAPER II
PLANT RESOURCE UTILIZATION AND CONSERVATION

UNIT -1

Biological Diversity : Concept and level ,role of biodiversity in ecosystem ,function and stability ,speciation and extinction ,IUCN categories of threat , distribution and global pattern ,terrestrial biodiversity ,hot spots inventory.

Plant Biodiversity: Concept, status in India, utilization and concerns.

UNIT -2

World Centers of Primary Diversity of Domesticated Plants: The Indo Bermiscentre, plant introduction and secondary centers .

Origin, Evolution, Botany Cultivation and Uses of: (i) food, forage and fodder crop, (ii) fiber crops (iii) medicinal and aromatic plants (iv) vegetable and (v) oil yielding crops.

UNIT -3

Important Fire –Wood and Timber Yielding Plant and Nonwood Forest Products(NWFPS) : such as bamboos ,rattans ,raw materials for paper making ,gums, tanins ,dyes ,resins and fruits .

Green Revolution: Benefits and consequence, Innovations for meeting world food demands,. plant used as avenue trees for shade ,pollution control and aesthetics.

UNIT -4

Principal of Conservation: Extinctions, environmental status of plant based on international Union for conservation of nature.

Strategies for conservation in situ Conservation : International efforts and Indian initiatives , protected areas in Indian – sanctuaries ,national park ,biosphere reserves wetland ,mangroves and coral reefs for conservation of wild biodiversity.

Strategies for conservation –Ex situ Conservation : Principles and practices ,botanical garden , field gene bank , seed in vitro repositories ,cry banks general account of the activities of botanical survey of India (BSI) ,National Bureau of Plant Genetic Resources (NBPGR) India Council of Agriculture Research (ICAR) ,Council of Scientific and Industrial Research (CSIR) and the Department of Biotechnology (DBT) for conservation non-formal conservation efforts.

Suggested Reading :

1. Anonymous (1997) National Gene Bank, Indian Heritage on Plant Genetic Resources (Booklet) NBPGER, New Delhi.
2. Baker, H.G. (1978) Plant and Civilization . C.A. Wadsworth ,Belmont.
3. Frankel ,O.H. ,Brown, A.H.D. and Burdon ,J.J. (1995) Conservation of plant Diversity ,Cambridge Univ. Press ,Cambridge, U.K.
4. Heywood ,V. (1995) Global Biodiversity Assessment ,UNEP . Cambridge Univ. Press ,Cambridge U.K.

5. Heywood ,V.H. and Wyse Jackson, P.S. (1991) Tropical Botanical Garden : Their Role in Conservation and Development. Academic Press, San Digo.
6. Kocher ,S.L. (1998) Economic Botany of the Tropics. McMillan India Ltd., New Delhi.
7. Kothari ,A. (1997) Understanding Bio- diversity ; life sustainability and Equity . Orient Longman.
8. Paroda ,R.S. and Arora ,R.K. (1991) plant Genetic Resources and Conservation and Management IPGRI (Publications).South Asia Office , c/o NBPGR , Pusa Campus , New Delhi.
9. Pinstrup –Anderson,P.et al (1999) world food prospects , critical issues for early 21st century . International Food Policy Research Institute , Washington D.C. USA.
10. Rogers , N.A. and Panwar ,H.S. (1988) Planning a wild life protected area network in India Vol. –I The report ,wildlife Institute of India ,Dehradun.
11. Scheri ,R.W. (1972) plants for Man . Englewood Cliffs , New Jersey ,Prentice Hall.
12. Swaminathan ,M.S. and Koccher S.L. (1989) Plants and Society ,MacMillan Publication Ltd. London .

Suggested Laboratory Exercise

1. Study of Morphology, anatomy and microchemical tests for stored food materials present in food crops- wheat, rice, maize chickpea, potato, sugarcane.
2. Study of any five important fodder /forage of the locality.
3. Morphology, Anatomy, and microscopic study of whole fibre of cotton, jute, linen, sun hemp, cannabis, cotton and kapok.
4. Study of various medicinal and aromatic plants available in the locality /college /university.
5. Study of herbarium specimen .
6. Field survey of importance plant source of firewood and timber in your locality (with their taxonomic description and properties)
7. Scientific visit of a protected area ,Biosphere reserve, national park or sanctuary.

SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-IV
PAPER III
GENETIC ENGINEERING OF PLANTS AND MICROBES

UNIT -1

Recombinant DNA Technology: Gene Cloning principal and techniques, construction of genomic /cDNA libraries, choice of vectors, DNA synthesis and sequencing, polymerase chain reaction (PCR), DNA finger printing.

UNIT -2

Genetic Engineering of Plants: Aims strategies for development of transgenic (with suitable example), Agro bacterium- the nature genetic engineer , T-DNA and transposon mediated gene tagging ,chloroplast transformation and its utility ,intellectual property right , possible ecological risk and concerns.

UNIT -3

Microbial Genetic Manipulation: Bacterial transformation, selection of recombinants and transform ants genetic improvement of industrial microbes and nitrogen fixer's fermentation technology.

UNIT -4

Genomics And Proteomics: Genetic and physical mapping of genes, molecular markers for introgression of useful traits, artificial chromosome, DNA sequencing, genome projects, bioinformatics, functional genomics, micro-arrays, protein profiling and its significance.
Biostatistics: Measurement of dispersion, standard deviation (S.D) and standard error (S.E.) comparison of data by chi-**square (x^2)** and test.

