PERIYAR UNIVERSITY, SALEM - 636 011 M. Sc., Botany - Choice Based Credit System Regulations and Syllabus (Effective from the Academic year 2008 - 09 onwards)

AIMS

- 1. Aims at providing skills in critical thinking and evaluation of information.
- 2. To instill knowledge across wide areas of plant science.
- 3. Help to understand the evolution of land plants from simple ancestors.
- 4. Providing an opportunity to familiarize with life cycles and mode of reproduction in different plant groups.
- 5. As the course includes units from related branches like Biochemistry, Biophysics, Microbiology, and Biotechnology, an opportunity is provided to understand the relationship between Botany and other related branches.
- 6. Appreciating the importance of Ecology of population and communities, the dynamics of Ecosystem, the Biosphere, and future of the Biosphere.
- 7. Identifying different flowering plants based on their characters.
- 8. The topics included in different units of different papers aim to enable the students to develop technical skills and innovative approach in Botanical and related branches.

SCOPE

- This course considers the patterns of plant diversity and the processes that generate and maintain plant diversity. It is an interdisciplinary approach in which major groups of plants are overviewed in holistic manner.
- This course also considers the Biology of plants. Different branches of Botany are given due importance us they deserve. Practicals are framed with an aim to improve skills in microcopy, observation, drawing, and laboratory exercise. During field trips the students are exposed to basic ecological principles and interactions.

- Students who complete this course will have better understanding on the types and sources of plants by diversity and the role of human and non human factors in plant diversity. Students will better understanding plants and their importance in Biosphere as life sustaining components.
- Students who complete this course can pursue research. As topics from relevant course are included there is a scope for the student to have opportunity in employment in state and central governments. Also the student has a scope for self employment.

REGULATIONS OF PG COURSES IN BOTANY OFFERED IN THE AFFILIATED COLLEGES

1. Condition for admission

A candidate who has passed Br. V in Botany or Br. V (a) Botany Vocational -Biotechnology or any of the above degree of any other University accepted by the syndicate as equivalent, thereto subject to such condition as may be prescribed therefore shall be permitted to appear examination and qualify for M. Sc. degree in Botany at this University after a course of study of two academic years.

2. Duration of the course

The course for the degree of Master of Science shall consist of two academic years divided in to four semesters. Each Semester consists of 90 working days. Practical examinations will be at the end of even semesters.

2. Passing minimum

al Assessment (CIA)
25 Marks
ment Structure Farks Jarks Jarks Jarks Jarks Jarks
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THEORY

Passing minimum (CIA) 50% - 12 Marks Passing minimum (EA) 50% - 38 Marks

Total Passing minimum = 50 Marks

PRACTICAL

University Examination (EA)	Internal Assessment (CIA)
60 Marks	40 Marks
Classification of Intern	al Assessment Structure
	Marks
Submiss	ion - 10 Marks
Т	est - 10 Marks
Attendar	nce - 10 Marks
Regularity in Practi	cal - 10 Marks
Total Mar	ks = 40 Marks
Passing minimum (CIA) 50	0% - 20 Marks
Passing minimum (EA) 5	0% - 30 Marks
Total Passing minimu	um = 50 Marks

- The candidate shall be declared to have passed the examination if the candidates secure not less than 38 marks out of 75 marks in the University examination in each theory paper and 12 marks out of 25 marks in the Internal Assessment and in total not less than 50 marks.
- For the practical paper 30 marks out of 60 marks in the University examination and the record notebook taken together and 20 marks out of 40 marks in the Internal Assessment and in total 50 marks. There is no passing minimum for the record notebook. However submission of a record notebook is a must.
- For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend Viva-voce examination to

secure pass in that paper.

Internal Assessment	(CIA) = 40 Marks
Dissertation	= 40 Marks
Viva voce	= 20 Marks
Т	otal = 100 Marks

Passing minimum (CIA) 50% - 20 Marks

Passing minimum (Dissertation) 50% - 20 Marks

Passing minimum (Viva voce) 50% - 10 Marks

Total passing minimum = 50 Marks

(Dissertation evaluation and Viva-voce to be conducted by an External examiner (Appointed by University) and an Internal examiner).

4. Classification of successful candidates

- Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First class.
- All other successful candidates shall be declared to have passed in the Second class.
- Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.
- Candidates who pass all the examinations prescribed for the course in the first instance and with in a period of two academic years from the year of admission to the course only are eligible for University Ranking.

5. Maximum duration for the completion of the PG Programme

The maximum duration for completion of the PG Programme shall not exceed eight semesters.

6. Commencement of this regulation

These regulations shall take effect from the academic year 2008-09, i.e., for students who are to be admitted to the first year of the course during the academic year 2008-09 and thereafter.

7. Transitory provision

Candidates who were admitted to the PG course of study before 2008-09 shall be permitted to appear for the examinations under these regulations for a period of three years i.e., up to and inclusive of the examinations of April/May 2011. Thereafter, they will be permitted to appear for the examination only under the regulation then in force.

Sem	Code	Course	Course title	Cre	Hrs		Marks	
ester				dits		CIA	EA	Total
Ι		Core course -I	Biodiversity of Plants -I	5	6	25	75	100
		Core course -II	Biodiversity of Plants -II	5	6	25	75	100
		Core course -III	Taxonomy of	5	6	25	75	100
			Angiosperms and					
			Economic botany					
		Core course -IV	Practical -I*	4	6	40	60	100
		Elective-I	Plant Resources and	4	6	25	75	100
			Utilization					
	1	Total		23	30	140	360	500
II		Core course -V	Microbiology and Plant Pathology	4	4	25	75	100
		Core course -VI	Anatomy of Angiosperms, Plant Micro-technique and Embryology of Angiosperms	5	5	25	75	100
		Core course -VII	Cell Biology and Genetics	5	5	25	75	100
		Core course -III	Practical -II	4	5	40	60	100
		Core course -IX	Practical -III	4	5	40	60	100
		EDC	Paper selected by the student	4	4	25	75	100
			Human rights	2	2	25	75	100
		Total		28	30	205	495	700
Sem	Code	Course	Course title	Cre	Hrs		Marks	8
ester				dits		CIA	EA	Tota
III		Core course -X	Plant physiology and Biophysics	5	6	25	75	100
		Core course -XI	Environmental Biology	4	6	25	75	100
		Core course -XII	Practical -IV*	4	6	40	60	100
		Elective -II	Herbal Botany	4	6	25	75	100
		Elective -III	Plant Bio-technology	4	6	25	75	100
Total		21	30	140	360	500		
IV		Core course -XIII	Biochemistry and Biostatistics	4	6	25	75	100
		Core course -XIV	Research Methodology	4	6	25	75	100
		Core course -XV	Practical -V	4	6	40	60	100
		Project work		4	6	40	60	100
		Elective -IV	Horticulture	4	6	25	75	100
		Total		20	30	155	345	500
		Grand tot	al	92	120	640	1560	2200

COURSE STRUCTURE (For the candidates admitted from the academic year 2008 - 09 onwards)

* Practical examinations at the end of even semesters Question paper pattern (Theory)

Time: 3 Hrs

Max. Marks : 75

Part – A $(5 \times 5 = 25 \text{ Marks})$

(Answer all questions)

(One question from each unit with internal choice)

Part – B $(5 \ge 10 = 50 \text{ Marks})$

(Answer all questions)

(One question from each unit with internal choice)

First Semester CORE COURSE -I: BIODIVERSITY OF PLANTS -I (ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

Unit -I

Algae: Classification of algae (F.E. Fritsh and P.C. Silva) criteria used in algal classification - Fine structure of eyespots and flagella - Ecology of algae. Evolutionary trends in algae.

Unit -II

Structure and reproduction of the following genera of algae: Lyngbya, Nostoc, Cladophora, Codium, Chara, Padina, Turbinaria, Batrachospermum, and Gracilaria.

Unit -III

General characteristics of fungi with reference to their occurrence, thallus structure and reproduction. Classification of fungi by Alexopolous & Mims (1978). Spore dispersal mechanisms in fungi. Nutrition in fungi. Heterothallism - Parasexuality - Mycorrhiza and VAM fungi.

Unit -IV

Detailed study of the occurrence, structure and reproduction of the following genera of fungi: Peronospora, Yeast, Aspergillus, Cercospora, Puccinia and Lycoperdon.

Unit -V

A general account of Lichens with special reference to their structure and reproduction. Morphology, Structure, Reproduction, Life history and classification of

6

Bryophytes. Ecology and evolution of Bryophytes. Fossil Bryophytes. A detailed study of Targionia, Dumortiera, Lunularia, and Funaria.

References

ALGAE

Bold, H.C. and Wyne, M.J. 1978. Introduction to algae: Structure and Reproduction. Prentice Hall India (Pvt.) Ltd., New Delhi.

Chapman V.J and D.J. Chapman 1981. The Algae. ELBS Publication, London.

Crosswell, R.C., Rees, T.A.V. and Shah, N. 1989, Cyanobacterial Biotechnology, Longmam, London.

Desikachary, T.V., Krishnamurthy, V. and Balakrishnan, M.S. Rhodophyta. Vols. I and II, Madras Science Foundation, Chennai.

Dodge, J.D 1973. The fine structure of algal cells, Academic Press, New York.

Fritsch, F.E., 1945, 1955. The Structure and Reproduction of Algae (Vol. I&II). Cambridge University Press, London

Ian Morris, 1967. An Introduction to the Algae. Hutchinson University Library, London.

Kumar, H.D and Singh, H.N. 1982. A text book of Algae. Affiliated East West Press, New Delhi.

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Lee, R.E 1987. Phycology. Cambridge University Press, London.

Lewin, R.A. 1972. Physiology and Biochemistry of Algae. Academic Press, New York.

