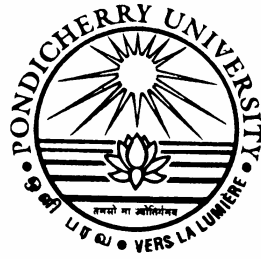


# **M.Sc. PLANT SCIENCE**

## **REGULATIONS AND SYLLABI** **(Effective from 2010-2011)**





**PONDICHERRY UNIVERSITY  
PUDUCHERRY 605 014**

**B.A./B.Sc./B.Com./M.A./M.Sc./M.Com. etc.,**

**REGULATIONS**

***Aim of the Course:***

The Degree of **Master of Science in Plant Science** aims to introduce the students to **various aspects of plant biology**. At the end of the course, the students are expected to have good working knowledge in **the field of Plant Science**.

***Eligibility for Admission:***

Candidates for admission to **M.Sc. Plant Science** shall be required to have passed **B.Sc. in Plant Science/ Botany or Life Sciences/Biological Sciences** conducted by the **Universities approved by UGC, New Delhi** with **Chemistry/ zoology as allied subject(s)** of study or an examination accepted as equivalent thereto and **40** percentage of marks in **Part III** (aggregate / Part – III), subject to such conditions as may be prescribed therefore.

***Lateral Entry (if applicable)***

~~Candidates who have passed Diploma in \_\_\_\_\_ in First Class (10+3 years of Study) are eligible to apply for the lateral entry to the 2<sup>nd</sup> year of the course subject to availability of seats, but limited to 10% of the sanctioned intake.~~

***Duration of the course:***

The Course shall be of **two** years duration spread over **four** semesters. The maximum duration to complete the course shall be **four** years (**including completion of arrears, if any**).

***Eligibility for admission to Examination:***

**Seventy five(75) percentage of attendance** for theory  
**Seventy five(75) percentage of attendance** for Practicals  
(i.e., % attendance required prescribed if any)

***Medium:***

The medium of instruction shall be **English**

***Passing Minimum:***

Passing eligibility & classification for the award of the Degree is as follows:

**Passing Minimum – 50%; II Class – 50 to 60%; I Class – 60 to 75%;  
Distinction – above 75%**

**PONDICHERRY UNIVERSITY**  
**M.Sc. PLANT SCIENCE – SEMESTER SYSTEM**

Details of papers and scheme of examination  
Effective from the academic year 2010-11

Semester	Title of Papers	University Examinations	Internal Assessment	Total Marks
I	Paper-I Plant Diversity – I (Algae, Fungi, Lichens & Bryophytes)	75	25	100
	Paper-II Plant Diversity – II (Pteridophytes, Gymnosperms & Palaeobotany)	75	25	100
	Paper – III Plant Anatomy, Embryology & Laboratory Techniques	75	25	100
	Practical – I (Covering above three papers)	75	25	100
II	Paper-IV Plant Diversity – III (Taxonomy of Angiosperms)	75	25	100
	Paper-V Plant Ecology, Resource Utilization & Conservation	75	25	100
	Paper-VI Biostatistics & Computer Applications in Biology	75	25	100
	Practical – II (Covering above three papers)	75	25	100
III	Paper-VII Biochemistry & Plant Physiology	75	25	100
	Paper-VIII Cell Biology & Genetics	75	25	100
	Paper-IX Microbiology & Plant Pathology	75	25	100
	Practical – III (Covering above three papers)	75	25	100
IV	Paper-X Plant Molecular Biology & Bioinformatics	75	25	100
	Paper-XI Plant Biotechnology	75	25	100
	Paper-XII Project* (Individual)	75 (Project report)	25 (Viva Voce)	100
	Practical IV	75	25	100
		1200	400	1600

\*Project to be valued by both examiners (internal and examiner); Viva voce with Power Point Presentation

## **PAPER- I PLANT DIVERSITY – I (Algae, Fungi, Lichens & Bryophytes)**

- Objectives:**
1. To learn the diversity, structural organization and reproduction of algae, fungi, lichens and bryophytes.
  2. To make the students aware of the economic value of Thallophytes, Bryophytes and their exploitation by humans.

### **Unit-I**

**7Hrs**

Criteria for algal classification – Chapman's system of algal classification [ In brief, general characters at class level only] – Modern trends in algal classification - Chief algal divisions and their principal characters: Cyanophyta, Chlorophyta, Bacillariophyta, Phaeophyta and Rhodophyta. Thallus organization in Green and Brown algae. Life cycle patterns in Brown and Red algae.

