Annexure - 9

PERIYAR UNIVERSITY
SALEM – 636011

PERIYAR INSTITUTE OF DISTANCE EDUCATION
(PRIDE)

M.Sc., Botany

Regulations and Syllabus

Effective from the academic year

2007 – 2008 and thereafter

PERIYAR UNIVERSITY
SALEM – 11
M.Sc. BOTANY
REGULATION AND SYLLABUS
REGULATIONS

Eligibility

A pass in the B.Sc., Botany with any Ancillary Subject. Preference in admission will be given to teachers in recognised schools and Research Assistants in research institutions and laboratories, besides meritorious candidates.

Examinations

There shall be two examinations, one at the end of the First year (part – I) and another at the end of the Second year (Part – II).

A candidate will be permitted to go to the second year. If he / she has been permitted to sit for the 1 year examination, irrespective of his / her performance in the I year examination.

The examination for the degree shall consist of theory and practicals. Each candidate shall submit his laboratory record note books of all his / her practical work performed during the period of study for the examination. The record should be countersigned by the teachers, as a bonafide record of work performed by the candidates. it shall be submitted on the day of practical examination.

Scheme of Examinations

First Year

	Name of the Papers	Duration Hours	Maximum Marks
Theory			
Paper – I	Algae, Fungi, Lichens, Plant Pathology and Bryophytes	3	100
Paper – II	Pteridophytes and Gymnosperms and Palaeobotany	3	100
Paper – III	Taxonomy of Angiosperms and Economic importance	3	100
Paper – IV	Plant Anatomy, Embryology and Microtechnique	3	100
			400
Practical- I	Theory Papers I and II	4	150
Practical-II	Theory Papers III and IV	4	150
			300
	Total Marks of Part – I = (400+300)		**700**

Second Year

	Name of the Papers	Duration Hours	Maximum Marks
Theory			
Paper – V	Cell Biology and Genetics	3	100
Paper – VI	Microbiology and Biotechnology	3	100
Paper – VII	Plant Physiology and Biochemistry	3	100
Paper – VIII	Plant Ecology and Phytogeography	3	100
			400
Practical- I	Theory Papers V and VI		150
Practical-II	Theory Papers VII and VIII	4	150
		4	
	Total Marks of Part – II = (400+300)		**300**
	Grand Total		**700**
	Part-I and Part-II=(700+700)		**1400**

Note : Those who fail in the theory / practical examinations, may reappear for such examination alone. The marks once awarded for records, Herbarium and submission will remain the same and will be considered for any reappearance.

Passing Minimum

A candidate must secure 50% of marks for a pass in each theory or / and practical.

Classification of Candidates

I. Candidates who secured 60% and more of marks in the aggregate in the whole examination shall be declared to have passed the examination in First Class.

II. Candidates who obtain 75% and more of marks in the aggregatc shall be provided to have passed the examination in First Class with distinction provided they pass all the examinations prescribed for the course in the first appearance.

III. Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course are only eligible for ranking, if he / she stands first in the total marks amongst his / her calssmates of that period.

IV. All other successful candidates shall be declared to have passed in Second Class.

PAPER – I

ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND BRYOPHYTES

UNIT – I

Classification of algae (F.E. Fritsch). Range of cell structure – prokaryotic and Eukaryotic cell organisation. Thallus organisation in algae. Evolution trends seen in Chlorophyceae, Phaeophyceae and Rhodophyceae. Economic importance of algae.

UNIT – II

Systematic position, distribution, thallus structure, cell structure, pigmentation, method of reproduction and life history of the following genera of algae.

Scytonema, Hydrodictyon, Cladophora, Enteromorpha, Nitella, Cyclotella, Padina, Batrachospermum and Gracilaria.

UNIT – III

Classification (Alexopoulos) of fungi. Spore dispersal mechanism in fungi. Nutrition in fungi. Economic importance of fungi.

Detailed study of the occurrence, structure and reproduction of the following genera of fungi.

Peranospora, Rhizopus, Yeast, Penicillium, Puccinia, Lycoperdon and Fusarium.

A general account of lichens with special reference to their structure, nutrition, reproduction and economic importance.

UNIT – IV

Stages in plant disease development, inoculum – predisposition – penetration – infection – invasion – growth, reproduction and dispersal of pathogen.

Host – pathogen interaction – physiological, chemical and bio – defence mechanism in host.

Plant disease control – prophylaction – protection – chemical, environmental manipulation – sanitation – biological control of disease.

Study of the follwoing plant disease with reference to causes, symptoms, dissemination, control and preventive measures – Bacterial blight of Rice, wilt of cotton, Bunchy top of banana, Little leaf of Brinjal.

UNIT – V

Thallus organisation of gametophytes and range of structure and evolution of sporophytes in Bryophytes. Vegetative reproduction in Bryophytes. Origin of Bryophytes. Ecology of Bryophytes.

Structure and reproduction of the following genera of Bryophytes – Reboulia, Porella, Anthoceros and Sphagnum.

Reference Books

Algae

1. Bold H.C. and Wyne M.J. 1978 Introduction to Algae (structure and reproduction) Prentice hall of India Ltd.
2. Borowitzka, M.A., and L.J. Borowitzka, M.A., and L.J. Borowtizka (eds) 1987 Microalgal Biotechnology, Cambridge univ. press.
3. Chapman V.J. and D.J. Chapman 1981 The Algal E.L.B.s. Edn.
4. Dodge, J.D. 1973. The fine structure of algal cells, Academic press, New york.
5. Fritsch F.E. 1945, 1955 The structure and reproduction of algal vol – I, II
6. Kumar, H.D., Algal Cell Biology Affiliated East west press.
7. Kumar., H.D., and H.N., Singh 1982. A text book of algae. Affiliated East west press.
8. Lee, R.E. 1987 Phycology Cambridge university press.
9. Smith, G.M. (Ed) Cryptogamic Botany Vol I.
10. Silva, P.C. 1982 (In sybil P. Parker Ed) Algae.
11. Venkataraman, G.S. et al Algal. From and Function Today and Tomorrow Publications.