Round, F.E. 1981. The Ecology of Algae. Cambridge University Press. London.

Smith, G.M. Cryptogamic Botany (Vol. I). McGraw-Hill Book Company, INC. New York.

Trainor, F.R. 1978. Introductory Phycology. John Wiley & Sons, New York.

Venkataraman, G.S. Algae: Form and Function. Today and Tomorrow Publications, New Delhi.

FUNGI

Ainsworth, S.E. Sparrow S.L and Sussman, A.D. The Fungi an advanced treatise. Academic Press, New York.

Alexopoulos, C.J. and Mims, C.W 1979. Introductory Mycology. Wiley Eastern Publication, New Delhi.

Bessey, E.A. 1979. Morphology and Taxonomy of Fungi. Vikas Publication House, Pvt. Ltd., New Delhi.

Bold, H.C., 1980. Morphology of Plants and Fungi. Harper and Row Publications, Inc. New York.

Burnett, J.H. 1971. The fundamentals of Mycology. ELBS Publication, London.

Dube, H.C. 1990. An Introduction of Fungi. Vikas Publication House Ltd, New Delhi.

Elizabeth Moore-Landecker, 1982. The fundamentals of Fungi. Prentice Hall, INC., New Jersey.

Ingold, C.T. 1984. The Biology of Fungi. ELBS Publication, London.

Sharma, P.D. 2003. The Fungi. Rastogi Publications, Meerut.

Webster. An Introduction to Fungi. Cambridge University Press. London.

LICHENS

Hale Jr. M. E. 1983 Biology of Lichens. Edward Arnold, Mary land.

BRYOPHYTES

Chopra, R.N and Kumar P.K. 1988. Biology of Bryophytes, John Wiley, New York.

Garham, L.E. 1993. Origin of land Plants. John Wiley, New York.

Prem Puri, P. 1990. Bryophytes: Morphology, Growth and Differentiation. Atmaram and Sons.

Smith G.M. Cryptogamic Botany. Vol.II, Chapman and Hall, London.

Smith, A.J.E. 1982. Bryophyte Ecology. Chapman and Hall. London

Watson E.V. 1968. British Mosses and Liverworts, Hutchinson and Co., London

Watson, E.V. 1970 Structure and life of Bryophytes. Hutchinson and Co., London.

CORE COURSE -I: BIODIVERSITY OF PLANTS -I

(ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Write a short note on the fine structure of eyespot.

(or)

b) Explain the structure of flagella.

2. a) Give a brief account on the nutrition in Fungi.

(or)

- b) Describe the thallus structure in Codium.
- 3. a) Write a short note on the nutrition in Fungi.

(or)

b) Explain VAM fungi.

4. a) Explain the structure of any two types of spores in Puccinia.

(or)

- b) Describe the structure of conidia in Cercospora.
- 5. a) Describe the internal structure of Lunularia thallus.

(or)

b) Describe the structure of capsule in Funaria.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Outline the classification of Fritsch. List out the criteria used in the algal classification.

(or)

b) Give an account on the ecology of Algae.

7. a) Explain the structure and reproduction in Gracilaria.

(or)

b) Explain the structure and life cycle in Chara.

8. a) Explain the different types of spore dispersal mechanisms in Fungi.

(or)

b) Write an essay on heterothallism in Fungi.

9. a) Discuss the salient features of Yeast.

(or)

b) Explain the structure and reproduction in Lycoperdon.

10. a) Enumerate the salient features of Targionia.

(or)

b) Give a general account of lichens with special reference to their structure.

First Semester CORE COURSE -II: BIODIVERSITY OF PLANTS -II (PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

Unit -I

Classification of Pteridophytes (Sporne, K.R., 1965). Evolution of sorus in ferns. Habit and habitat of ferns. Economic importance of Pteridophytes. Range in morphology, structure, reproduction and evolution of the gametophytes and sporophytes of the following orders: Psilophytales, Psilotales, Isoetales, Equisetales, Ophioglossales, Osmundales, Filicales and Salviniales.

Unit -II

Detailed Study of Range in structure, reproduction and evolution of the gametophytes and sporophytes with special reference to Isoetes, Sphenophyllum, Equisetum, Angiopteris, Pleopeltis, Pteris, Osmunda and Salvinia. Apospory and Apogamy. Heterospory and Seed habit.

Unit -III

Classification of Gymnosperms (Sporne, K.R., 1965). General account of Pteridospermales, Bennettitales and Pentoxylales. Economic importance of Gymnosperms. Comparative morphology and phylogeny of Cycadales Coniferales, Taxales and Gnetales.

Unit -IV

Study of morphology and anatomy of the vegetative and reproductive structures of Araucaria, Podocarpus, Cupressus and Lagenostoma.

Unit -V

Fossils, Fossilization methods, types of fossils. Study of morphology and anatomy of the vegetative and reproductive structure in the following fossil forms: Rhynia, Lepidodendron, Sphenophyllum, Lyginopteris, Pentoxylon and Cordaites.

References

Beck, G.E. 1988 Origin and Evolution of Gymnosperms, Colombia University Press.

Bhatnagar and Moitra, 1996, Gymnosperms. New age International Publishers, New Delhi.

Bierhost, D.W. 1971. Morphology of Vascular plants. McMillan Company, New York.

Biswas, C. and Johri, B.M. 2004. The Gymnosperms. Narosa Publishing House, New Delhi.

Bower. The Ferns (Filicales) Vol. I. Today and Tomorrow Publications, New Delhi.

Chamberlain, C.J. 1934. Gymnosperms: Structure and Evolution. Chicago (Reprinted 1950) New York.

Delveloryas, T. 1962. Morphology and evolution of fossil plants.

Doyle, W.T. 1970. Non Vascular Plants: Form and function. Belmont, California.

Foster and Gifford, Jr., 1962. Comparative Morphology of Vascular Plants. Allied Pacific Pvt. Ltd., Bombay.

Johri, R.M. Sneh Lata and Sandhya Sharma, 2004. A Textbook of Pteridophyta. Vedams Books (P) Ltd., New Delhi.

Kirkaldy, J.E. 1963. The study of Fossils. Hutchinson Educational, London.

Parihar, N.S. 1965. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.

Pooja, 2004. Pteridophyta. Discovery Publications. New Delhi.

Rashid, A. 1979. An Introduction to Pteridophyta. Vikas Publishing House. Pvt. Ltd., New Delhi.

Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson University Press, London.

Sporne, K.R. 1965. The Morphology of Pteridophytes. Hutchinson University Press, London.

Stewart, W.N. and Rothwell, G.W. 1993. Paleobotany and evolution of plants. Cambridge University Press, Cambridge.

Subhash Chandra Datta. Introduction to Gymnosperms. Kalyani Publishers, New Delhi.

Surange, K.R. 1966. Indian Fossil Pteridophytes. CSIR, New Delhi.

Vashishta, P.C., Sinha, A.K. and Anil Kumar. 2008. Pteridophyta. S. Chand & Co., New Delhi.

Vashista, B.R. 1987. Pteridophyta. S. Chand & Co., New Delhi.

CORE COURSE -II: BIODIVERSITY OF PLANTS -II

(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks

Draw labelled sketches wherever necessary

1 a) Give an account on the economic importance of Pteridophytes.

(or)

b) Write a short note on Psilotales.

2. a) Write short note on Apospory and Apogamy.

(or)

b) Describe the structure of sorus in Pteris.

3. a) Write a general account on Pentoxylales.

(or)

- b) Write the comparative morphology of Taxales.
- 4. a) Explain the anatomy of the Podocarpus leaf.

(or)

- b) Describe the anatomy of the Cupressus stem.
- 5. a) Describe the fossilization methods.

(or)

b) Describe the fossil form Rhynia.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Give an account on the evolution of sorus in Ferns.

(or)

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

7. a) write an essay on Heterospory and seed habit.

(or)

b) Write the range in structure and reproduction of Isoetes.

8. a) Give an account on the economic importance of Gymnosperms.

(or)

b) Write an essay on the comparative morphology of Cycadales.

9. a) Give an account on morphology and anatomy of Araucaria.

(or)

b) Write an essay on Lagenostoma.

10. a) Explain the different types of fossils.

(or)

b) Explain the vegetative and reproductive structure of Sphenophyllurn.

First Semester CORE COURSE - III: TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

Unit -I

History and principles of classification: Detailed account of the system of classifications proposed by Bentham & Hooker, Engler & Prantl, Bessey and Cronquist (including merits and demerits). Phylogeny of Angiosperms: Origin, evolution and interrelationship.

Unit -II

Modern trends in classification: Taximetrics, Chemotaxonomy and Biosystematics: Botanical Survey of India (B.S.I) - Organization, function and contribution. National and International Herbaria. Taxonomic literature - taxonomic index, monographs and revisions. Bibliographies, catalogues and review serials, periodicals, glossaries, dictionaries, icons and floras.

Unit -III

Plant identification; Methods of Identification, Keys: types of keys; rules for construction of Keys; advantages and disadvantages. Nomenclature: International code of Botanical Nomenclature (ICBN). Typification, Priority, Publication, Author citation and retention, choice and rejection of names, current changes. Taxonomy in relation to Anatomy, floral anatomy, Palynology, Embryology and Cytology.

Unit -IV

A detailed account of the following families and their economic importances: Annonaceae, Capparidaceae, Caryophyllaceae, Portulacaceae, Rhamnaceae, Meliaceae, Sapindaceae, Aizoaceae, Rosaceae and Moringaceae.

Unit -V

Rubiaceae, Boraginaceae, Bignoniaceae, Scrophulariaceae, Chenopodiaceae. Casuarinaceae, Orchidaceae, Comrnelinaceae, Typhaceae, Alismataceae and Poaceae. **References**

Annie Roland, 2005. Taxonomy of Angiosperms. Saras Publication, Nagercoil.