### **Unit -II**

**7Hrs**

Some selected organelles in algae – Chloroplast, Pyrenoid, Eyespot, flagella and Gas vacuoles. Culture of algae in the laboratory - Nitrogen fixation in Cyanobacteria. Beneficial and detrimental aspects of algae: Biotechnological applications of Cyanobacteria – Commercial utilization of brown and red algae. Bioluminescence – Algal bloom, Red tide, and Algal toxins. Algae as indicator of water pollution.

### **Unit-III**

**8Hrs**

Classification of fungi proposed by Alexopoulos and Mims (1979) [ In brief, general characters at class level only]. General characters of the following classes: Myxomycetes, Oomycetes, Zygomycetes, Basidiomycetes and Deuteromycetes - Somatic structure of fungi: mycelial and non mycelial thallus – Reproduction in fungi: Asexual and Sexual. Nutrition in fungi – Fructifications found in Ascomycetes - Patterns of Life cycle in fungi. Economic importance of fungi – Mycotoxins, and mycotoxicoses.

### **Unit- IV**

**6Hrs**

Lichens - Nature of the relationship between algae and fungi in Lichens - Habit and habitat – Classification of Lichens. Fine structure of lichen thallus – Internal structure – Special structures: Clypellae, Cephalodia, Soredia, Isidia and Rhizinae. Reproduction: Asexual reproduction: Fragmentation, Isidia and Soredia – Sexual reproduction – Apothecia of lichen. Economic importance of lichens. Lichen as pollution indicators.

### **Unit-V**

**7Hrs**

Schuter's classification of Liverworts and Reimer's classification of mosses [ In brief, general characters at class level only]. Origin of Bryophytes including fossil evidence - Morphological variations, Anatomical and Cytological studies of Gametophytes and Sporophytes - Dehiscence of capsule and dispersal of spores. Evolution of gametophytes and sporophytes – Affinities of Bryophytes - Progressive sterilization of the sporogenous tissue – Ecology of bryophytes (Pollution indicators and monitoring) – Economic importance of Bryophytes.

### **Practicals:**

Algae:- Study of the morphology and internal structure of the algae with particular reference to the following forms.

*Oscillatoria, Spirulina, Nostoc, Anabaena, Microcystis, Scytonema, Tolypothrix, Westiellopsis, Cylandrospermum,*

*Chlorella, Desmids, Ulva, Caulerpa, Halimeda, Diatoms, Padina, Dictyota, Sargassum, Gracilaria.*

Fungi:- Isolation and identification of fungi from bread, soil, seed & dung. Identification of the following genera –

*Rhizopus, Mucor, Pilobolus, Aspergillus, Penicillium, Trichoderma, Fusarium, Curvularia & Alternaria.* Section cutting

material – *Agaricus, polyporus & Peziza*

Lichens :- *Usnea, Parmelia* thallus and Lichen Apothecium for sectioning.

Bryophyta:- Morphological and Anatomical studies of the following specimens – *Marchantia, Targionia, Reboulia,*

*Dumortiera, Porella, Anthoceros and Pallavicinia.*

### **Text books:**

1. Kumar, H.D. 1988. Introductory Phycology. Affiliated East-West Press Ltd, New Delhi
2. Round, F.E. 1986. The Biology of Algae. Cambridge University Press, Cambridge.
3. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 1996. Introductory Mycology, John Wiley & Sons Inc.
4. Ahmadjan, V. 1973. The Lichens. Academic Press, New Delhi.
5. Rashid, A. 1998. An Introduction of Bryophytes. Vikas Publishing House Pvt. Ltd. New Delhi.

## **PAPER –II PLANT DIVERSITY – II ( Pteridophytes, Gymnosperms & Palaeobotany)**

### **Objectives:**

1. To learn the diversity, structural organization and reproduction of pteridophytes and Gymnosperms.
2. To learn the preserved vestiges of plant life of the geological past .

### **Unit-I**

**6Hrs**

Classification (G.M. Smith) of Pteridophytes – General aspects of the Psilopsida, Lycopsidea, Sphenopsida and Pteropsida . Origin of Pteridophytes: Telome theory; Origin of Leaves; Origin of sporophylls; Origin of roots; Stellar system in Pteridophytes; Comparative account of the important characters of the Psilopsida, Eligulopsida and Ligulopsida.