Fungi and Lichens

1. Anisworth S.E., S.L., Sparrow and A.D. Sussman. The fungi an advanced treatise vols. I, II, III, IV – A and IV – B. Acadamic press, Newyork.
2. Alexopoulos, C.J. and C.W. Mims 1979. Introductory mycology Wiley Eastern Publication New Delhi.

3. Bold, H.C., et al. 1980 Morphology of Plant and Fungi Harper and Row Publication inc, Newyork.
4. Bessey, E.A. 1979 Morphology and Taxonomy of Fungi, Vikas Publication House Pvt.Ltd. New Delhi.
5. Burnet, J.H. 1971. The fundamentals of Mycology, ELMS Publication London.
6. Dube, H.C., An Introduction to fungi, Vikas Publication House Ltd, New Delhi.
7. Sharma. P.D. 1989. The fungi, Rastogi, Meerut.
8. Webster. An Introduction to Fungi, Cambridge university press, London
9. Ahmadjian, V. and Hale, N.E. 1973. The Lichens, Academic press, Newyork.
10. Hale Jr. M.E., 1983 Biology of Lichens. Edward Arnold Maryland.

Bryophyta

1. Cavers, I. 1980. The interrelationships of Bryophytes.
2. Chopra, R.N. and P.K. Kumar 1988 Biology of Bryophytes, John wiley Newyork.
3. Graham, L.E. 1993 Origin of land plants, John wiley New york.
4. Puri, P. 1990, Bryophytes, Morphology, growth and differentiation. Atmaram and sons.
5. Smith, A.J.E. 1982. Bryophyte ecology. Chapman and Hall. London
6. Smith, G.M. Cryptogamic Botany Vol. II
7. Watson, E.V. 1968 British Mosses and Liver worts.
8. Watson, E.V. 1970 Structure and life of Bryophytes Hutshinson and co. London
9. Parihar, N.S. An Introduction to embryophyta I Bryophyta.
10. Ram udar., 1976 Bryology in India.

Plant pathology

1. Singh, R.S., Plant Pathogens.
2. Mehrotra, R.S., Plant Pathology Tata Mc. Graw Hill
3. Agnihotri., et.al. 1989 perspective in phytopathology. Today and Tomorrow publishers.
4. Bilgrami, K.S. and H.C. Dube 1976. A text book of modern plant pathology, Vikas Publications.
5. Nagarajan., S. 1983 plant diseases Epidemilogy oxford IBH.
6. Agries, N. 1969 Plant Pathology Academic press.
7. Mukherji, K.G. and Bhasin J. 1972 plant disease of India. A source book. Tata Megrew Hill.
8. Rangasamy. G. 1988 Disease of crop plants in India. Prentice Hall of India.

Practicals

Detailed study of the vegetative and reproductive morphology of the genera of Algae, Fungi, Lichens and Bryophytes included in the syllabus. Study of the disease mentioned in the sysllabus.

PAPER – I

ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND BRYOPHYTES.

Time : 3 Hours **Maximum : 100 Marks**

Draw diagrams wherever necessary
Part – A (5 X 5 = 25 Marks)
Answer All Questions

1. (a) Give a brief account of prokaryotic cell

Or

(b) Describe the branching and cell structure of Cladophora.

2. (a) Describe briefly alternation of generation in an algae.

Or

(b) Describe briefly the structure and a sexual reproduction in Cyclotella.

3. (a) Describe the types of spores produced by Puccinia graminis.

Or

(b) Write notes on the economic importance of lichens.

4. (a) Write short note Little leaf of Brinjal

Or

(b) Explain the causal organism, symptoms and control measures of Blight of Rice.

5. (a) Describe the structure and morphology of Reboulia.

Or

(b) Write an account of any four vegetative reproduction in Bryophytes.

Part – B (5 X 15 = 75 marks)

Answer all questions.

6. (a) Trace the lines of evolution in the thalli organisation of chorophyceae.

Or

(b) Explain the unique features of Nitella. How is it more advanced among the Charophyta.

7. (a) Write an essay on organisation of thallus, cell structure asexual and sexual reproduction in Bactrochospermum.

Or

(b) Write an essay on the economic importance of algae

8. (a) Describe the different mechanisms of spore dispersal in fungi

Or

(b) Describe different types of fruit bodies in fungi.

9. (a) Describe the biological method of controlling the disease.

Or

(b) What are the various types of defense mechanisms exhibited by plants and explain any four in detail.

10. (a) Describe the structure and evolution of sporophytes in bryophytes.

Or

(b) Describe the structure and reproduction of Sphagnum.

PAPER – II

PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

OBJECTIVE

To understand the general features, Origin, Structure (External and Internal), Reproduction, Evolution and Economic importance of Pteridophytes and Gymnosperms. Also to impart knowledge on Fossilization, Geological time scale, structural details of fossil plants of these groups and techniques of fossil study.

UNIT I

General features of Pteridophytes – Classification of Pteridophytes (Sporne, 1965) – Stelar evolution – Origin of Pteridophytes – Heterospory and seed habit – Apogamy and Apospory – Spore producing organs and evolution of sorus – Economic importance.