Davis, P.H. and Heywood, V.M. 1965. Principles of Angiosperm Taxonomy. Oliver and Boyd Edinburgh.

Gamble, J.S. and Fisher, L.E.F. 1967. The Flora of the presidency of Madras (Vol. I-III). Botanical Survey of India, Calcutta.

Grant, E.F. 1984. Plant Biosystematics. Academic press Inc., Canada.

Heywood, V.H. 1967. Plant Taxonomy. Edward Arnold, Great Britain.

Hutchinson, J. 1973. The families of flowering plants. Oxford University Press, London.

Jeffery, C. An Introduction to Plant Taxonomy. J & A Churchill Ltd., London.

Lawrence, G.H.M. 1955. The Taxonomy of vascular plants (Vol. I-IV). Central Book Depot, Allahabad.

Mathew, K.M. 1983. The Flora of Tamil Nadu Carnatic. The Rapinat Herbarium, Trichy.

Porter, C.L, Taxonomy of flowering plants. Eurasia Publishing House, New Delhi.

Rendle, A.B. The Classification of flowering plants (Vol. I-II).

Santapau, H. and Henry, H.D. 1994. A dictionary of flowering plants of India. C.S.N., New Delhi.

Singh, V. and Jain, V.K. 1989. Taxonomy of Angiosperms. Rastogi Publication, Meerut.

Sivarajan, V.V. 1989. Introduction to principles of plant Taxonomy. Oxford and IBH, New Delhi.

Subramaniyam, N.S. 1995. Modern Plant Taxonomy. Vikas Publishing House, New Delhi.

CORE COURSE -III: TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Explain the natural system of classification.

(or)

b) Discuss the ancestors of angiosperms.

2. a) What are the rules for construction of keys.

(or)

b) Give an account on International herbaria.

3. a) Describe the role of Embryology in taxonomic studies.

(or)

b) What are Glossaries and Periodicals?

4. a) Give an account on the salient features of Caryophyllaceae.

(or)

b) Describe the floral variation in Portulacaceae.

5. a) Describe the features of Sapindaceae

(or)

b) Discuss the floral variation in Poaceae.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary 6. a) Give an account on Bessey's classification.

(or)

- b) Write an essay on the origin and evolution of Angiosperms.
- 7. a) Give the organization, functions and contributions of BSI.

(or)

- b) Write an essay on Taximetrics.
- 8. a) Write an essay on taxonomic literature.

(or)

- b) Write an essay on ICBN.
- 9. a) Give an account on the Palynology in reaction to taxonomy.

(or)

- b) Give a comparative account of the families of Annonaceae and Meliaceae.
- 10. a) Mention any 10 economically important plants with uses from the following families:
 - i) Rubiaceae
 - ii) Scrophulariaceae

(or)

b) Give an account on the floral variation in Orchidaceae and Poaceae.

* CORE COURSE -IV: PARACTICAL - I (Covering the Core courses I & II) (ALGAE, FUNGI, LICHENS, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

Study of morphology and anatomy of the vegetative and reproductive organs of the following taxa:

Algae

Lyngbya, Nostoc, Cladophora, Codium, Chara, Padina, Turbinaria, Batrachospermum, and Gracilaria.

Fungi

Peronospora, Yeast, Aspergillus, Cercospora, Puccinia and Lycoperdon.

Lichens

Vegetative and reproductive Structures.

Bryophytes

Targionia, Dumortiera, Lunularia, and Funaria.

Pteridophytes

Isoetes, Sphenophyllum, Equisetum, Angiopteris, Pleopeltis, Pteris, Osmunda and Salvinia.

Gymnosperms

Araucaria, Podocarpus, Cupressus and Lagenostoma.

Paleobotany

Rhynia, Lepidodendron, Sphenophyllum, Lyginopteris, Pentoxylon and Cordaites.

Note:

- Field trip to a hill station and coastal area for a minimum period of five days for the collection of herbarium specimens and to observe and study the lower plants in their natural habitat.
- Submission of 15 herbarium sheets from Algae / Fungi / Lichens / Bryophytes / Pteridophytes / Gymnosperms (during the Internal practical examination).
- Certified record work done in the laboratory during practical classes.

* Practical examination at the end of second semester.

First Semester

ELECTIVE COURSE - I: PLANT RESOURCES AND UTILIZATION

Unit -I

Plant Biodiversity: Concepts and status in India - world centres of primary diversity of domesticated plants - Plant introduction and secondary centers - Useful aspects of lower plants: Algae, Fungi and Lichens.

Unit -II

Binomial, cultivation and uses of food crops: Cereals (Rice and Pennisetum); Pulses-[Gram and Soyabean] Vegetables, [Carrot and Cabbage] Fodder crops: [Natural grass and cultivated fodder] oil cakes, poultry feeds. Fibre and fibre plants: Nature of fibre - classification of fibres. Binomial and uses of Cotton and Jute.

Unit -III

Medicinal plants: Classification of drugs, drugs from various parts of plants chemical constituents - alkaloids - therapeutic uses. Binomial, cultivation, medicinal properties and uses of: Dioscorea, Colchicum, Curcuma, Asafoetida, Adathoda vasica, Solanum nigrum, Piper betel. Phyllanthus emblica, Aegle marmelos and Trigonella foenum graceum.

Unit -IV

Vegetable oil yielding plants: Classification of vegetable oils - chemical constituents, nature of vegetable oils. Binomial, classification and uses of Corn oil, Sunflower oil, Vegetable fat - Cocos nucifera. Forest resources: Wood - its importance and structure - types, properties, uses. A brief account of Bio-diesel plants. Paper industry - raw materials, manufacturing process. Gums, tannins, dyes, resin yielding plants and their uses.

Unit -V

Plants used as avenue trees for shade, hedge, pollution control and aesthetics. Strategies for Conservation - in-situ conservation; Protected areas in India -Sanctuaries, National parks, Biosphere reserves, Wetlands, Mangroves and Coral reefs for conservation of wild Biodiversity. Strategies for conservation - ex-situ conservation: principles and practices; Botanical gardens.

References

Agarwal, 1985. Drug Plants in India. Kalyani Publishers, Ludhiana.

Agrobios (India). A Hand Book of Medicinal Plants: A Complete Source. Agrobios, Jodhpur.

Agrobios (India). Bio-diesel and Jatropa cultivation. Agrobios, Jodhpur.

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Bhat. Chemistry of Natural Products. Tamilnadu Book House. Triplicane, Chennai.

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Frankel, D.H. and Benneth, E. 1970. Genetic Resources in Plants: The Exploitation.

Gupta, P.K., 1996. Transgenic Plants: Some current issues. Current. Sci.70:

Jayaraman, J. 1981. Laboratory manual in Biochemistry. Wiley Eastern Ltd., New Delhi.

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Resources (Booklet). National Bureau of Plant Genetic Resources, New Delhi.

Sadasivam, S. and Manicam, A. Biochemical Methods. New Age International, New Delhi.

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ELECTIVE COURSE - I: PLANT RESOURCES AND UTILIZATION

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Give an account of primary centers and secondary centers of origin of domesticated plants.

(or)

- b) Write about the role of plant introduction in the view of merits and demerits.
- 2. b) Give an account of fodder crops.

(or)

b) Write about the chemistry of fibres.

3. a) Give a general nature of alkaloids derived from medicinal plants.

(or)

- b) Write about Phyllanthus in medicinal aspect.
- 4. a) Give an account on Bio-diesel plants.

(or)

- b) List out some resin yielding plants and their uses.
- 5. a) Write about the role of avenue trees.

(or)

b) Write about the role of International Union for Conservation of Nature.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary labelled

6. a) Write about the useful products derived from Fungi used in various industries.

(or)

b) Write about the uses of Lichens in ecological, medicinal and food aspects.

7. a) Give an account of underground vegetables.

(or)

b) Write about the binomial, cultivation and uses of leafy vegetables

8. a) Write about the botanical description, cultivation and medicinal properties of Dioscorea and Adathoda.

(or)

b) Give an account on Bio-insecticides.

9. a) Give a detailed account of the structure, types, chemical composition, properties and uses of Wood.

(or)

b) Write about the classification and chemical constituents of vegetable oils and give binomial and uses of corn oil.

10. a) Write about 'in-situ' conservation in detail.

(or)

b) Write about 'ex-situ' conservation in detail.

Second Semester CORE COURSE - V: MICROBIOLOGY AND PLANT PATHOLOGY Unit -I

Definition of microbiology - Classification of microorganisms. Microbiological stains and staining method: simple, differential and special stains. Sterilization techniques - Culture media - Types and preparation - Pure culture and sub culture methods. Decimal dilution technique.

Unit -II

Types of soil microorganisms - Rhizosphere and non-rhizosphere. Nitrogen fixing organisms - Decomposers. (Solid waste disposal - composting, biodegradation and bioremediation). Microorganisms in air - sources - types, air sampling techniques. Microbes in water - Microbial examination of water. Waste water treatment and recycling.

Unit -III

Food and dairy microbiology. Food spoilage and poisoning by microorganisms. Methods of food preservation. Microbes of milk and milk products - milk pasteurization. Industrial microbiology - Alcoholic fermentation - process and recovery of products. Bio-pesticides and immobilization of microbes.

Unit -IV

Bacteria - Structure and organization - types -reproduction - mode of nutrition. Classification (Bergey's) - Economic importance. Viruses - General properties. Structure - symmetry, envelopes - viral genome - Plant viruses - types, double standard DNA and RNA viruses. Bacteriophages, Cyanophages, Mycophages, Viroids and Interferons.

Unit -V

Plant pathology - definition - common terminology used in plant pathology. Pathogenesis - Host pathogen interaction. Defensive mechanism in plants. Enzymes and Mycotoxins in plant diseases - Environmental factors in plant diseases -Management of plant diseases.