### **Unit-II**

**7Hrs**

Experimental studies in Pteridophytes: sexuality of Equisetum, sexuality of homosporous ferns, regulatory role of light, hormonal control of antheridial differentiation and archegonial differentiation. Experimental studies on the development of gametophyte – regeneration of gametophyte Reproductive physiology in relevance to genetics. Sporophytes in Pteridophytes- Heterospory and seed habit in Pteridophytes- Economic importance of Pteridophytes.

### **Unit-III**

**7Hrs**

Classification of Gymnosperms by Sporne. General characters of the following orders: Psilophytales, Lepidodendrales, Sphenophyllales and Coenopteridales. Salient features of the following orders: Class: Cycadopsida – Order: 1. Pteridospermales 2. Pentaxylales, Class: Coniferopsida – Order: 1. Coniferales 2. Taxales 3. Ginkgoales. Class: Gnetopsida –Order: 1. Gentales.

### **Unit-IV**

**8Hrs**

Evolutionary tendencies among Gymnosperms – Comparative account of important characters of Cycas and Pinus. Comparative account of important characters of Gnetum and Ephedra. Primary and secondary structure of wood in coniferales only. Organization of male and female cones. Development of male and female gametophytes and embryogeny of class Coniferopsida only. Experimental studies in Gymnosperms. Economic importance of Gymnosperms.

### **Unit-V**

**7Hrs**

Palaeontology – Mega and microfossils - Geological time table – Salient features of Paleozoic Pteridospermae and Mesozoic Pteridospermae Affinities of the Cordaitales, Resemblances with Cycads, Ginkgoales and Pteridosperms. A detailed study of external, internal morphology and reproduction in the following fossils – *Asteroxylon Mackiei*, *Lepidocarpon lomaxi*, *Lyginopteris oldhamia*, *Ginkgo biloba*, and *Cordaites*.

**Practicals:**

1. Study of morphology, anatomy and reproductive structures of *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum*, *Lygodium*, *Gleichenia*, *pteris*, *Ophioglossum*, *Isoetes*, *Ceratopteris*, *Marsilea*, *Cycas*, *Ginkgo*, *Cedrus*, *Araucaria*, *Podocarpus*, *Ephedra*, *Pinus*, and *Gnetum*
2. Study of important fossil forms from slides and specimens.

**Text books:**

1. Sporne, K.K. 1991. The Morphology of Pteridophytes. B.I. Publishing Pvt. Ltd. Bombay.
2. Sporne, K.R. 1974. Morphology of Gymnosperms. Hytchson Univ. Library. London.
3. Vasishta, B.R., A.K. Sinha, and Anil Kumar, 2005. Pteridophyta. S. Chand & co. Ltd. New Delhi.
4. Sambamurty, A.V. S.S. 2005. A Text book of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. I.K. International Pvt. Ltd. New Delhi.
5. Stewart, W.N. and Rathwell, G.W. 1993. Palaeobotany and the Evolution of Plants. Cambridge University press.
6. Bajaj, Y.P.S. 1989. Biotechnology in Agriculture and Forestry. Trees. Vol. II. Springer Verlag. Berlin, Hiedelberg.

### **PAPER-III PLANT ANATOMY, EMBRYOLOGY AND LABORATORY TECHNIQUE**

#### **Objectives:**

- \* To study the internal morphology of root, stem and leaf of angiosperms.
- \* To learn the various techniques used in Botanical laboratory

#### **UNIT-I**

**6Hrs**

Cell wall - types, ultra structure of cell wall, pits, plasmodesmata, functions. Theories of organization of meristem in stem and root. Secondary cambium types - vascular cambium and phellogen - structure and functions. Cambial activity, wound healing and grafting. Nodal anatomy - types.

#### **UNIT-II**

**7Hrs**

Simple tissues structure and their functions. Secondary xylem, secondary phloem - structure and functions. Ontogeny and phylogeny of vessels. Leaf structure - types - ontogeny of dorsiventral leaf. Secondary and anomalous secondary growth in dicot and monocot stems. Wood types & structures.

#### **UNIT-III**

**7Hrs**

Microsporogenesis and male gametophyte development. Megasporogenesis and female gametophyte development. Pollen-pistil interaction, sexual incompatibility .

#### **UNIT-IV**

**7Hrs**

Structure and development of different types of Endosperms. Embryo development - Dicot (*Capsella bursa - pastoris*) monocot (*Luzula forsteri*) polyembryony, apomixes.