UINT II

Range in Morphology, Structure, Reproduction, Gametophyte and Embryogeny in Psilotum, Equisetum, Isoetes, Ophioglossum, Angiopteris, Osmunda, Pteris and Salvinia.

UNIT III

General characters, Distribution, Phylogeny, and Economic Importance of Gymnosperms – Classification of Gymnosperms (Sporne 1965) – Evolution of male and female gametophytes in Gymnosperms.

UNIT IV

Morphology Anatomy, Reproduction and Phylogeny of Cycas, Cupressus, Ginkgo and Gnetum.

UNIT V

Geological Time Scale – Types of Fossils – Methods of Fossilization – A study of the following fossils of Pteridophytes and Gymnosperms.

Pteridophytes	**Gymnosperms**.
A. Rhynia	A. Lagenostoma
B. Lepidodendron	B. Cordites
C. Calamites	C. Pentoxylon.

PRACTICALS

01. Structural details of the vegetative and reproductive parts of the types included in unit II and unit IV of the theory syllabus.
02. Structural details of the fossils through fossil slides.

REFERENCE BOOKS

1. Parihar, N.S. The biology and Morphology of Pteridophytes. Central book Depot, Allahabad.
2. Rashid, A. 1979. An Introduction to Pteridophyta, Vikas Publishing house, New Delhi.
3. Sporne, K.R. 1965. The Morphology of Pteridophytes Hutchinson London.
4. Surange. K.G. 1966. Indian Fossil Pterdophytes C.S.I.R. New Delhi.
5. Vashista B.R. 1987. Pteridophyta. S. chand & co, New Delhi.
6. Beck, G.E. 198. Origin and Evolution of Gymnosperms, Colombia University Press.
7. Bhatnagar and Misra 1996. Gymnosperms. New age International Publishers, New Delhi.
8. Chamberlain, C.J. 1934. Gymnosperms : Structure and Evolution. Chicago (Reprinted 1950) New York.
9. Coulter and Chamberlin, 1971. Morphology of Gymnosperms.
10. Dalimore and Jackson, 1948. A Hand Book of Coniferales.
11. Grehass, P. 1955. Identification of Living Gymnosperms on the basis of Xylotomy.
12. Sporne, H.R. 1965. The Morophology of Gymnosperms, Hutchinson University press.

PAPER - II

PTERDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

Time : 3hrs Maximum : 100 marks

(Draw labeled sketches wherever necessary)

PART - A

Answer all the questions (5 x 5 = 25)

1. (a) Give the important features of the gametophytes of pteridophytes.

Or

(b) List out the salient features of the morphology of pteridophytes.

2. (a) Write a short note on Psilophytales.

Or

(b) What are the important features of Isoetales.

3. (a) Describe the structure of sorus in Angiopteris.

Or

(b) Describe the internal structure of Equisetum stem.

4. (a) Explain the anatomy of the Gnetum stem

Or

(b) Describe the structure of Cordaites Leaf

5. (a) Write a short note on cycadales.

Or

(b) Explain the structure of stem in Cupressus.

PART- B

Answer all the questions (5 x 15 = 75)

6. (a) Give an account on the Reimer's classification of pteridophytes.

Or

(b) Write an essay on the evolution of sporophytes in Pteridophytes.

7. (a) Enumerate the salient features of the Ophioglossales.

Or

(b) Give an account on Osmundales.

8. (a) Write an essay on Heterspory and seed habit

Or

(b) Explain the different methods of fossilization in Pteridophytes.

9. (a) Explain the evolution of female gametophytes in gymnosperms.

Or

(b) Give an account on the economic importance of Gymnosperms

10. (a) Give an account on Pentoxylales.

Or

(b) Write an essay on the evolution of Coniferales.

PAPER III

TAXONOMY OF ANGIOSPERMS AND ECONOMIC IMPORTANCE

UNIT – I

A detailed account of the classification of Linnaeus. Bentham and Hooker, Cronquist (Including Merits and demerits). Phylogeny of Angiosperms. National and International herbaria.

UNIT – II

Modern trends in classification Taximetrics, Chemotaxonomy, Botanical Survey of India [BSI]. ICBN, Herbarium technique. Typification, Priority, Publication, Author Citation.

UNIT – III

A detailed account of the following families and their economic importance.

Ranunculaceae
Magnoliaceae
Capparidaceae
Caryophyllaceae
Meliaceae
Sapindaceae

UNIT – IV

Asteraceae
Sapotaceae
Asclepiadaceae
Solanaceae
Bignoniaceae
Verbenaceae

UNIT – V

Amaranthaceae
Euphorbiaceae
Casuarinaceae
Typhaceae
Poaceae
Zingiberaceae

PRACTICALS

Taxonomy

Identification of specimens belonging to the families included in theory syllabus at family, generic and specific levels. Familiarity with the use of floras.

REFERENCE

1. Annie Roland 2005, Taxonomy of Angiosperms, Saras Publications, Nagercoil.
2. Cronquist, A 1968. The Evolution and classification of flowering plants.
3. Davis, P.H. & Heywood, V.M. 1965 Principle of Angiosperm Taxonomy, Oliver and Boyd. Edinburh.
4. Gamble, J.S. and L.E.F. Fisher 1967. The Flora of the Presidency of Madras Vol – I, II, III, BSI, Calcutta.
5. Grant, E.F. 1984 Plant Biosystematics, Academic Press Inc. Canada.
6. Heywood, V.H. 1967 Plant Taxonomy, Edward Arnold, Great Britain.
7. Hutchinson, J. 1973. The families of flowering plants 3rd Edn Oxford University Press, London.
8. Jeffery, C. An Introduction to Plant Taxonomy J & A Churchill Ltd, London.
9. Lawerence, G.H.M 1955. The Taxonomy of Vascular Plants. Central Book Depot, Allahabad – Vo I, II, III and IV
10. Mathew, K.M. 1983. The Flora of Tamil Nadu – Carnatic. The Rapinat Herbarium, Trichy.
11. Porter, C.L, Taxonomy of flowering plants Eurasia publishing house, New Delhi.
12. Rendle, A.B. the Classification of flowering plants Vol. I and II.