Distribution - symptoms, disease cycle, disease management and epidemiology of the following plant diseases.

1. Damping off of Pythium.

- 2. Little leaf of Brinjal (Mycoplasma).
- 3. Bacterial Blight of paddy.
- 4. Bunchy top of Banana (Virus).

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CORE COURSE - V: MICROBIOLOGY AND PLANT PATHOLOGY

Time: 3 Hours

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Write short notes on Gram's staining.

(or)

b) Write short notes on Nitrogen fixing organisms.

2. a) Give an account on Pasteurization.

(or)

b) Give an account on Bio-pesticides.

3. a) Write short notes on soil bacteria.

(or)

b) Give an account on Nitrogen fixing organisms.

4. a) Write short notes on Chemotrophic bacteria.

(or)

b) Give an account on food spoilage by bacteria.

5. a) Write short notes on Bacterial Blight of paddy.

(or)

b) Give an account about Mycotoxins.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

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

(or)

b) Explain the various sterilization techniques.

7. a) List out the microbes present in the air. Explain the different techniques employed in air sampling.

(or)

b) Give a brief account on waste water treatment and recycling.

Maximum: 75 Marks

8. a) Write a brief account on Microbes in water.

(or)

b) Discuss the role of Bacteria in Dairy Industry.

9. a) Give a detailed account of Bergey's Classification of Bacteria.

(or)

b) Write a brief account on the following:

- i. Cyanophages
- ii. Mycopages
- iii. Interferon

10. a) Write an essay on the occurrence, casual organism, symptoms, disease management of little leaf of Brinjal.

(or)

b) Explain briefly about the interaction between the host and pathogen.

Second Semester CORE COURSE - VI: ANATOMY OF ANGIOSPERMS, PLANT MICRO-TECHNIQUE AND EMBRYOLOGY OF ANGIOSPERMS Unit -I

Cell wall - types, pits, Plasmodesmata, functions. Meristem - types - Theories on shoot and root apical meristems. Procambium - vascular cambium - structure and functions - seasonal activity, role in wound healing and grafting. Transfer cells - Root - stem transition.

Unit -II

Simple tissues - Parenchyma, Collenchyma, Sclerenchyma - structure and functions. Complex tissues - ontogeny and phylogeny of vessels - Secondary xylem - structure and functions. Secondary phloem - structure and functions. Leaf - structure - types - ontogeny of dorsiventral leaf - Secondary thickening in stem and root, periderm formation - lenticels. Anomalous secondary growth in dicot and monocot stems. Nodal anatomy - uni, tri and multilacunar nodes.

Unit -III

Light microscopy - optical principles, resolution, magnification, aberrations. Phase contrast microscopy - Dark field illumination. Electron microscope (TEM & SEM) - Principle and preparation techniques. Special techniques - Maceration, Squashes, Smears, Whole mounts and clearing techniques.

Unit -IV

Microtechnique steps - Fixation and fixatives, dehydration, clearing, infiltration, embedding block making, and sectioning. Microtomes - types, principles and operating mechanism. Stains and staining techniques. Camera Lucida - types, principle and their uses. Micrometry.

Unit -V

Development of male and female gametophytes. Pollen - pistil interaction, concept of fertilization. Sexual incompatibility - genetic basis, barriers to fertilization, physiology and biochemistry of incompatibility. Structure and development of different types of endosperms. Embryo development and nutrition of embryo. Polyembryony - causes - classification - practical value. Apomixis: Agamospermy and Apospory. Parthenocarpy - types.

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CORE COURSE - VI: ANATOMY OF ANGIOSPERMS, PLANT MICRO-TECHNIQUE AND EMBRYOLOGY OF ANGIOSPERMS

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Write notes on Transfer cells.

(or)

b) Explain the different types of pits.

2. a) Give a short notes on Collenchyma.

(or)

b) Write short notes on lenticels.

3. a) Write short notes on maceration technique.

(or)

b) Give a short account on Dark-field illumination.

4. a) How to measure a microscopic object by means of micrometry?

(or)

b) Give short notes on Fixatives.

5. a) Write notes on Apomixis.

(or)

b) Explain Pollen-kit and its function.

Part -B (5 X 10= 50 Marks)

Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Describe the types, structure and functions of vascular cambium.

(or)

b) Describe the different structural models of Plasmamembrane and its function.

7. a) Write an essay on the anomalous secondary growth in Dicot stems.

(or)

b) Describe the structure and functions of secondary phloem.

8. a) Write an essay about the Scanning Electron Microscope.

(or)

b) Explain the principle and techniques in Phase contrast microscope.

9. a) Write an essay on stains and staining techniques.

(or)

b) Give a brief account on Freezing and Rotary microtome.

10. a) Define incompatibility. Explain the various methods employed to overcome incompatibility.

(or)

b) Write an essay about the different types of endosperm.

Second Semester CORE COURSE -VII: CELL BIOLOGY AND GENETICS

Unit -I

Plasmamembrane: structure, models and functions; sites for ATPases, ion carriers, channels and pumps; receptors. Chloroplast and Mitochondria - structure, genome organization and functions. Structure and functions of Golgi apparatus, Lysosomes, Endoplasmic Reticulum. Nucleus: Structure, Nuclear pores, Nucleolus organization.

Unit -II

DNA structure - A, B, C and Z forms; replication, damage and repair. RNA types - RNA splicing - Biosynthesis of mRNA, tRNA and rRNA. Ribosomes: Structure and their role in protein synthesis - biogenesis. Chromosomes: Morphology, ultra structure and types. (Lampbrush, Polytene, Isochromosome and B chromosome). Chromosome identifications - Banding technique. Structural and numerical variations in Chromosomes.

Unit -III

Introduction to molecular biology - Eukaryotic transcription - RNA polymerase - General and Specific transcription factors - regulatory elements and mechanisms of transcription regulation - transcriptional and post transcriptional gene splicing. Translation - initiation, elongation and termination.

Unit -IV

Gene interaction and modification of Mendel's ratios - Multiple alleles and pseudo alleles - Polygenic inheritance - Linkage - Recombination and chromosome mapping - Sex determination - Sex linked inheritance - Cytoplasmic inheritance. **Unit -V**

Mutation - Types - detection and its role in evolution - Mutagens (Physical and Chemical) - Population genetics - Hardy-Weinberg law and its applications, changes in gene frequency. Modem concept of gene - Introns, Extrons and their significance -Cis-trans effect - Regulation of gene expression in prokaryotes.

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CORE COURSE -VII: CELL BIOLOGY AND GENETICS

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) What are the salient features of Cell theory.

(or)

b) Explain the importance of Mitochondria in cellular metabolism.

(or)

2. a) Write critical notes on Plasma membrane.

(or)

b) Describe the importance of Microbodies.

3. a) What are the different regulatory elements of Transcription.

(or)

b) Explain C-value Paradox.

4. a) Explain Epistasis with suitable example.

(or)

- b) Define Gene and chromosome.
- 5. a) Explain Genetic drift.

(or)

b) Explain Mutation and its allied types.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Describe the structure and genome organization of Chloroplast.

(or)

- b) Describe Ribosome in detail and point out their role in evolution.
- 7. a) Write an essay on types, structure and replication of DNA.

(or)

- b) Discuss the importance of Dictyosome in a cell.
- 8. a) Explain the translation mechanisms in Eukaryotes.

(or)

- b) Give an account on RAPD and AELP analysis.
- 9. a) Write an essay on sex determination in plants.

(or)

b) Distinguish between Epistasis and Complementary genes.

10. a) Write an essay on Mutation.

(or)

b) Explain how environment regulates gene expression?

CORE COURSE -VIII: PRACTICAL-II (Covering the core courses III & V) (TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY, MICROBIOLOGY AND PLANT PATHOLOGY)

Taxonomy

Identification of specimens at family, generic and species levels belonging to

the following families:

Annonaceae, Capparidaceae, Caryophyllaceae, Portulacaceae, Rhamnaceae, Meliaceae, Sapindaceae, Aizoaceae, Rosaceae, Moringaceae, Rubiaceae, Boraginaceae, Bignoniaceae, Scrophulariaceae, Chenopodiaceae, Casuarinaceae, Orchidaceae, Commelinaceae, Typhaceae, Alismataceae and Poaceae.

- Economic importance of families mentioned above.
- Familiarity with the use of floras.
- Preparation of dichotomous artificial keys using locally available plants.

Microbiology

- 1. Cleaning and sterilization methods. (Laminar air flow chamber, Autoclave and Oven).
- 2. Preparation of culture media agar slant agar plate.
- 3. Isolation of microbes by streak and pour plate method.
- 4. Isolation of microbes by soil dilution techniques.
- 5. Isolation and identification of Bacteria and Fungi from spoiled food.
- 6. Gram staining of Bacteria.
- 7. Simple staining of bacteria (Ethylene blue/Crystal violet).
- 8. MBRT of milk (Phosphatase test).

Plant Pathology

Study the disease symptoms, causal organism, transmission and control measures of the following plant diseases.

- 1. Damping off of Pythium.
- 2. Little leaf of Brinjal (Mycoplasma).
- 3. Bacterial Blight of Paddy.
- 4. Bunchy top of Banana (Virus).

Note:

- A field trip of not less than **four days** to a place of luxuriant vegetation to study the flora and to study the different types of vegetation.
- Submission of a tour report and **25** herbarium sheets (Specimens collected from tour collection / locally available plants) during the Internal practical examination.
- Certified record work done in the laboratory during practical classes.