#### **UNIT-V**

**8Hrs**

Microtechnique steps - Fixation & fixatives, dehydration clearing, infiltration, embedding & block making, microtome - Rotary, sledge & freezing, Section cutting, staining. Camera lucida – types, principle, Micrometry. Phase contrast microscopy, Electron microscope (TEM & SEM) - principle & preparation techniques. Biochemical techniques; Centrifuges, pH meter, Chromatography, Spectrophotometer, and Electrophoresis.



## **Practicals:**

### **Anatomy**

1. Study of living shoots apices by dissection using aquatic plants such as *Ceratophyllum* and *Hydrilla*.
2. Study of cytohistological zonation in the shoot apical meristem (SAM) in sectioned and doubled stained permanent slides of suitable plant such as *Coleus*, *Kolanchoe*, *Tabacco*.
3. Wood structure – T.S., T.L.S., and R.L.S., - showing variations in vessel elements, fibres, axial parenchyma and ray parenchyma.
4. Examination of different types of pits – secondary wall thickening – annular, helical and scalariform and pitted thickening.
5. Examine of L.S. of root from a permanent preparation to understand the organization of root apical meristem & its derivatives (use maize, aerial roots of banyan, *Pistia*, *Jussiaea* etc.). Origin of lateral roots.
6. Study of leaf anatomy – structure, stomata, trichomes, types of stomata.

### **Embryology:**

1. Study of microsporogenesis in sections of anthers.
2. Study of ultrastructure of male gametophyte with the help of slides and microphotographs.
3. Study of ultrastructure of female gametophyte with the help of slides and microphotographs.
4. Field study of several types of flower with different pollination mechanisms
5. Study of nuclear and cellular endosperm through dissections and staining.
6. Isolation of zygotic globular, heart-shaped, torpedo stage and mature embryos from suitable seeds and polyembryony in Mango, *Citrus* by sections.

### **Laboratory techniques**

1. Study of techniques included in the syllabus..

### **Text books:**

#### **Anatomy**

1. Pandey, B.P. 1978 Plant Anatomy. S, Chand & Co, New Delhi.
2. Esau. K. 1977 Anatomy of Seed Plants. Wiley publications. New Delhi.
3. Fahn, A. 1997 Plant Anatomy, Fourth Edition, Aditya books (P) Ltd, New Delhi
4. Cutter, E.G. 1971 Plant Anatomy, Edward Arnold publication Ltd, London.

## **Embryology**

1. Bhojwani, S.S. and Bhatnagar, S.P. 1981. The Embryology of Angiosperms. Vikas publishing house Ltd, New Delhi.
2. Maheswari P. 1976 An Introduction to Embryology of Angiosperms
3. Rahavan, V. 1976 Experimental Embryogenesis in Vascular Plants, Academic press, London.

## **Microtechnique**

1. Patki, L.R, Balachandra, B.L, and Jeevaji, I.H. An Introduction to Microtechnique. S.Chand & Company, New Delhi.
2. Prasad, M.K, and Prasad, M.K. Outlines of Microtechnique. Emkay Publications, New Delhi.
3. Johaneson, D.A. 1940. Plant Microtechnique - Mc. Graw Hill BookCo., Ins, New Delhi.
4. Sass. J.E. 1958. Botanical Microtechnique.
5. Prakash, M and Arora, C.K Microscopical Methods. Anmol Publications Pvt Ltd. New Delhi
- 6 Prakash, M and Arora, C.K. Laboratory Instrumentation. Anmol Publications Pvt Ltd. New Delhi .

**PAPER-IV PLANT DIVERSITY III,  
(Taxonomy of Angiosperms)**

**Objectives:**

- **To study the principles of taxonomy of angiosperms**
- **To know the local flora**
- **To get training in the identification of angiospermous taxa**
- 

**Unit- I**

**7Hrs**

The Species Concept, Taxonomy hierarchy, species, genus, family and other categories; principles used in assessing relationship, delimitation of taxa and attribution of rank. Salient features of ICBN, Typification, Priority, Homonyms and Tautonyms, Conservation and Rejection of names, Author Citation, Effective and Valid publication.

**Unit-II**

**7Hrs**

Taxonomic evidences: Morphology, Anatomy, Palynology, Embryology, Cytology, Phyto-chemistry, Genome analysis and nucleic acid hybridization. Taxonomic tools: herbarium, floras, histological, cytological, phyto-chemical, serological, biochemical and molecular techniques; computer and GIS.