13. Santapau, H and H.D. Henry 1994. A dictionary of flowering plants of India C.S.N New Delhi.
14. Singh, V. and V.K. Jain, 1989. Taxonomy of Angiosperms Rastogi Publication, Meerut.
15. Sivarajan, V.V. 1989 Introduction to Principles of Plant Taxonomy. Oxford and IBH, New Delhi.
16. Subramaniyam, N.S. 1995. Modern Plant Taxonomy Vikas Publishing House, New Delhi.

PAPER - III

TAXONOMY OF ANGIOSPERMS AND ECONOMIC IMPORTANCE

Time : 3hrs Maximum : 100 Marks

PART – A

Answer all questions (5 X 5 = 25)

1. (a) Explain the natural system of classification

Or

(b) Discuss the ancestors of angiosperms

2. (a) Write a short notes on BSI.

Or

(b) Comment on Taximetrics

3. (a) Bring out the characteristic features of Magnoliaceae

Or

(b) Write notes on the Floral variation in Meliaceae

4. (a) Describe the general features of Sapotaceae

Or

(b) Write on the Adnation in Solanaceae

5. (a) Write notes on the Floral variation in Euphorbiaceae

Or

(b) Discuss the systematic position of Casuarinaceae

PART – B

Answer all questions (5 X 15 = 75 Marks)

6. (a) Give an account on Engler and Prantl's classification.

Or

(b) Write an essay on the origin and evolution of Angiosperms.

7. (a) Give the organisation, function and Contribution of BSI.

Or

(b) Write an essay on chemotaxonamy.

8. (a) Give a comparative account of the families of Capparidaceae and Caryophyllaceae.

Or

(b) Bring out the economic value of the following families

1. Magnoliaceae
2. Sapindaceae
3. Meliaceae.

9. (a) Describe the features of Asclepiadceae.

Or

(b) Floral variation in Bignoniaceae and Verbenaceae.

10. (a) Describe the features of Amaranthaceae and Polygalaceae.

Or

(b) Give a comparative account of Typhaceae and Poaceae.

PAPER - IV

PLANT ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE

UNIT – I

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

Simple tissues structure and their functions. Secondary xylem, secondary pholem – structure and functions. Ontogeny and phylogeny of vessels. Leaf structure – types – ontogeny of dorsivental leaf. Secondary and anomalous secondary growth in dicot and monocot stems. wood types & structures.

UNIT – III

Microsporogenesis and male gametophyte development. Megasporogenesis and femalegemetophyte development. Pollen–pistil interaction, sexual incompatibility.

UNIT – IV

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

UNIT – V

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.

PRACTICALS

Study of suitable examples to understand the anatomy of plants based on the theory syllabus.

Suitable examples to illustrate the features in the theory syllabus with the help of embyro mounting, pollen types, and whole mounts.

Knowledge of the function of rotary and sledge microtome. Measure and calculate the macerated elements by micrometry. Submission of 5 double stained permanent hand sections.

REFERENCE BOOKS

Anatomy

1. Pandey, B.P. 1978 Plant Anatomy. S, Chand & Co, New Delhi.
2. Esau. K. 1977 Antomy of seed plants. Wiley publications.
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, Balachandra and Jeevaji, An introduction to Microtechnique

2. Johanesen, D.A. 1940. Plant microtecnique – Mc. Graw Hill BookCo., Ins, New Delhi.
3. Sass. J.E. 1958. Botanical Microtechnique.

PAPER - IV

PLANT ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE

PART – A

Answer all questions (5 X 5 = 25)

1. Write a short notes on periderm

   Or

   Write notes on plasmodesmata

2. Describe the ontogeny of dorsivental leaf

   Or

   Explain the different types of sclereids.

3. Explain Hypostase and Epistase

   Or

   Explain pollen kitt and its function.

4. Write a short notes on ruminate endosperm

   Or

   Write short notes on Apomixis

5. Write a short notes on camera Lucida

   Or

   Write a short notes on Fixatives.

PART – B

Answer all questions (5 X 15 = 75)

6. Describe the different theories of shoot apical meristem.

   Or

   Explain the structure of vascular cambium

7. Describe the structure and function of secondary xylem

Or

Describe the anomalous secondary growth in Dicot stem

8. Write an essay about the development of male gemetophyte

Or

Write an essay on sexual imcompatibility

9. Give an account of polyembryony

Or

Write an essay about the embyro development in Dicot (Capsella)

10. Write an essay on parrafin and Freezing microtome

Or

Write an essay on Transmission Electron microscope.

PAPER - V

CELL BIOLOGY AND GENETICS

UNIT - I

General Organisation of Plant cell. Molecular Organisation of the cell membrane; cell permeability. Types of Plastids. Ultrastructure, function and biogenesis of chloroplast.

Structure and function of mitochondria. Ultrastructure and function of Endoplasmic retriculum, Ribosomes and Dictyosomes. Microbodies – Peroxysomes and Glyoxysomes.