CORE COURSE -IX: PRACTICAL-III (Covering the core courses VI & VII) (ANATOMY OF ANGIOSPERMS, PLANT MICRO-TECHNIQUE, EMBRYOLOGY, CELL BIOLOGY AND GENETICS)

Anatomy

1. Study of suitable examples to understand the anatomy of plants mentioned in the theory syllabus.

Plant Micro-technique

- 1. Knowledge of functioning of rotary and sledge microtome.
- 2. Demonstration of section cutting using a rotary microtome and staining.
- 3. Measurement and calculation of macerated elements by micrometry.

Embryology

1. With the help of suitable examples, to illustrate the features of the theory syllabus by whole mounts, embryo mounting and permanent micro-slides.

Cell Biology

- 1. Study of squash and smear with suitable materials.
- 2. Study of induced aberrations in Onion root tip using chemicals (Demonstration Only).
- 3. Observation of electron micrographs of sub-cellular structures.

Genetics

- 1. Simple problems about segregation and independent assortment and gene interaction.
- 2. Chromosome mapping from three point test cross data, calculation and interference [Linkage and crossing over percentage].
- 3. To study the population genetics problems applying Hardy-Weinberg law.

Note:

- Submission of 5 double stained permanent slides as follows: Microtome sections 2 (or) free hand sections 2, peel 1, cleared material 1, maceration 1 (during the Internal practical examination).
- Certified record work done in the laboratory during practical classes.

Third Semester CORE COURSE -X: PLANT PHYSIOLOGY AND BIOPHYSICS

Unit -I

Water and Plant relations; Absorption of water and its mechanism - Apoplast symplast transports. Mechanism of ascent of sap. Mineral nutrition: Role of micro and macro elements. Mechanism of mineral absorption and phloem transportation. Hydroponics. Environmental stress: Types of stress. Effect of water and salt stress on crop plants.

Unit -II

Photosynthesis: Pigment system I & II - Emerson's enhancement effect. Photochemical reactions. Cyclic and Non-cyclic Photophosphorylation. C_3 and C_4 pathways. Photorespiration, CAM pathway. Respiration- Mechanism of Respiration-Glycolysis - Oxidation of Pyruvic acid - Kreb's cycle - Electron transport System - Hexose Monophosphate shunt.

Unit -III

Nitrogen Metabolism - Nitrogen cycle - Asymbiotic and symbiotic Nitrogen fixation. Leghaemoglobin, nod and nif genes. Nitrate reduction. NR and NIR - Assimilatation of Ammonia. GDH, GS and GOGAT pathway.

Unit -IV

Physiological effects and mode of action of plant growth regulators - Auxins, Gibberellins. Cytokinins, Ethylene and Abscissic acid. Phytochrome - role and mode of action. Photoperiodism and mechanism of flowering. Vernalaization - Senescence -Dormancy.

Unit -V

Bioenergetics - Laws of thermodynamics. Enthalpy, Entropy and free energy. Mitochondrial bioenergetics, Chloroplast bioenergetics, ATP bioenergetics NADP / NADHP redox couple bioenergetics. Photobiology - Light characterization of solar radiation. Absorption spectrum, action spectrum and emission spectrum in molecules. Fluorescence and Phosphorescence. Bioluminescence.

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CORE COURSE -X: PLANT PHYSIOLOGY AND BIOPHYSICS Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Explain the concept of water potential.

(or)

b) Describe redox potential.

2. a) What are macro nutrients?

(or)

b) What are high energy compounds?

3. a) Why anaerobic respiration is considered as a wasteful process?

(or)

b) What is reductive amination?

4. a) What is the importance of Photophosphorylation?

(or)

b) What is the role of Nitrogenase and Leghaemoglobin?

5. a) Write short notes on biosynthesis of Auxins.

(or)

b) Comment on the role of Cytokinins in plant metabolism.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) How is drought resistance in nature is achieved by plants? Add a note on antitranspirants.

(or)

b) Write an essay on mineral absorption in plants.

7. a) Discuss the needs for various types of respiration.

(or)

b) Illustrate and explain C₄ pathway in plants.

8. a) Trace the path of Nitrogen in higher plants.

(or)

b) Discuss Nitrate reduction in detail and explain its significance.

9. a) Give an account on plant growth regulators.

(or)

b) Discuss the Photoperiodism and mechanism of flowering.

10. a) Discuss the mitochondrial bioenergetics.

(or)

b) Write elaborate notes on action and absorption spectrum.

Third Semester CORE COURSE - XI: ENVIRONMENTAL BIOLOGY

Unit -I

Aim and scope of Ecology. Autecology - Population ecology - Characteristics of Population. Positive and negative interactions between Species (Plant and animal interactions) - Synecology - Qualitative and Quantitative characters of community. Niche - definition and types. Methods of studying plant community.

Unit -II

Ecosystem: Kinds and structure - Trophic levels. Food chain, Food webs, and Ecological pyramids. Energy flow in the ecosystems. Biogeochemical cycles -Hydrological, Carbon, Nitrogen, and Phosphorous cycles. Characteristic features, structure and functions of Forest, Grassland, Pond, Estuary and Manmade (Cropland) ecosystems.

Unit -III

Human impact on ecosystems. Environmental pollution - Air, water and soil. Solid waste management. Hazardous and biomedical waste management. Biocompost technology. Biomagnifications and Eutrophication. Disaster management - Floods, Earth quake, Cyclone, Tsunami and Landslides. Dams and their effects on forest and tribal people.

Unit -IV

Biodiversity: Definition - genetic, species and ecosystem diversity. Value of biodiversity, consumptive use, productive use, social, ethic, aesthetic values. Biodiversity at global and national levels. Hot-spots of biodiversity. Threats to biodiversity - IUCN.

Unit -V

Endemism - Red data book - Continuous and discontinuous distribution of vegetation. Phytogeographical regions of World - Types of vegetation in India. Deforestation and aforestation - Age and area hypothesis - Remote sensing -Principles, tools and application in Agriculture and Forestry.

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CORE COURSE - XI: ENVIRONMENTAL BIOLOGY

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Write short notes on Biological clocks.

Time: 3 Hours

(or)

b) Explain the Raunkiaer's life-form classification.

2. a) Define ecosystem and comment on its magnitude

(or)

b) Write notes on Ecological pyramids.

3. a) What is E-waste ? Give an example.

(or)

b) Write a critical note on Cyclone.

4. a) What is ecosystem diversity?

(or)

b) Write notes on aesthetic values of Biodiversity.

5. a) Write a short note on Endemism.

(or)

b) Discuss Age and area hypothesis.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Write an essay on animal - plant interactions.

(or)

b) Describe the methods of studying plant community.

7. a) Describe the characteristic features, structure and functions of Forest ecosystem.

(or)

b) Write an essay on energy flow in the ecosystem.

8. a) What is soil pollution ? Mention its changes, effects and control measures

(or)

b) What are biomedical wastes? Add a note on its influence on environment.

9. a) Write an essay on Hot-spots of biodiversity.

b) Write an essay on IUCN.

10. a) Write an essay on Remote sensing

(or)

b) Explain the types of vegetation in India.

CORE COURSE XII: PRACTICAL - IV (Covering the core courses X & XI) (PLANT PHYSIOLOGY, BIOPHYSICS AND ENVIRONMENTAL BIOLOGY)

Plant Physiology and Biophysics

- 1. Measurement of stomatal index and frequency.
- 2. Measurement of membrane permeability as affected by chemicals and temperature.
- 3. Separation of photosynthetic pigments by paper chromatography.
- 4. Estimation of photosynthetic pigments by Arnon's method.
- 5. Estimation of leghaemoglobin content of root nodules.
- 6. Estimation of total nitrogen by Nesslerization method (or) Microkjeldhal method.
- 7. Seed viability Tetrazolium chloride test.

Demonstrations

- 1. Determination of relative water content of leaf material.
- 2. Preparation of knops' solution Hydroponics study.
- 3. Warburg manometer principle and application.
- 4. Absorption spectrum of chlorophylls.

Environmental Biology

- 1. Estimation of soil moisture content.
- 2. Determination of soil pH.
- 3. Study the plant community by Quadrat method by determining frequency, density and abundance of different species.
- 4. Determination of minimum size of the quadrats by species area curve method.
- 5. Determining minimum number of quadrats to study maximum vegetation.
- 6. Line transect method to study vegetation.
- 7. Measuring the transparency level of an aquatic system using Secchi disc.
- 8. Spotting of Phytogeographical regions of India in maps (Soil, Vegetational and Botanical).
- 9. Study the Ecological interest of Ecosystems / Ecological tools / Photographs / Models / Plants studied in the theory syllabus (spotters).

Note:

- Field study of an area (not less than a period of 4 days) to document environmental assets and study the ecosystems and different types of vegetation (Forest / Grassland / Mountain / National parks / Sanctuary / Botanical garden / Lake / Pond / River / Water falls / Estuary / Mangrove / Sea coast) submit a tour report (during the Internal practical examination).
- Certified record of work done in the laboratory during practical classes.

Third Semester ELECTIVE COURSE - II: HERBAL BOTANY

Unit -I

History of Medicinal plants. Traditional Medicinal systems: Ayurvedha, Siddha, Unani and Naturopathy. Definition of Drug - Classification of natural drugs (Alphabetical, Morphological, Pharmacological, Chemical and Chemotaxonomical). Traditional and Folklore medicines - Native medicine.

Unit -II

Pharmacognosy - Definition and Scope. Drug adulteration, Drug evaluation, Chemical evaluation, Physical evaluation and Biological evaluation. Phytochemical investigations, standardization and quality control of herbal drugs.

Unit -III

Cultivation, collection and preparation of natural drugs - Macroscopic characters (Physical and Organoleptic characters), therapeutical and pharmaceutical uses of the following medicinal plants: Adadhoda, Aloe, Centella, Eugenia, Datura, Piper nigram, Allium sativum, Azaderacta indica, Ocimum, and Vinca

Unit -IV

Cultivation and utilization of selected medicinal plants - Bacopa monnieri, Cassia senna, Gloriosa superba, Phyllanthus amarus and Rauwolfia serpentina. National Medicinal Plants Board of India.