**Unit – III**

**8Hrs**

System of angiosperm classification: phonetic versus phylogenetic systems; cladistics in taxonomy; relative merits and demerits of major systems of classification; Artificial (Linnaeus), Natural (Bentham and Hooker), Phylogenetic (Hutchinson) and Modern (Cronquist) systems, relevance of taxonomy to conservation.

**Unit –IV**

**6Hrs**

Study of the following Polypetalae & Gamopetalae families and their economic importance: **Menispermaceae, Portulacaceae, Meliaceae, Sapindaceae, Vitaceae, Combretaceae, Lythraceae, Boraginaceae, Gentianaceae, Bignoniaceae, and Acanthaceae.**

**Unit – V**

**7Hrs**

Study of the following Monochlamideae & Monocotyledonae families and their economic importance **Chenopodiaceae, Nyctaginaceae, Loranthaceae, Casuarinaceae, Polygonaceae, Aristolochiaceae, Amarillidaceae, Orchidaceae, Commelinaceae, Araceae, and Cyperaceae.**

### **Practicals:**

1. Description of specimens from representative, locally available families.
2. Description of various species of a genus; location of key characters and preparation of keys to generic level. Location of key characters and use of keys at family level. Training in using floras and herbaria for identification of specimens described in the class.
3. Demonstration of the utility of secondary metabolites in the taxonomy of some appropriate genera.
4. Comparison of different species of a genus and different genera of a family to calculate similarity coefficient and preparations of dendrograms.
5. A study tour under the supervision of lecturers to a place of botanical interest.

Note: The students are required to prepare and submit a brief account of the field survey and **30** herbarium sheets of wild plants.

### **Text books:**

**Grant, W.F.** 1984. Plant Biosystematics. Academic Press, London.

**Henry A.N, M. Chandrabose.** 1980. An aid to International Code of Botanical Nomenclature. Today & Tomorrow's Printers and Publishers. New Delhi.

**Hutchinson, J.** 1973. The Families of Flowering Plants. 3<sup>rd</sup> Edition. Oxford University Press Oxford.

**Heywood, V.H. and Moore, D.M.** 1984. Current Concept in Plant Taxonomy, Academic Press, London.

**Jain, S.K. and R.R. Rao.** 1977. A Handbook of Field and Herbarium Methods. Today & Tomorrow's Printers and Publishers. New Delhi.

**Lawrence, G.H.M.** 1951. Taxonomy of Vascular Plants. The Macmillan Company. New York.

**Nordenstam, B., El Gazaly, G. and kassas, M.** 2000. Plant Systematics for 21<sup>st</sup> Century. Portlant Press Ltd., London.

**Solbrig, O.T.** 1970. Principles and Methods of Plant Biosystematics. The MacMillan Co- Collier- MacMillan Ltd., London.

**Takhtajan, A.L.** 1997. Diversity and Classification of Flowering Plants. Columbia University Press, New York..

**Sivarajan, V.V.** 1991. Introduction to the principle of plant Taxonomy. Oxford IBH Publication Pvt Ltd, New Delhi.

**Subramaniam, N.S.** 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.

## **PAPER – V PLANT ECOLOGY, RESOURCE UTILIZATION AND CONSERVATION**

### **Objectives:**

1. To understand the concepts of plant Ecology
2. To enhance the knowledge of the students in wide array of plant and their interaction with the environment.

### **Unit-I**

**7Hrs**

**Vegetation organization & Development** – Community concepts & their characteristics, ecological succession, nutrient cycling, structure & function of ecosystem, biogeochemical cycle of C, N, P & S, population & the environment, ecads & ecotypes .

### **Unit-II**

**7Hrs**

**Vegetation pattern & Biological diversity** – Major biomes & vegetation, soil, concept of biodiversity, IUCN categories of threat, speciation & extinction, inventory, hot spots, endemism, plant introductions, biodiversity & ecosystem, local plant diversity & its socio – economic importance.

### **Unit-III**

**7Hrs**

**Ecological Pollution & Management** – Air Pollution, Water Pollution & Soil Pollution (Sources, effects on plants & ecosystem, control measures), Climatic change, Green house effect, Global warming, Ozone layer depletion, UV radiation & their impacts on vegetation, Environmental Impact Assessment, Ecosystem restoration, Sustainable development.

