KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE- 641 029.
M.Sc. BOTANY
Curriculum & Scheme of Examination under CBCS
(Applicable to Students Admitted from the Academic Year (2014-2015)

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	13PB0101	C.P.1 - Plant diversity -I	6	25	75	100	3	4
	13PBO102	C.P.2 - Plant diversity – II	6	25	75	100	3	4
	13PBO103	C.P.3 - Developmental Biology	6	25	75	100	3	4
	13PBO1E1	Major EL.1 - Forest Resources and Utilization.	6	25	75	100	3	5
		C.Pr.1 - Plant Diversity - I, II. & Developmental biology	6					
II	14PBO204	C.P.4- Bioinformatics	6	25	75	100	3	5
	14PBO205	C.P.5 - Cytology, Genetics, Plant Breeding and Biostatistics.	6	25	75	100	3	4
	12PBO206	C.P.6 - Ecology, Bioenergetics and Natural Resource Management.	6	25	75	100	3	4
	14PBO2E2	Major EL. 2. Modern Methods of Plant analysis and Bioinstrumentation	6	25	75	100	3	5
	14PBO2CL	C.Pr.1- Plant diversity-I , II. & Developmental biology		40	60	100	4	4
	12PBO2CM	C.Pr.2 - Cytology, Genetics, Plant Breeding and Biostatistics, Ecology, Bioenergetics and Natural Resources Management.	4	40	60	100	4	4
	14PBO2CN	C.Pr.3 – Bioinformatics.	2	40	60	100	4	4
III	13PBO307	C.P.7 - Taxonomy and Biosystematics	7	25	75	100	3	4
	13PBO308	C.P.8 - Biotechnology & Nanobiology	7	25	75	100	3	4
	14PBO309	C.P.9 – Pharmocognosy.	6	25	75	100	3	4
	13PBO3N1	Non major EL 1. 1-Horticulture	6	25	75	100	3	5
	12PBO3CO	C.Pr.4 – Taxonomy and Biosystematics, Biotechnology and Nanobiology.	4	40	60	100	4	4
IV	13PBO410	C.P.10 –Biochemistry & Biophysics.	7	25	75	100	3	4
	14PBO411	C.P.11 –Plant Physiology.	7	25	75	100	3	4
	14PBO4N2	Non major EL. 2 - Medicinal Plants.	6	25	75	100	3	5
	13PBO4CP	C.Pr.5 - Plant Physiology, Biochemistry& Biophysics.	4	40	60	100	4	3
	12PBO4Z1	Project Work & Viva – Voce	6	40	160	200	-	6
		Total				2200		90

Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. **Forest Resources and Utilization**
2. **Seed Technology**
3. **Modern Methods Plant Analysis**
4. **Food Science and Nutritions**

Non Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. **Horticulture**
2. **Limnology**
3. **Medicinal Plants**
4. **Industrial Microbiology**

Tally Table:

Part	Subject	No. of Subjects	Total Marks	Credits
I	Core – Theory / Practical / Project	17	1800	70
	Major Elective Paper	2	200	10
	Non Major Elective Paper	2	200	10
	Grand Total	**21**	**2200**	**90**

Note:

CBCS – Choice Based Credit System
CIA – Continuous Internal Assessment
ESE – End of Semester Examinations

25 % CIA is applicable to all subjects except JOC, ALC, COP and Diploma Courses, which are considered as extra credit courses.

PBO-1

SEMESTER-I **13PBO101**

C.P.1 – PLANT DIVERSITY - I

(Phycology, Mycology, Lichenology, Bacteriology, Virology and Plant Pathology)

Objectives:

- To study the pathogenic microorganisms causing various plant disease.
- To know the primitive plants of the earth.
- To know the classification of algae based on the pigment system in plants

Total hours: 105 **Credit**: 4

UNIT I (21 HOURS)

Algae: Classification of Algae by Fritsch (1945). General characters - Thallus organization, algal pigments, reproduction and life cycle in algae. Thallus organization, reproduction and life cycles in Cyanophyceae, Chlorophyceae, Phaeophyceae Bacillariophyceae and Rhodophyceae. Economic importance of algae.