Unit -V

A brief account of the following drugs:

Drugs containing carbohydrates - Plantago (Isapgol).

Drugs containing glycosides - Cassia anqustifolia (Indian senna).

Drugs containing tannins – Terminalia chebula (Myrobalan).

Drugs containing lipids – Arachis oil.

Drugs containing resin and resin combination - Cannabis.

Drugs containing alkaloids - Cinchona.

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Third Semester ELECTIVE COURSE - II: HERBAL BOTANY Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) What is Native medicine?

(or)

- b) Explain the Chemotaxonomical classification of natural drugs.
- 2. a) Give an account on types of drug adulteration.

(or)

b) Write short notes on quality control of herbal drugs.

3. a) Give an account on the chemical constituents of Allium sativum .

(or)

- b) Give an account on the medicinal uses of Adadhoda.
- 4. a) Give a short account on the cultivation of Rauwolfia serpentina.

(or)

- b) Write short notes on uses of Bacopa monnieri.
- 5. a) Explain the procedures for collection and the characters of Cinchona.

(or)

b) Give an account on the medicinal uses of Cannabis.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Write an essay on Traditional and Folklore medicines.

(or)

b) Give a detailed account on the Siddha medicinal system.

7. a) How will you deduct the adulteration of plant drugs?

(or)

b) Give an account on chemical evaluation of plant drugs.

8. a) Write an essay on cultivation, collection and preparation of natural drugs.

(or)

b) What are the Organoleptic characters?

9. a) Give a brief account on the cultivation and utilization of Gloriosa superba.

(or)

b) Write an essay about the National Medicinal Plants Board of India.

10. a) Give a brief account on the drugs containing lipids - Arachis oil.

(or)

b) Give a brief account on the drugs containing glycosides - Indian senna.

Third Semester ELECTIVE COURSE - III: PLANT BIO-TECHNOLOGY

Unit -I

Biotechnology - scope and potentialities. Genetic engineering - enzymes - nucleases, polymerases, ligases, alkaline phosphatase, reverse transcriptase - Sl nucleases - vectors - use of plasmids, cosmids, phage and transposans as vectros - gene cloning - cloning in eukaryotes. Amplification of genes by PCR. cDNA and construction of cDNA libraries.

Unit -II

Recombinant DNA technology - gene transfer in plants - aims, strategies for development of transgenic plants - specific and non-specific methods of gene transfer

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- organization of Ti plasmid in Agrobacterium tumifaciens - Ti plasmid mediated gene transfer. DNA transfer by particle bombardment, micro and macro injection methods lipofection - electroporation.

Unit -III

Plant tissue culture - concept of totipotency - organization of tissue culture laboratory. Sterilization methods - callus induction, subculture and maintenance. Organogenesis - anther culture and production of haploids - somatic embryogenesis isolation, culture and fusion of protoplast - cybrids - micro-propagation - encapsulated seeds. Application of plant tissue culture in agriculture and crop improvement.

Unit -IV

Application of biotechnology - useful products from microbes. Production of organic acids (Acetic acid and Citric acid), enzymes (Amylase) Alcohol (Ethanol). Biogas technology in India - benefits - feed stock materials and biogas production. Bio-diesel and Bio-hydrogen.

Unit -V

Germplasm storage - Cryopreservation. Bio-fertilizer - Azatobacter, Azospirillum, Cyanobacteria (BGA) and Phosphate solubilizers. Bio-control of crop pests. Single cell protein (Algae, Fungi and Bacteria). Bioremediation and biodegradation of toxic substances.

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ELECTIVE COURSE - III: PLANT BIO-TECHNOLOGY Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Write notes on gene cloning.

(or)

b) Explain the enzymes which involved in the Genetic engineering.

2. a) What are the objectives of producing transgenic plants?

(or)

b) What is vector? Describe its importance in gene transfer.

3. a) Mention the applications of plant tissue culture in agriculture.

(or)

b) Mention the importance of anther culture and production of haploids.

4. a) Explain the role of microbes in medicine.

(or)

b) Mention the uses of enzymes (Amylase) and organic acids (Acetic and Citric acid.)

5. a) Write notes on Cryopreservation.

(or)

b) Write notes on Bio-fertilizer.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Write an essay about recombinant DNA technology.

(or)

- b) Give an account on Amplification of genes by PCR.
- 7. a) Write an essay on Agrobacteriurm tumifaciens mediated gene transfer.

(or)

- b) Write in detail about the different gene transfer methods.
- 8. a) Write an essay on protoplast fusion technique.

(or)

- b) Write an essay about plant tissue culture technique.
- 9. a) Write in detail about commercial production of alcohol.

(or)

b) Write an essay on Biogas technology in India.

10. a) Write an essay on Single Cell Protein.

(or)

b) Write an essay on Bio-control of crop pests.

Fourth Semester

CORE COURSE - XIII: BIOCHEMISTRY AND BIOSTATISTICS Unit -I

Basic concepts of atoms and molecules - chemical bonds - covalent bonds, hydrogen bond, electrostatic interactions, hydrophobic interactions, Vander Waals forces. Five types of chemical transformations in cells (oxidation -reduction, rearrangement, group transfer, cleavage, and condensation). Optical isomerism. pH and its significance, Isoelectric point. Buffer systems. Redox potential.

Unit -II

Carbohydrates: Occurrence, structure and properties of monosaccharides, oligosaccharides and polysaccharides. Biological significance of carbohydrates. Proteins: Classification, structure - primary, secondary, tertiary and quaternary. Properties and purification of proteins.

Unit -III

Amino acids: Structure, D & L forms - classification. Essential and nonessential amino acids, Properties. Enzymes: Chemistry of enzymes - Classification -Mechanism of action - Factors affecting enzyme activity. Michaelis-Menten model of enzyme kinetics. Co-enzymes, Isoenzymes Allosteric enzymes, Ribozymes and Abzymes.

Unit -IV

Lipids: Components of lipids - classification of fatty acids. Simple lipids, compound lipids and derived lipids (steroids) - properties of lipids. Biosynthesis and functions of terpenoids, alkaloids and flavanoids. Vitamins - structure, types, source and their role.

Unit -V

Methods of sampling, classification and tabulation of data. Histograms frequency polygon, frequency curve. Measures of central tendency - mean, median and mode. Measures of dispersion - standard deviation and standard error. Student's't' test, Chi-square test and analysis of variance.

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CORE COURSE - XIII: BIOCHEMISTRY AND BIOSTATISTICS Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) Give an account on Iso-electric point.

(or)

- b) Explain the phenomenon of optical isomerism.
- 2. a) Mention the properties of Oligosaccharides.

(or)

- b) Explain the properties of Proteins.
- 3. a) Give an account on the structure of Amino acids.

(or)

- b) Write short notes on Iso-enzymes.
- 4. a) What are simple Lipids?

(or)

- b) Explain the role of Vitamins.
- 5. a) Give an account on Frequency polygon.

(or)

b) Briefly explain about Chi-square test.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) What are the concepts of atoms? Explain the various kinds of bonds and their significance.

(or)

- b) Give a detailed account on various kinds of chemical transformations you have studied.
- 7. a) Write an essay about Polysaccharides.

(or)

- b) Explain the classification of Proteins.
- 8. a) Write the different forms of amino acids and their properties.

(or)

b) Write an essay on the mechanism of action and classification of enzymes.

9. a) Explain the mechanism of Biosynthesis and functions of flavonoids.

(or)

b) What are the components of lipids? Write notes on derived lipids.

10. a) What is sampling? Write about the methods and classification of sampling.

(or)

b) What are mean, median and mode? How to find out the standard deviation?

Fourth Semester

CORE COURSE - XIV: RESEARCH METHODOLOGY Unit -I

Basic principles and measurement of pH - pH meter - Buffers - Measurement of primary productivity of an aquatic ecosystem. Electrical conductivity meter principles and uses - Photomicrography - Processing, developing and printing of photographic materials.

Unit -II

Centrifuge - principles - types - low speed, high speed and ultra (Preparative and Analytical) centrifuges - operations and uses. Chromatography - basic principles and types - Paper, TLC, Column, Ion-exchange and HPLC.

Unit -III

Electrophoresis - Principles and types - SDS PAGE. Isoelectric focusing -Principles and applications. Colorimeter - Spectrophotometer - Flame photometer -Atomic absorption spectrophotometer - construction, principles and uses.

Unit -IV

Chemical analysis of plant parts. Muffle furnace - ash analysis. Energy estimation by Bomb calorimeter. Titrimetry (DO of water samples) - Isotope methodology - Radio activity and half life - G.M. counter and Scintillation counter - Autoradiography.

Unit -V

Scientific data collection, source and methods - Web browsing and searching. Tabulation - Graphical and diagrammatic representation - Histograms - Literature and reference collection - Thesis format - Journal format - Citation, proof correction and editing.

References

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CORE COURSE - XIV: RESEARCH METHODOLOGY Time: 3 Hours Maximum: 75 Marks

Part - A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

1. a) List the characters of an ideal buffer.

(or)

- b) What is an oxygen electrode? Point out its uses.
- 2. a) Write briefly on the advantages of ion exchange chromatography over paper chromatography.

(or)

b) Write on refrigerated centrifuge.

3. a) Critically analyze the basics of colorimeter.

(or)

- b) Write notes on isoelectric focusing.
- 4. a) Explain the construction of G.M. counter and principle involved in measurement.

(or)

- b) Write notes on ash analysis.
- 5. a) With examples cite the uses of tables.

(or)

b) Write briefly on author citation.

Part - B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Write an essay on construction, principle and uses of Conductivity bridge.