### **Unit-IV**

**7Hrs**

**Plant resources:** Plant resources – Global and national scenario (terrestrial and marine), various utility values of plant resources (food, fodder, timber, medicinal, aromatic, oil, ornamental, ethical, aesthetic and option values), Ecosystems in India with rich biological diversity (mangroves, coral reefs, wetlands and sub-tropical forests) and threats to these resources (natural and manmade).

### **Unit V**

**7Hrs**

**Conservation and Management of Biodiversity:** Need for conserving the biodiversity, International and National aid, policies and legal assistance, Detailed account on *In-situ* and *Ex-situ* conservation methods.

**Practicals:**

1. To calculate mean, variance, deviation, standard error, students t- test, chi square test for comparing two variables related to ecological data.
2. To find out relationship between two ecological variables using correlation coefficient and regression equation.
3. To determine minimum size of quadrat required for the estimation of biomass in grassland ecosystem
5. To study the community by quadrat method by determining frequency, density, abundance & importance Value Index
6. To determine soil moisture, porosity and bulk density and water holding capacity of soil collected from varying depth at different locations.
7. To estimate chlorophyll content in SO<sub>2</sub> fumigated and unfumigated plant leaves.
8. To estimate dissolved oxygen content in water samples collected from different sources.
9. To perform simple test for tannins/alkaloid/oil/Starch /Protein.
9. Primary productivity measurement using Light and Dark Bottle method.
10. Field visit to any of the protected habitat or ecosystem with rich biological diversity to assess and document the values and threats.
11. Scientific visit to institutes which are involved in conserving biological diversity to learn the conservation strategies.

**Text books:**

1. Odum, E.P. 1971. Fundamentals of Ecology. Saunders, Philadelphia
2. Sharma. P. D.1988 Elements of Ecology
3. Ambast, R. S. Ecology Students Friends Publications, Varanasi.
4. Ecology and Environment by P.D. Sharma
5. Umar U and Asija M. 1997 Biodiversity: Principles and Conservation (2<sup>nd</sup> Edn), Agrobios Jodhpur.
6. Brain Groombridge (Ed)1987..Global Biodiversity: Status of Earths Living resources, Chapman & Hall London.

## **PAPER VI - Biostatistics and Computer applications in biology**

### **Objectives:**

- **To learn basic principles of biostatistics**
- **To make students aware of computer applications in biology**

### **Unit-I**

**6Hrs**

**Biostatistics:** Introduction to Biostatistics, measures of central tendency and measures of dispersion - Measures of variation.

### **Unit-II**

**7Hrs**

**Hypothesis testing :** Student's t-test, Chi-square test, Anova(one way), Correlation (simple) and regression. Experimental designing, planning of an experiment, replication and randomization.

### **Unit-III**

**9Hrs**

**Introduction to computers:** Computer types; basic Computer organization; RAM, ROM, PROM and EPROM, Cache memory; Input-output and storage devices; concepts of different operation systems; details of Networks; internet & email; browsing and designing web pages using HTML. Databases types and its uses; fundamentals of digital imaging, uses of programming languages.

### **Unit IV**

**7Hrs**

**Computers and Biology:** botanical softwares and its uses, Introduction to Bioinformatics and its applications, EMBL and GenBank and DDBJ Data libraries, PIR Database, Fundamentals of Geographic Information Systems (GIS) and Remote Sensing and its uses in biology, Information systems – BTIS, ENVIS.

### **Unit V**

**7Hrs**

**Softwares used in Biology:** Outline of MS-Office (MS-Word, MS-Excel and MS-Power point), Database softwares – MS access, Image editing softwares (Photoshop), Biological Sequence searching and comparison softwares (Blast), Search engines (Google), GIS Softwares (Google Earth).

### **Practicals:**

1. Use of computer and statistical packages (MS-Excel in built in MS-office or SPSS or Minitab) for computation of mean, standard deviation, correlation and annova)
2. Tabulation and graphical representation of scientific data using MS-Excel
3. To plot and import Graphs and charts using biological & statically data in MS-office
4. Search biological information (Texts and images) using internet
5. Biological sequence searching using Blast software