UNIT - II

Ultrastructure of Nucleus. Cell cycle and cell division – Mitosis and Meiosis. Morphology, ultrastructure and types of chromosomes.

Special types of chromosomes – Polytene chromosome, Lampbrush chromosome, B – chromosome and Isochromosomes. Identification of chromosomes – Banding technique.

UNIT - III

Mendel's work – Monohybrid cross and law of segregation; Dihybrid cross and law of independent assortment. Interaction of genes – (Incomplete dominance; Co-dominance, Epistasis, Complementary genes, Duplicate genes). Quantitative inheritance, Multiple alleles, with reference to blood group in humans. Linkage and recombination – gene mapping.

UNIT- IV

The genetic control of sex in plants : Sex chromosomes and sex – linked inheritance, extranuclear transmission of traits. Variation in chromosomes number; chromosomal aberrations.

Chemical nature of DNA and RNA. Replication of DNA.

UNIT - V

Gene transcription, genetic code and translation. Genetic regulation in prokaryotes (The Lac operon model). Mutation types – Mutagenic agents; Significance of mutation.

Gene and genotype frequencies; The Hardy – Weinberg Law.

PRACTICALS

1. Study of mitosis and meiosis - squash and smear techniques.
2. Demonstration of salivary gland chromosomes.
3. Examination of electron micrographs of cell organelles.
4. Genetic problems in mendelism, gene interactions and sex linkage.
5. Construction of chromosomes map.

REFERENCE

1. De. Robertis, E.D.P. and De Robertis, E.M.F., Jr. (2001) Cell and molecular biology. A Wolters Kluwer Company, Newyork.
2. Gupta, P.K. (1999) Cell and molecular biology. Rastogi Publications, Meerut, India.
3. Wilson and Morrison, (1977) Cytology. East West Press, New Delhi.
4. Verma, P.S. and Agarwal, V.K. (1998). Concept of Cell biology. S. Chand and Company, New Delhi.
5. Strickberger, M.W. (1999). Genetics. Prentice Hall of India Pvt. Ltd., New Delhi.
6. Sinnott, Dun and Dobzhansky (1968). Principles of Genetics. Mc. Graw hill Co., New York.
7. Verma, P.S. and Agarwal, V.K. (1990). Genetics. S. Chand & Company, New Delhi.
8. Ahulwalia, K.B. (1991). Genetics. Wiley Eastern Limited, New Delhi.
9. Tamarin, R.H. (1999) Principles of Genetics WCB Mc. Graw hill, New York.
10. Philip sheeler and Donald E. Binachi (1987). Cell and Molecular Biology. John Wiley & Sons INC. New York.

PAPER - V

CELL BIOLOGY AND GENETICS

Time : 3 hrs Maximum : 100 marks

PART – A

Answer all the questions (5 X 5 = 25)

1. a) Write notes on the DNA of Chloroplast.

   Or

   b) Describe the functions of Dictyosome.

2. a) Comment on the significance of meiosis.

   Or

   b) What are B chromosomes.

3. a) Explain the phenomenon of Epistasis.

   Or

   b) Give an account of gene mapping.

4. a) Describe the replication of DNA.

   Or

   b) Briefly explain the operon concept.

5. a) What are the salient features of genetic code.

   Or

   b) Write notes on mutagenic agents.

PART – B

Answer all the Questions (5 X 15 = 75 Marks).

6. a) Describe the structure and function of plasma membrane.

Or

b) Give an account of Microbodies.

7. a) Explain the special types of chromosomes.

Or

b) How banding technique is helpful in the identification of chromosomes.

8. a) Using suitable examples explain the process of quantitative inheritance.

Or

b) Write an essay on the genetic control of sex.

9. a) Describe the Organisation and function of DNA.

Or

b) Give an account of the mechanism of Protein synthesis

10. a) Write an essay on Mutation.

Or

b) Explain the Hardy – Weinberg Law.

PAPER - VI

MICROBIOLOGY AND BIOTECHNOLOGY

MICROBIOLOGY

UNIT – I

Scope of microbiology – sterilization techniques – culture media – Pure culture and Sub – culture. Microbial examination of water and air. Food spoilage and preservation – Pasteurization – Soil microbes – microorganisms associated with nitrogen cycle and organic matter decomposition.

UNIT – II

Sources and importance of primary metabolites (vitamins, organic acids, alcohols, amino acids), Sources and importance of secondary metabolites : toxins, antibiotics (Penicillin) – microbial proteins and SCP – mushroom cultivation and uses – microorganisms producing enzymes – methods of enzyme production and application – microbial pesticides and herbicides – microbial degradation of xenobiotics – microbial enzyme production and application.

BIOTECHNOLOGY :

UNIT – III

Recombinant DNA technology : Enzymes (nucleases, polymerases, ligases, alkaline phosphotase, reverse transcriptase, SI nucleases), brief study vectors (Plasmids, cosmids, phages and transposons). Gene cloning. Amplication of genes by PCR – Gene transfer using Ti plasmid of Agrobacterium tumefaciens – transgenic plants.

UNIT – IV

Plant cell and tissue culture : - culture media (MS medium, White's medium – Cell culture). Organogenesis – Somatic Embryogenesis – Micropropagation – Synthetic seeds – Uses of tissue culture.

UNIT – V

Protoplast culture and regeneration of plants – isolation of protoplast methods – protoplast viability testing – isolation of sub – protoplasts – protoplast fusion and somatic hybridization – uses of protoplast fusion – cybrids.