(or)

- b) What is pH? How is it measured?
- 7. a) Write in detail the principles and applications of Column Chromatography.

(or)

- b) Describe in detail about the principles, types and uses of Centrifuge.
- 8. a) Write an essay on Atomic absorption spectrophotometer.

(or)

- b) Describe gel electrophoresis in detail.
- 9. a) Using liquid scintillation how will you measure radioactivity?

(or)

b) Write an essay on Autoradiography

10. a) How will you write and present thesis?

(or)

b) Write an essay about the sources and methods of data collection.

CORE COURSE - XV: PRACTICAL -V (Covering the core courses XIII & XIV)

(BIOCHEMISTRY, BIOSTATISTICS AND RESEARCH METHODOLOGY) Biochemistry and Biostatistics

- 1. Preparation of solutions percent ppm, molal, molar and normality concentrations.
- 2. Preparation of buffers (phosphate & citrate)
- 3. Estimation of reducing sugars (Nelson Somogyi method)
- 4. Estimation of total free amino acids (Moore & Stein, 1948).
- 5. Estimation of proline (Bates et al., 1973).
- 6. Estimation of protein (Lowry's Method).
- 7. Estimation of phenol (Mahadevan, 1996)
- 8. Analysis of a sample (leaf/fruit/seed) covering Mean, Median and Mode, Histograms, Frequency curve, Standard deviation and Standard error.

Demonstration experiments

- 1. Estimation of oil in oil seeds.
- 2. Assay of amylase (or) Peroxidase.
- 3. Study the spotters from the theory syllabus in Biochemistry and Biostatistics (Instruments /Apparatus / Chemicals / Photographs / Charts / Figures/ Graphs / Tables / Diagrams / Models).

Research methodology

- 1. Measurement of conductivity of water sample.
- 2. Measurement of pH of the fruit juice.
- 3. Verification of Beer's law using CuSO₄ / K₂Cr₂O₇ Solution.
- 4. Preparation of standard graph for Amino acid.
- 5. Estimation of dissolved Oxygen (Winkler's method).
- 6. Separation of photosynthetic pigments by TLC.

Demonstration Experiments

- 1. Analysis of minerals K, Ca, Na from soil / water / plant samples using flame photometer.
- 2. Separation of proteins by Electrophoresis.
- 3. Quantitative separation of any three standard amino acids by Paper Chromatography method.
- 4. Study the spotters from the theory syllabus in Research methodology (Instruments /Apparatus / Chemicals / Photographs Charts / Figures/ Graphs / Tables / Diagrams / Models).

Note:

- Submit a data collection (not less than 20 pages) using internet for Literature Review / References to any one topic in the theory syllabus of Biochemistry / Biostatistics / Research Methodology (during the Internal practical examination).
- Certified record work done in the laboratory during practical classes.

Fourth Semester ELECTIVE COURSE - IV: HORTICULTURE

Unit - I

Principles and scope of Horticulture. Importance of soils and plants. Classification of horticultural crops - fruits and vegetables. Types of gardens: formal, informal and kitchen. Principles of designing a garden.

Unit - II

Plant propagation methods: Cutting, layering, budding and grafting. Stock-scion relationship in horticultural crops. Use of plant growth regulators in horticulture. Induction of rooting, flowering, fruit set, fruit development and control of fruit crops. Importance of Bio-fertilizers in Horticulture.

Unit - III

Aftercare of plants: weeding, top dressing methods of pruning and topiary. Lawn making: types of lawn grasses and maintenance. Plants suitable for hedges. Uses of insecticides and fungicides in ornamental plants. Types of vegetable gardens. Classification of vegetables. Preservation of fruits and vegetables. Cultivation of edible roots, tubers and rhizomes.

Unit - IV

Floriculture: cultivation of commercial flowers - Rose, Jasmine, Carnation, Anthurium and Chrysanthemum. Nursery management and propagation. Flower and fruit development. The role of phytochromes in flowering. Cut flowers - flower arrangement. Ikebana - Preparation of plants for special occasional exhibitions. Decoration with dried plant materials. Development of Orchid garden. Beautiful avenues for Town roads.

Unit - V

A brief knowledge of annual, biennial and perennial with reference to gardens. Green house, water garden, rock gardens, Bonsai techniques - Aesthetic aspects of Bonsai. Containers of Bonsai. Methods of dwarfing. Flowering and fruit bearing Bonsai. Hydroponics. Storage of vegetables and fruits.

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ELECTIVE COURSE - IV: HORTICULTURE Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary 1. a) Give a brief account on importance of soils and plants.

(or)

b) Bring out the principles of designing a garden.

2. a) Describe the role of plant growth regulators in Horticulture.

(or)

b) Give an account on layering.

3. a) Bring out the cultivation of edible rhizomes.

(or)

b) Suggest effective methods for after care of the plants.

4. a) Define Floriculture.

(or)

b) Give the list of beautiful avenues for roads.

5. a) Explain the Hydroponics.

(or)

b) Give an account on rockery.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks Draw labelled sketches wherever necessary

6. a) Explain the classification of horticultural crops.

(or)

b) Write an essay on different types of gardens.

7. a) Write an essay on different grafting techniques.

(or)

b) Describe the role and applications of Bio-fertilizers in Horticulture.

8. a) Write an essay on different types of lawn grasses. How do you prepare lawn?

(or)

b) Explain in detail about the preservation of fruits and vegetables.

9. a) Explain cultivation of the commercial flowers Rose and Carnation.

(or)

b) Write an essay on indoor gardens.

10. a) Write an essay on storage of vegetables.

(or)

b) Explain the various techniques in Bonsai garden.

CORE COURSE - IV: PRACTICAL - I (Covering the core courses I & II) (ALGAE, FUNGI, LICHENS, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

	Practical	: 50 marks
	Record	: 5 marks
	Viva - voce	: 5 marks
Hrs	Max. Marks	: 60 marks

- 1. Make suitable micropreparations of A, B, C, D and E. Draw labelled sketches. Identify giving seasons. Submit the slides for valuation. $(5 \times 4 = 20 \text{ marks})$
- 2. Make suitable micropreparations of **F** and **G**. Draw labelled sketches identify giving seasons. Submit the slides for valuation. $(2 \times 5 = 10 \text{ marks})$
- 3. Identify any two algae from the given algal mixture **H.** Draw diagrams only. (4 marks)
- 4. Name the genus and group of the given specimens I and J. $(2 \times 2 = 4 \text{ marks})$
- 5. Draw diagrams and notes of interest on K, L, M and N. $(4 \times 3 = 12 \text{ marks})$

Key:

Time: 4

A, B, C, D & E	- Materials one each from Algae, Fungi,
	Bryophytes, Pteridophytes and Gymnosperms.
F & G	- Reproductive parts one each from
	Pteridophytes and Gymnosperms.
Н	- Mixture of three micro algae.
I & J	- Macroscopic structure one each from
	Pteridophytes and Gymnosperms.
K, L, M & N	- Materials one each from Fungi, Bryophytes,
	Lichens and Fossils.

Note:

- Submission of 15 herbarium sheets from Algae / Fungi / Lichens / Bryophytes / Pteridophytes / Gymnosperms (during the Internal practical examination).
- Field trip to a hill station and coastal area for a minimum period of five days for the collection of specimens and to study the plants in their natural habitat.
- Certified record work done in the laboratory during practical classes.

CORE COURSE - VIII: PRACTICAL - II (Covering the core courses III & V) (TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY, MICROBIOLOGY AND PLANT PATHOLOGY)

Time: 4 Hrs	Practical Record Viva - voce Max. Marks	: 50 marks : 5 marks : 5 marks : 60 marks
1. Find out the Binomials of A and B.	(3X2	= 6 Marks)
2. Refer specimens C, D and E to their respective	families giving	g reasons at
each level of hierarchy.	(3X3	= 9 Marks)

3.	Construct a key using F, G, H, I, J and K.	(6 Marks)
4.	Determine whether the given sample L is contaminated w	with bacteria or not.
	Leave the sample for valuation.	(5 Marks)
5.	Name the causal organism, disease symptoms and contra	ol measures of the
	given material M.	(5 Marks)
6.	Mention the Family, Genus and Species of N, O and P.	(3X3 = 9 Marks)
7.	Write notes on Q , R and S .	(3X2 = 6 Marks)
8.	Write the economic importances of T and U .	(2X2 = 4 Marks)

Key:

A & B	- Flowering plants from families prescribed in the syllabus.
C, D & E	- Flowering plants from families prescribed in the syllabus.
F, G, H, I, J & K	- Flowering twigs from the families given in the syllabus.
L	- Milk sample.
Μ	- Pathological material specified in the syllabus.
N, O & P	- Flowering twigs from the families given in the syllabus.
Q, R & S	- Spotters from Microbiology (Equipments / Instruments /
	Chemicals / Culture media / Stains / Photographs / Slides)
T & U	- Economic Botany.

Note:

- A field trip of not less than four days to a place of luxuriant vegetation to study the flora and to study the different types of vegetation.
- Submission of 25 herbarium sheets (specimens collected from tour collection / locally available plants) during the Internal practical examination.
- Certified record work done in the laboratory during practical classes.

CORE COURSE - IX: PRACTICAL -III (Covering the core courses VI & VII) (ANATOMY OF ANGIOSPERMS, PLANT MICRO-TECHNIQUE, EMBRYOLOGY, CELL BIOLOGY AND GENETICS)

Practical	: 50 marks
Record	: 5 marks
Viva - voce	: 5 marks
Max. Marks	: 60 marks
	Practical Record Viva - voce Max. Marks

- Cut transverse section of A. Identify the anomaly by giving reasons. Draw diagrams. Submit the slide for valuation. (6 Marks)
- Macerate and identify the elements in **B**. Measure the length / breadth using micrometry. (6 Marks)

- From the given material C dissect and mount any 2 stages of embryo.
 Submit the slide for valuation. Draw diagrams. (6 Marks)
- 4. By using the flower bud given in **D** identify any 2 developmental stages of microsporogenesis. Submit the slide for valuation. Draw diagrams.