### **Text books:**

1. Pranap Kumar Banarjee, 1887. Introduction to Biostatistics (A text book of Biometry), S.Chand & Co, New Delhi
2. Gould I.F and Gould, G.F. 2001. Biostatistics basics, A student handbook, First edition, WH Freeman company.London.
3. Campbell, R.C, 1986. Biostatistics for biologists, Third Edition, Cambridge Univ. Press. London.
4. Computer - An Introduction, BPB Publication, New Delhi
5. Mastering MS-office 2000, Professional edition, BPB Publication, New Delhi
6. Genbank: <http://www.ncbi.nlm.nih.gov/genbank/index.html>
7. EMBL Nucleotide Sequence Database <http://www.ebi.ac.uk/embl.html>
8. Abraham Silberschatz, Henry f Korth, 1998. Data Base Concept 3rd edition McGraw Hill, New York.
9. C. J. Date, 1994 An Introduction to Database Systems, , Addison-Wesley, New York.
10. R.G. Dromey, 1995. How to solve it by Computer, Prentice Hall of India. New Delhi.
11. M. Mano, 1991. Computer System Architecture, 3rd Edition, Prentice-Hall India, New Delhi.
12. D.Harm, Baker: 1997. Computer Graphics, Prentice Hall of India. New Delhi.
13. D.F.Rogers 1992. Procedural Elements for Computer Graphics, McGraw Hill. New York.

### **1. Introduction to Computer**

Its Types and uses, Computer Generations, Hardware, software, Elements of computer system, Number Systems:- Decimal, Binary, Octal, hexadecimal, Storage Devices- primary memory, Secondary Memory, Input and output devices.

### **2. Operating system**

Basic Concepts, Organization, functions, operations and types, Features of DOS, Windows and Unix operating systems. Dos Commands.

### **3. Data Transmission and Networks**

Basic Concepts LAN, MAN, WAN. Network Topologies, TCP/IP, Worldwide web, URL, HTML. Transmission Media.

### **4. Programming**

High Level languages, Machine languages, Syntax, semantics. Compiler, Interpreter Algorithms and Flowchart.

### **5. Programming Language 'C'**



Data types, Constants, variables, Operators, symbolic constants, input and output, increment and decrement operators. Control Structures: while, do- while, for, if, if-else, and switch statement. Functions, header files, recursion, pointers and arrays, structures.

## **6. Application software**

Word processing, formatting, printing setups, mail merge, Table Handling, picture handling, spreadsheet programs, workbooks/ worksheets, formatting of sheets, formulae and functions, graphs, Import and export of files / data. Presentation Packages, Slide designing.

### **Practicals**

Introduction to various components of computer, Use of External & Internal DOS Commands, MS- Office – MS Word, MS, Excel, Powerpoint. A simple documentation preparation & printing. Usage of printer & other components. Simple programs in C.

### **Books Recommended**

1. V. Rajaraman: Fundamentals of computer, Iind Edition, East Economy Edition.
2. E. Balaguruseamy: Programming In C, TMH Pub
3. D.S. Yadav: Fundamentals of Information Technology, New Age Publication.
4. P.K. Sinha: Fundamentals of Computer
5. Computer Architecture (Schaum's outline) CARTER, TMH

## **FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS**

### **PRACTICALS**

Evolution of Computers - Organization of Modern Digital Computers-Single user

Operating System-

Multitasking OS-GUI

- a) Word Processing
- b) Data Base Management System
- c) Spread Sheet Package
- d) Presentation Software

Database Management Systems-Data views-Architecture-Data models-Data Dictionary-Relational Databases.

**BLUE PRINT OF QUESTION PAPER FOR M.Sc. PLANT SCIENCE**  
(Effective from the academic year 2010-11)

Time – 3 hrs  
Max. Marks – 75

**Section – A**

Answer **all** the questions. Each answer should not exceed 50 words.

Two questions from each unit (10 x 2 = 20 marks)

- |             |             |
|-------------|-------------|
| 1. Unit I   | 6. Unit III |
| 2. Unit I   | 7. Unit IV  |
| 3. Unit II  | 8. Unit IV  |
| 4. Unit II  | 9. Unit V   |
| 5. Unit III | 10. Unit V  |

**Section – B**

Answer **all** the questions. Each answer should not exceed 200 words.

Two questions from each unit (5 x 5 = 25 marks)

- 11 a) Unit I  
or  
11 b) Unit I
- 12 a) Unit II  
or  
12 b) Unit II
- 13 a) Unit III  
or  
13 b) Unit III
- 14 a) Unit IV  
or  
14 b) Unit IV
- 15 a) Unit V  
or  
15 b) Unit V

**Section – C**

Answer any **three** questions. Each answer should not exceed 600 words.