PRACTICALS

1. Cleaning and sterilization of glasswares.
2. Preparation of culture media – agar slant, Agar plate.
3. Isolation of microbes by soil dilution technique
4. Gram staining of bacteria
5. MBRT of milk (Phosphotase test)
6. Study of biotechnologically important chemicals
7. Isolation of leaf protoplasts (mechanical method)
8. Extraction and estimation of leghaemoglobin in root nodules.

REFERENCE BOOKS

1. Microbiology – essentials and Applications : Larry MeKane, Judy Kandel, McGraw hill Inc.
2. Microbiology – Presscott, Harley, Klein, Mc Graw Hill Inc.
3. Microbial Biotechnology, Alexander, N. Glazer, HiroshniiKaido, W.H. Freeman and Co., 1995.

TEXT BOOKS

1. Microbiology – essential and Application, Mc Kane and Kannel, Mc Graw Hill Publishing Co.,
2. General Microbiology, C.B. Powar, H.F. Daginwala, Himalaya Publishing House
3. Microbiology, concepts and applications. Ketchum, P.A. Wiley Publications, USA
4. Microbiology, Mani – A, et.al. saras publications, Nager koil, Kanyakumari District.
5. Industrial Microbiology, Casido.j.r, Willey Eastern Ltd., ISBN.
6. Industrial Microbiology, Read. A. Prescott and Dunns, AOS Publication, 1983.

BIOTECHNOLOGY

REFERENCE BOOKS

1. Plant Biotechnology, Mantell, S.H., and Smith.H. 1983., Cambridge University press.
2. Plant Biotechnology, Hammond,P. Mc Garvey and Yuribov (Eds) 2000, Springer verlag.
3. Plant Biotechnology, Slater Andrian (2003). the genetic manipulation of plants. Oxford University Press.
4. Plant cell culture. A practical approach. Dixon. R.A. and Gonzales, R.A. 1994. Second Edition. Oxford University Press, Oxford.

TEXT BOOKS

1. Plant Biotechnology, Ignacimuthu, S., Oxford and IBH Publishing co, New Delhi.
2. Elements of Biotechnology, Gupta, P.K. Rartogi Publications, Meerut.
3. Plant tissue culture, Islan, A.C. (1996), Oxford and IBH Publishing co., Pvt Ltd, New Delhi.
4. A Text book on Biotechnology, Kumar, H.D., Affliated East West Press Private Limited, New Delhi.
5. Applied and Fundamental Aspects of plant cell, tissue and organ culture, Reinert.j. and Baja. Y.P.S (1997), Narosa Publishing house.
6. Biotechnology, Kumaresan. V., Saras Publication, Nagerkoil, Kanyakumari District.
7. A Text Book of Biotechnology, Dubey. R.C., S. Chard and Co New Delhi.

PAPER - VI

MICROBIOLOGY AND BIOTECHNOLOGY

PART – A

Answer the all questions (5X5 =25 Marks)

1. a) Write about the methods of microbial growth.

   Or

   b) Write about fermentation technology.

2. a) Give an account on microbial insecticides.

   Or

   b) Write abut toxins.

3. a) Give an account on the role of nucleases in Recombinant D.N.A. technology.

   Or

   b) Write about amplification of genes.

4. a) Discuss about Micropropagation.

   Or

   b) Describe somatic embryogenesis.

5. a) Write notes on Cybrids.

   Or

   b) Give an account on somatic hybridization.

PART – B

Answer the all questions (5x15 = 75 Marks)

6. a) Describe the various types and preparation of culture media

Or

b) Give a brief account on microbial products

7. a) What are vitamins ? Give a detailed account of vitamin - B_{12}

Or

b) List out microorganisms producing enzymes and add note on their production and application.

8. a) Write an essay on different methods used in the production of transgenic plants.

Or

b) Write an essay on the role of vectors in Recombinant D.N.A. technology.

9. a) Write in detail about the isolation, culture and application of cell culture.

Or

b) Write an essay on biotechnological applications of plant cell and tissue culture in Agriculture.

10. a) How will you isolate protoplasts from the plant cells ? Give the application of protoplast culture.

Or

b) Write about protoplast fusion technique and application.

PAPER - VII

PLANT PHYSIOLOGY AND BIOCHEMISTRY

PLANT PHYSIOLOGY

UNIT – I

Mechanism of water absorption and ascent of sap. Transpiration – types and mechanism. Role and deficiency symptoms of micro and macro nutrients. Mechanism of mineral salt uptake and transport of solutes across membrane.

UNIT – II

Photochemical reactions – Non – cyclic and cyclic electron transport - photophosphorylation. Calvin cycle. Hatch and Slack pathway. Photorespiration and Glycolate metabolism cycle.

UNIT – III

Glycolysis (EMP) pathway. Kreb's (TCA) cycle. Electron transport system and oxidative phosphorylation. Pentose phosphate pathway.

Symbiotic & Asymbiotic nitrogen fixation. Ammonium assimilation (GDH, GS & GOGAT) pathway.

UNIT – IV

Plant growth regulators – Physiological effects of auxins, gibberellins, cytokinins, abscissic acid and ethylene. Role of phytochrome. Photoperiodism and mechanism of flowering. Vernalization, Dormancy and Seed viability.

UNIT – V: BIOCHEMISTRY

Classification and properties of carbohydrates. Classification of amino acids. Classification and structures of protein. Classification and mode of action of enzymes.

PRACTICLES

1. Measurement of membrane permeability as affected by chemicals
2. Separation of photosynthetic pigments by paper chromatography
3. Estimation of photosynthetic pigments (Arnon's method)
4. Measurement of transpiration by Ganongs potometer.
5. Estimation of total free amino acids (Moore and Stein's method)

   Or

   Estimation of protein (Lowry's method)
6. Seed viability – Tetrazolium test.