Suggested Readings

1. Brown ,T.A. (1999) Genomes . John Wiley and Sons (Asia) Ltd. Singapore.
2. Callow, J.A. Ford –Loyd ,B.V. And Newbury ,H.J. (1997) Biotechnology and Genetic Resources : Conservation and Use .CAB international ,Oxon ,UK.
3. Glazer, A.N. and Nikaido,H. (1995) Microbial Biotechnology .Freeman and company ,NewYork USA.
4. Henery R.J. (1997) Practical Application of plant Molecular Biology .Chapman and Ht. 11,London ,UK.
5. Jolles ,O and Jornvali ,H. (2000) Proteomics in functional Genomics .BirkhauserVerlag ,Basel ,Switzerland .
6. Old ,R.W. primerose ,S.B. (1989) Principles of Gene Manipulation .Blackwell Scientific Publication ,Oxford ,UK.
7. Primrose ,S.B. (1995) Principles of Genome Analysis Blackwell Scientific Publication ,Oxford ,UK
8. Raghavan,V. (1997) Molecular Biology of flowering plants Cambridge Uni. Press ,Cambridge ,USA.

Suggested Laboratory Exercise

1. Preparation of liquid and solid culture media for bacteria culture.
2. Study of growth characteristics of E .coli using plating and turbido metric method.
3. Isolation of total DNA from E. Coli by lysozyme lysis method and its quantification by spectrophotometric method .
4. Isolation of plasmid DNA from E. Coli by alkaline lysis method and its quantification by spectrophotometric method.
5. Restriction digestion of plasmid and genomic DNA and estimation of size of various DNA fragments.
6. Isolation of Rhizobium from root nodules of leguminous plants
7. Isolation of Agrobacterium tumifaciens form tumours of dicot plants.

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SEMESTER SYLLABUS
M.Sc. BOTANY

SEMESTER-IV
PAPER IV
ELECTIVE –I (A)
PLANT PATHOLOGY-II
EFFECT OF ENVIRONMENT, CONTROL AND PLANT DISEASE CYCLE

UNIT -1

Effect of Environment on Disease Development: Predisposition and stress epidemiology and disease forecasting, sources of infection i.e., seed. Soil, water and air born disease of plants, significance of phyllosphere and rhizosphere studies, recurrence of disease.

UNIT -2

Control of Plant Disease: Principles of plant disease control, 'method of control eg regulatory, chemical, biological and breeding for disease resistant varieties of host, plant quarantine.

UNIT -3

Details of Disease Cycle: Crop loss estimate an recommended control for important plant disease caused by fungi bacteria, viruses, mycoplasma and nematodes in the following crop plants-

a) Wheat, Rice, Bajra, Maize Sugarcane.
b) Arhar, Gram, Pea.

UNIT -4

Details of Disease Cycle: Crop loss estimate and recommended control for important plant disease caused by fungi bacteria, viruses, mycoplasma and nematodes in the following crop plants-

a) Groundnut, Till, Linseed, Cotton.
b) Chillies, Tomato, Potato, Brinjal, coriander, Tobacco.
c) Citrus fruit e.g.,Lemon, Orange, Musambi, Papaya, Apple and Banana.

Suggested Readings:

As described for Paper IV Elective I (A), Plant Pathology of Third semester.

Suggested Laboratory Exercise

1. Study of various bacteria /fungal plant pathogens of various crop plants.
2. Study of life cycle of bacteria –Xanthomonascitri, X. oryzae etc. and fungi causing white rust , black rust, loose and covered smut on various crop plants
3. Demonstration of antibiosis using bacteria culture and know n antibiotics.
4. Isolation of cellulose from disease plants.
5. Study of antagonism between isolated antagonists and plant pathogens.

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SEMESTER SYLLABUS
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SEMESTER-IV
PAPER IV
ELECTIVE –I (B)
WEED BIOLOGY

UNIT -1

Germination, Establishment and Growth – Light Requirement for germination, Seedlongevity AndMortality. Pattern of emergence, The Safe -Site Concept.

UNIT -2

Management of Weeds- Type of weed control: Prevention, Suppression and Eradication; physical, chemical and Biological control of weeds .concept of Integrated Weed Management

UNIT -3

Classification of Herbicides Selective and non selective herbicides, contact and Trans located herbicides. Mode of Action of Herbicides. Application method of Herbicides and Precautions.

UNIT -4

Chemistry of some importance herbicides: Phenoxy acid as 2, 4-D, Pendimethalin Butachlor and Nitro fen. Critical Period for weed control,Aquatic weed management .Plant Environment and Herbicides interactions. Weed Thresholds and management.

PRACTICALS –

Exercises involving

- The study of different factors of the percentage germination of some important weed seeds.
- Measurement of seedling growth of weed plant.
- Study of a weed plant using different growth parameters.
- Measurement of effect of density on Mortality of a weed plant.
- Measurement of effect of density on competition.
- Calculation of Competition Index.

Suggested Books –

1. V.S. Rao , Principles of Weed Science – Oxford & IBH Publishing Pvt. Co. Ltd. New Delhi
2. O. P. Gupta, Modern Weed Management – AgrobiosIndia, Jodhpur.
3. N.C. Joshi, Researchco Publication Delhi.
4. Ashton &Crafts, Mode of Action of Herbicides – Wiley Interscience Publication New York.
5. U.S. Shree Ramulu –Chemistry of Herbicides – Oxford & IBH Publishing Co. Ltd. New Delhi.
6. Majid, F.Z. Aquatic Weed: Utility and Development .Agrobotanica, Bikaner, India.

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