(6Marks)

5. Prepare a squash of E. Display any two stages of cell divisions. Draw labelled sketches. (4 Marks)
 6. Construct a chromosome map of a three point test cross using the given data F. (8 Marks)
 7. Solve the genetic problems G and H. (2x3 = 6 Marks)
 8. Write notes of interest on I, J, K and L. (2X4 = 8 Marks)

Key:

A, B, C, D & E	- Material given in the practical class.
F	- Chromosome map data
G & H	- Genetic problems given in the practical.
I, J & K	- Spotters from Anatomy, Microtechnique, and Embryology (Slides / Chemicals / Instruments).
L	- Spotters from Molecular Biology.
Note:	

- Submission of 5 double stained permanent slides (Microtome sections / free hand sections 2, peel 1, cleared material 1, and maceration 1) during the Internal practical examination.
- Certified record work done in the laboratory during practical classes.

CORE COURSE - XII: PRACTICAL - IV (Covering the core courses X & XI) (PLANT PHYSIOLOGY, BIOPHYSICS AND ENVIRONMENTAL BIOLOGY)

	Practical	: 50 marks
	Record	: 5 marks
	Viva - voce	: 5 marks
Time: 4 Hrs	Max. Marks	: 60 marks

 Set up the experiment A assigned to you. Record your observation and interpret the results. Leave the set up for valuation. (10 Marks)
 Comment on the set up B. (5 Marks)

3. Write notes of Physiological interest of C, D and E. (3x3 = 9 Marks)

Construct a meter quadrat F. Study the plant community by determining frequency, density and abundance of different species. Analyze the vegetation. Record your data and interpret the results. (10Marks)
 Determine the pH of the given soil sample G. (4 Marks)
 Write notes of ecological interest of H, I, J and K. (4x3 = 12 Marks)

Key:

Α	- Plant physiology experiment given in the syllabus
	(Selected by each student by lot)
B	- Plant physiology experiment
C, D & E	- Charts /Figures/ Graphs / Tables / Instruments / Apparatus /
	Chemicals / Models / Photographs related to Plant Physiology.
F	- Simple quadrat.
G	- Soil Sample.
H, I, J, & K	- Ecological tools / Chemicals / Graphs / Photographs / Maps of
	Phytogeographical regions / Vegetations of India.

Note:

- Field study of an area of natural habitat (Lake / Pond / River / Water falls / Grassland / Mountain / Estuary / Marine / Sanctuary / Botanical garden) for not less than a period of 5 days to document environmental assets and study the ecosystems and **submit a Tour report** (during the Internal practical examination).
- Certified record work done in the laboratory during practical classes.

CORE COURSE - XV: PRACTICAL -V (Covering the core courses XIII & XIV) (BIOCHEMISTRY, BIOSTATISTICS AND RESEARCH METHODOLOGY)

Practical	:	50 marks
Record	:	5 marks
Viva - voce	:	5 marks
Max. Marks	:	60 marks

Time: 4 Hrs

- 1. Conduct the experiment **A** assigned to you. Record your results. Leave the set up for valuation. (10 Marks)
- From the given material B find out the mean and calculate the standard deviation with reference to its length. Present your data in the form of a graph. (7 Marks)
- 3. Verify Beer's law using the given solution **C**.

(or)

Prepare a standard graph of the given amino acid **D**. (8 Marks)

4. Separate and identify the photosynthetic pigments from the given sample **E** using Thin Layer Chromatography.

(or)

Determine the dissolved oxygen of the given sample **F** by Winkler's method. (10 Marks)

5. Write notes on **G**, **H**, **I**, **J** and **K**.

(5X3 = 15 Marks)

Key:

- A Biochemistry experiment from the syllabus (Selected by each student by lot).
- **B** Leaf / Fruit (any one 50 in number).
- $\mathbf{C} \qquad -\operatorname{CuSO}_4\left(\mathrm{or}\right)\mathrm{K}_2\mathrm{Cr}_2\mathrm{O}_7$
- **D** Glycine
- E Leaves
- **F** Any water sample
- G & H Biochemistry (Equipments / Apparatus / Chemicals / Photographs / Charts / Diagrams)
- Biostatistics (Charts / Diagrams)
- J & K Research methodology (Charts /Figures/ Graphs / Tables / Instruments /Apparatus / Chemicals / Models / Photographs).

Note:

- Submit a data collection (not less than 20 pages) for Literature Review / References using internet to any one topic in the theory syllabus of Biochemistry / Biostatistics / Research Methodology (during the Internal practical examination).
- Certified record of work done in the laboratory during practical classes.

EXTRA DISCIPLINARY COURSE - I: HORTICULTURE

Unit - I

Horticulture and its importance - Branches of Horticulture - Importance of soil and plants - Classification of horticultural crops - Types of garden: Formal, informal and kitchen - Principles of designing a garden.

Unit - II

Plant propagation methods: Cutting, layering, budding and grafting -Stock and scion relationship - Induction of rooting, flowering, fruit set, fruit development and control of fruit crops.

Unit - III

Lawn making: Types of lawn grasses and maintenance - Plants for hedges -Types of vegetable garden - Classification of vegetables - Preservation of fruits and vegetables - Cultivation of edible roots, tubers and rhizomes.

Unit - IV

Importance of Floriculture - Cultivation of commercial flowers: Rose, Jasmine and Chrysanthemum - Nursery management and propagation - Cut flowers - Ikebana - Preparation of plants for special occasions - Decoration with dried plant materials.

Unit - V

A brief knowledge of Green house, water garden, rock garden and Bonsai -Aesthetic aspects of Bonsai - Containers of Bonsai - Flowering and fruit bearing Bonsai - Storage of vegetables and fruits.

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MODEL QUESTION

EXTRA DISCIPLINARY COURSE - I: HORTICULTURE

Time: 3 Hours

Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks) Answer ALL the questions All questions carry equal marks

1. a) Bring out the principles of designing a garden.

(or)

b) Give a brief account on importance of soil and plants.

2. a) Give an account on stock and scion relationship.

(or)

- b) Give an account on grafting.
- 3. a) Bring out the cultivation of edible tubers.

(or)

- b) Give short notes on the types of vegetable gardens.
- 4. a) Define Floriculture.

(or)

- b) Give short notes on nursery management.
- 5. a) Give short notes on Bonsai.

(or)

b) Give a short account on water garden.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks

6. a) Write an essay on different types of gardens.

(or)

- b) Explain the classification of horticultural crops.
- 7. a) Write an essay on plant propagation methods.

(or)

- b) Write an essay about induction of flowering and fruit set.
- 8. a) Explain in detail about the preservation of fruits and vegetables.

(or)

b) Write an essay on different types of lawn grasses. How do you prepare lawn?

9. a) Explain the cultivation of the commercial flowers Jasmine and Chrysanthemum.

(or)

b) Write an essay on nursery management and propagation.

10. a) Explain the various techniques in Bonsai garden.

(or)

b) Write an essay on storage of vegetables and fruits.

EXTRA DISCIPLINARY COURSE - II: HERBAL BOTANY Unit -I

History of Medicinal plants - Historical account of Medicinal plants in India -Establishment of medicinal plant gardens - Traditional Medicinal systems: Ayurvedha, Siddha, Unani and Naturopathy - Traditional and Folklore medicine.

Unit -II

Cultivation and utilization of the selected medicinal plants: Adadhoda, Aloe, Allium, Ocimum, and Vinca - National Medicinal Plants Board of India.

Unit -III

Definition of Drug - Classification of natural drugs: Alphabetical, Morphological, Pharmacological and Chemical - Native medicine.

Unit -IV

Drugs from leaves (Eucalyptus), Flower (Eugenia), Fruits and seeds (Coriander) Roots (Rauwolfia), Bark (Cinchona) and Wood (Ephedra).

Unit -V

Pharmacognosy - Definition and scope. Biological evaluation of drugs. Phytochemical investigations - Quality control of herbal drugs.

References

Amruth, The Medicinal plants Magazine (All volumes) Medplant Conservatory Society, Bangalore.

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MODEL QUESTION

EXTRA DISCIPLINARY COURSE - II: HERBAL BOTANY Time: 3 Hours Maximum: 75 Marks

Part -A (5 X 5 = 25 Marks)

Answer ALL the questions

All questions carry equal marks

1. a) Mention the importance of medicinal plants.

(or)

- b) Give an account on the history of medicinal plants.
- 2. a) Mention the utilization and uses of Vinca.

(or)

b) Write short notes on National Medicinal Plants Board of India.

3. a) Give an account on the chemical classification of drugs.

(or)

b) Explain Native medicine

4. a) Write notes on drugs from leaves.

(or)

b) Explain the medicinal values of Cinchona.

5. a) How the quality control of drugs are determined?

(or)

b) Define the scope of Pharmacognosy in India.

Part -B (5 X 10= 50 Marks) Answer ALL the questions All questions carry equal marks

6. a) Write an essay on the establishment of medicinal plant gardens.

(or)

b) Write a concise account on Siddha medicinal system.

7. a) Give a brief account on the cultivation and utilization of Allium.

(or)

b) Give a brief account on the cultivation and utilization of Ocimum.

8. a) Explain the morphological classification of drugs.

(or)

b) How pharmacological characters are useful in the classification of herbal drugs?

9. a) Define the cultivation and medicinal uses of Rauwolfia.

(or)

- b) Discuss the medicinal importance of Eucalyptus.
- 10. a) Write an essay on the Biological evaluation of drugs.

(or)

b) Write a brief account on the quality control of herbal drugs.