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1. Annie and Arumugam, 2000. Biochemistry and Biophysics. Saras Publications, Nagercoil, Tamil nadu.
2. Beevers, L. 1996. Nitrogen Metabolism in Plants. William Clowes and Ltd., London.
3. Devlin, R.M. 1996. Plant Physiology. Affiliated East west press, New Delhi.
4. Dey, P.M and Harborne, J.B. 2000. Plant Biochemistry. Harcourt Asia Pvt Ltd., Singapore.
5. Jain, V.K. 2007. Fundamentals of Plant Physiology, S. Chand and Co., New Delhi.
6. John Jothi Prakash, E. and Joseph A.J. Raja. 2002. An Introduction to Biochemistry, TPR publication Vallioor. Tamil Nadu
7. Lehninger, A.L. Nelson, D.I. and Cox, M.M 1993. Biochemistry. CBS Publishers, New Delhi.

8. Malik, C.P. and Srivastava, A.K. 1995. Text Book of Plant Physiology. Kalyani Publication, New Delhi.

9. Noggle, G.R and Fritz, G.J. 1976. Introductory Plant Physiology. Prentice Hall, India, New Delhi.

10. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology, Wordsworth Publication, California.

11. Sinha, R.K. 2004. Modern Plant Physiology. Narosa Publication, New Delhi.

12. Srivastava, H.S. 1990, Elements of Biochemistry Rastogi Publications, Meerut.

13. Srivastava, H.S.P. 1993. Plant Physiology. Rastogi and co, Meerut.

14. Taiz, L and Zeiger, E. 1998. Plant Physiology. Sinaner Associates Publishers, USA.

PAPER - VII

PLANT PHYSIOLOGY AND BIOCHEMISTRY

Time : 3 Hrs Maximum : 100 Marks

PART – A

Answer all questions(5 X 5 = 25 Marks)

Draw diagrams wherever necessary

1. (a) Explain the passive absorption of water.

Or

(b) Describe the ion – channels of solute transport.

2. (a) Give the schematic diagram of photophosphorylation.

Or

(b) Describe the glycolate metabolism during photorespiration.

3. (a) Draw the Kreb's cycle schematically

Or

(b) Write an account on the symbiotic nitrogen fixing organisms.

4. (a) Write notes on photoperiodism

Or

(b) Give an account on vernalization.

5. (a) How the carbohydrates are classified ?

Or

(b) What are the aliphatic amino acids ?

PART – B

Answer all questions(5 X 15 = 75 Marks)

Draw diagrams wherever necessary

6. (a) Explain the mechanism of stomatal transpiration.

Or

(b) Explain the role and deficiency symptoms of micro and macro nutrients.

7. (a) Describe the Calvin cycle.

Or

(b) Explain the Hatch and Slack pathway.

8. (a) Describe the glycolysis pathway.

Or

(b) Explain the GDH, GS and GOGAT pathway.

9. (a) What are the physiological effects of auxins and giberellins ?

Or

(b) Write an essay on dormancy of seeds and seed viability.

10. (a) Describe the secondary and tertiary structure of proteins.

Or

(b) Explain the mode of action of enzymes.

PAPER - VIII

PLANT ECOLOGY AND PHYTOGEOGRAPHY

UNIT – I

Scope and importance of Ecology. The environment – climatic factors (Light, Temperature, rainful, humidity and wind), Edaphic factors – Components of soil. Soil erosion and conversation. Biotic factors (human activity and forest fire).

UNIT – II

Ecosystem – structure and function. Types of ecosystem (Grassland and Pond). Energy flow in ecosystem. Interaction between plants and animals. Plant succession – causes of succession, climax concept. Kinds of succession (Hydrosere, Xerosere).

UNIT – III

Autecology and Synecology – Population ecology. Quantitative analysis of plant community structure (quadrat, transect and point methods). Habitat ecology (Fresh water, Marine and Estuary).

UNIT – IV

Environmental pollution, air, water, soil and their control measures. Impact of pollution on vegetation. Conservation of natural resources – water resources and energy resources. Wild life management. Endangered species of plant and animals, Red Data Book.

UNIT – V

Disaster management – floods, earthquake, and Tsunami – Age and area hypothesis – endemism. – Continuous and discontinuous distribution of vegetation. Phytogeographical regions of India. Remote sensing – principle, tools and application in forestry.

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1. Ambasht, R.S. Text book of Plant Ecology, Student Friend Co., 1978.
2. Daubemine, R.F. Plant and Environment, John Wiley, 1973.
3. Odum, E.P. Ecology, Hold Rinehart and Winson, 1963.
4. Sharma, P.D. Ecology and Environment, Rastogi Publications, 1990.
5. Shukla, R.S. and I.P.S. Chande, Plant Ecology and Soil Science, S. Chand & Company Ltd. 2005.
6. Vasishta, P.C. Plant Ecology, Vishal Publication, 1979.
7. Verma, V.A. Text Book of Plant Ecology, Emkay Publication, 1981.
8. Kellman, C.M. Plant Geography, Methuen, 1980.

PRACTICALS

1. Estimation of Soil moisture
2. Determination of pH of Soil and water samples.
3. Simple quadrat method of studying vegetation
4. Line transect method of studying vegetation
5. Measuring the transparency level of an aquatic system using secchi disc.
6. Spotting of phytogeographical regions of India.

PAPER - VIII

PLANT ECOLOGY AND PHYTOGEOGRAPHY

Time : 3 hrs Maximum : 100 Marks

PART – A

Answer the all questions (5 x 5 = 25)

1. a) Write short notes on wind.