One question from each unit (10 x 3 = 30 marks)

16. Unit I
17. Unit II
18. Unit III
19. Unit IV
20. Unit V

**BLUE PRINT OF PRACTICAL QUESTION PAPER FOR M.Sc. PLANT  
SCIENCE**

(Effective from the academic year 2010-11)

**PRACTICAL PAPER – I (Covering Theory Papers I,II & III)**

Time –4 Hrs.

Max. Marks – 75

1. Make a suitable micro preparations of A,B,C & D. Draw labeled sketches and identify them giving reasons. Leave the slide for valuation.

(Slide-2 marks, Identification-1 mark, Sketch-1 mark, Notes-1 mark) **4x5=20 Marks.**

2. Make a suitable micro preparation (T.S/L.S) of specimen E. Identify giving reasons. Draw labeled sketches. Leave the slide for valuation.

(Slide-2 marks, Identification-1 mark, Sketch-1 mark, Notes-1 mark) **1x5=05 Marks.**

3. Make a T.S of anther of the given specimen F. . Identify the stages giving reasons. Draw labeled sketches. Leave the slide for valuation.

(Slide-2 marks, Identification-1 mark, Sketch-1 mark, Notes-1 mark) **1x5=05 Marks.**

4. Identify, draw and write notes on G,H,I & J.

(Identification-1 mark, Sketch-1 mark, Notes-1 mark)

**4x3=12 Marks.**

5. Identify, draw and write notes on K,L,M,N,O & P.

(Identification-1 mark, Sketch-2 marks, Notes-2 marks)

**5x6=30 Marks.**

6. Comment on Q.

(Identification-1 mark, Notes-2 marks)

**1x3=03 Marks.**

**KEY**

A	ALGAE	SECTION	
B	FUNGI	SECTION	
C	PTERIDOPHYTE	SECTION	
D	GYMNOSPERMS	SECTION	
E	ANATOMY	SECTION	
F	EMBRYOLOGY	SECTION	
G	ALGAE	SLIDE/SPECIMEN	
H	FUNGI	SLIDE/SPECIMEN	
I	LICHENS	SLIDE/SPECIMEN	
J	BRYOPHYTES	SLIDE/SPECIMEN	
K	PTERIDOPHYTE	SLIDE/SPECIMEN	
L	GYMNOSPERMS	SLIDE/SPECIMEN	

M	PALEOBOTANY	SLIDE/SPECIMEN	
N	ANATOMY	SLIDE/SPECIMEN	
O	EMBRYOLOGY	SLIDE/SPECIMEN	
P	LAB. TECHNIQUE	APPARATUS	
Q	BRYOPHYTES	MACRO SPECIMEN	

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**PRACTICAL PAPER – II (Covering Theory Papers IV,V & VI)**

Time –4 Hrs.

Max. Marks – 75

1. Describe the given specimens A & B in technical terms and assign them to their respective families giving reasons. Draw flower.L.S, & Floral diagram. Write Floral formula.

(Identification-1 ,Technical description-2 ,Flower.L.S-1,Floral diagram-1,Floral formula-1,Reasons-1) **2x7=14Marks.**

2. Using the given plant specimens A,B,C,D & E prepare a taxonomic key for identification.

**1x5=05 Marks.**

3. Determine frequency, abundance and density of the given vegetation in F by using quadrat method. Estimate Importance Value Index.

(Frequency-2, abundance-2, density-2,IVI-2)

**1x8=08 Marks.**

4. Performs simple test for tannin/Alkaloid/Oil/Starch/Protein in G.

(Procedure 4, setup 2, results 1)

**1x7=07 Marks**

5. Solve the given problem H

**1x10=10 Marks**

6. Tabulate and graphically represent the given scientific data in I using MS-Excel

**1x10=10 Marks**

7. Identify, draw and write notes on J,K and L

(Identification - 1 , Diagram -2, notes -2).

**3x5=15 Marks**

8. Submission of herbarium sheets

**=06 Marks**

**KEY**

A	TAXONOMY	SPECIMEN	
B	TAXONOMY	SPECIMEN	
C	TAXONOMY	SPECIMEN	
D	TAXONOMY	SPECIMEN	
E	TAXONOMY	SPECIMEN	
F	ECOLOGY	PROBLEM	
G	RESOURCES	TEST	
H	BIO-STATISTICS	PROBLEM	
I	COMP.APPLICATION	PROBLEM	

J	ECOLOGY	SLIDE/SPECIMEN	
K	RESOURCES	SLIDE/SPECIMEN	
L	COMP.APPLICATION	EXHIBIT	