   Or

   b) Explain soil erosion.

2. a) Add a note on Decomposers.

   Or

   b) Write short notes on succession.

3. a) Define Autecology and Synecology.

   Or

   b) Write short note on Ecads and Ecotypes.

4. a) Add a note on green house effect.

   Or

   b) Write short notes on Red Data book.

5. a) Define age and area hypothesis.

   Or

   b) Define Endemism with an example.

PART – B

Answer the all questions (5x15 = 75)

6. a) Explain the effect of light on vegetation. Add a note on its significance.

Or

b) Write an essay on soil erosion and its control measures.

7. a) Explain in detail about the energy flow in an ecosystem.

Or

b) What is plant succession? Write an essay about lithosere.

8. a) What are the various methods used to study a plant community.

Or

b) Give an account on autecology studied of a species.

9. a) Write an essay about water pollution and their control measures.

Or

b) Write an essay about conservation of natural resources.

10. a) Give an account on remote sensing and its applications.

Or

b) What are the various phytogeographical regions of India.

PRACTICAL - I

COMPRISING THE THEORY.

PAPERS I & II (ALGAE, FUNGI, LICHEN, PATHOLOGY, BRYOPHYLES, PTERIDOPHYTES AND GYMNOSPERMS)

Time : 4 Hrs

Practical : 100
Record (2) : 30
Submission : 10
Viva – voce : 10

Max. Marks : 150

1. Make suitable micropreparation of A, B and C. Draw labelled sketches Identify giving seasons. Submit the slides for valuation

   (3 X 9 =27)

2. Make suitable micropreparation of D, E and F. Draw labelled sketches identify giving seasons. Submit the slides for valuation

   (3 X 9 =27)

3. Identify any two algae from the given algal mixture G. Draw diagrams only.
4. Name the genus and group of the given specimens. H, I, J and K.

   (4 X 2 = 8)

5. Draw diagrams and notes of interest on. L, M, N and O.

   (4 X 5 = 20)

6. Name the causal organism, disease symptoms and control measures of pathological speciman P. (8 marks)

Key

1. A, B, C materials each one from Algae, Fungi and Bryphytes.
2. D, E and F. Materials each one from Pteridophates and Gymnosperms. (Vegetative / Reproductive).
3. G. Microscopic algal material

4. H, I, J and K. Macroscopic forms from algae, fungi, lichens, bryophytes. Pleridophytes and Gymnosperms
5. L. Fossil Slide. M. N and O – Permanent Slides
6. P = Pathological specimen

PRACTICAL PAPER – II

COMPRISING THE THEORY

PAPERS III & IV (TAXONOMY, ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE)

Practical	**:**	**100**
Record (2)	**:**	**30**
Submission	**:**	**10**
Viva	**:**	**10**
Max. Marks	**:**	**150**

1. Find the binomials of A, B and C 3 X 5 = 15

2. Refer specimens D, E and F to their respective families giving reasons at each level of hierarchy 3 X 7 = 21

3. Describe the given plant specimen G in botanical terms with diagram 1 X 10 = 10

4. Cut transverse section of H and I. Identify with suitable diagram and reasons. Submit the slide for valuation. 2 X 10 = 20

5. Dissect and mount any two stages of embryo from the given material J. Submit the slide for valuation. 2 X 4 = 8

6. Name the family, genus and species K and L. 2 X 3 = 6

7. Name the family, genus, species and economic importance of M, N and O. 3 X 4= 12

8. Write a short notes on P and Q. 2 X 4 =8

PRACTICAL PAPER III

COMPRISING THE THEORY.

PAPERS V & VI (CELL BIOLOGY, GENETICS, MICROBIOLOGY & BIOTECHNOLOGY)

Practical : 110
Record (2) : 30
Viva – voce : 10
Max. Marks : 150

1. Make a squash preparation of A. 15
   Display any two stages of cell division.
   Draw diagrams. Submit the slides for valuation.

2. Prepare a smear of B. 15
   Display any two stages of cell division.
   Draw diagrams and submit the slides for valuation.

3. Solve the genetic problems C and D. 20

4. Construct a chromosome map from the given data. 25

5. Determine whether the given sample F is contaminated with bacteria or not. Leave the sample for valuation. 10

6. Isolate the protoplasm of the given material G by mechanical method. 10

7. Write notes of interest on H, I and J. 15

Key

H – Cell Biology
I – Microbiology
J – Biotechnology

PRACTICAL PAPER – IV

COMPRISING THE THEORY

PAPERS VII & VIII (PLANT PHYSIOLOGY, BIOCHEMISTRY, ECOLOGY AND PHYTOGEOGRAPHY)

Practical : 110
Record : 30
Viva – voce : 10
Max. Marks : 150

1. Set up the experiment A assigned to you. Record your observation and interpret the results. Leave the set up for valuation 25
2. Set up the experiment B assigned to you. Record your observation and interpret the results. Leave the set up for valuation 25
3. Construct a meter quadrat C. Analyze the Vegetation. Record your data. Interpret the results. 20
4. Determine the pH of the given soil / water sample D. 10
5. Write critical notes on E, F, G, H, I, J 6 X 5 = 30

Key

A – Plant Physiology

B – Biochemistry

C – Quadrat

D – Soil / Water Sample

E – J (Apparatus / Instruments / Chemicals/ Figures / Graphs / Models from Plant Physiology, Biochemistry, Ecology and Phytogeography).

E, F – Physiology

G – Biochemistry

H, I – Ecology

J – Phytogrography.