UNIT II (21 HOURS)

Fungi: Classification of fungi by Alexopoulos and Mims 1979. Range of structure, reproduction heterothallism and types of fructifications in fungi. Phylogeny and interrelationships of Myxomycetes, Oomycetes, Ascomycetes and Basidiomycetes. **Lichens:** Role of phycobionts and mycobionts in lichen thallus. Structure and reproduction of Ascolichen- *Usnea*, Basidiolichen – *Lichenomphalia* and Deutrolichens- . Economic importance of lichen.

UNIT III (21 HOURS)

Bacteria: Morphology and ultra structure of bacteria, bacterial culture – continuous culture and synchronous culture. Isolation and maintenance of pure culture. Growth curve of bacteria population. Industrial uses of bacteria in the production of lactic acid, vinegar and citric acid.

UNIT IV (21 HOURS)

Virus: History of virus, Morphology and general characteristics of plant viruses (Lowff *et al.*, 1979). Symmetrical structure of virus. Double stranded DNA viruses. Bacteriophage- morphology, structure and replication. Isolation and purification of plant viruses.

UNIT V (21 HOURS)

Plant Pathology: History of Plant pathology. Classification of plant diseases. Host parasite interactions, structural, physiological and biochemical defense mechanism in hosts. Symptoms, causal organisms and control measures of Late blight of Potato, Powdery mildew of Grapes, Black rust of wheat, Blast diseases of paddy, Bunchy top of banana.

PBO-2

TEXTBOOKS

1. Alexopoulos C.J. and C.W. Mims.1952. Introductory mycology. East Wiley Ltd. New Delhi.
2. Gangulee, Das & Kar – 2001. College Botany Vol I & II. New central Book agency Pvt. Ltd. Calcutta.
3. Sharma, O.P. 1986. Text book of Fungi. Tata McGraw – Hill publishing Co. New Delhi.
4. V.Singh, P.C. Pande and D.K. Jain. 2012. A Text book of Botany. Rastogi Publication. Meerut, India.

REFERENCES

1. Bessey, E.A. 1971. Morphology and Taxonomy of Fungi. Hafner Publication Company, New York.
2. Bilgrams, K.S. and Verma, R.N. 1978. Physiology of Fungi. Vikas Publishing House.
3. Deacon, J.W.1984. Introduction to mycology. Blackwell science publication, Oxford.
4. Duke, H.C. 1983. Introduction to fungi. Vikas publishing house. New Delhi.
5. Fritsch F.E. 1965. (Rep) Structure and reproduction of the Algae. Vol I & II Cambridge University Press.

PBO-3

SEMESTER-I **13PBO102**

PLANT DIVERSITY - II

(Bryophytes, Pteridophytes and Gymnosperms)

Objectives:

- To study the life cycle of higher thallophytes in Pteridophyta and Bryophyta.
- To study the dead remains of the plants in the division of Paleobotany.

Total hours: 90 **Credit**: 4

UNIT 1 **(18 HOURS)**

Classification of Bryophytes. (Smith, 1955). General characters of Hepaticopsida, Anthoceropsida and Bryopsida. Structure and evolution of gametophytes and sporophyte. Fossil bryophytes.

UNIT II **(18 HOURS)**

Classification of Pteridophytes by (Smith, 1955). General characters of Psilophytopsida, Lycopsida, Sphenopsida and Pteropsida. Methods of reproduction in Pteridophytes.

UNIT III **(18 HOURS)**

Vascular organization and evolution of stele in Pteridophytes. Hetrerospory and seed habit. Evolution of sorus. Evolution of sporophyte.

UNIT IV **(18 HOURS)**

Classification of Gymnosperms by Pilger and Melchoir (1956). General characters of *Pteridospermales*, *Bennettitales*, *Pentoxylales* and *Ginkgoales*.

UNIT V **(18 HOURS)**

General characters of Coniferales and Gnetales. Angiospermic characters of Gnetales. Phylogenetic trends and affinities of various classes. Economic importance of Gymnosperms.

TEXTBOOKS

1. Gangulee, Das & Kar. 2001. College Botany Vol I & II. New central Book agency Pvt. Ltd. Calcutta.
2. Pandey, B.P. 1990. (6^{th} Ed.). A Textbook of Botany Vol. II. S. Chand & Co. Ltd., New Delhi.
3. Vasistha, P.C. 1971. Botany for Degree students. S. Chand & Co. Ltd., New Delhi.

REFERENCES

1. Sporne, K. R. 1966. The morphology of Pteridophytes. Bal Bergen Boeken, London.
2. Sporne, K.R. 1967. The morphology of Gymnosperms. Bal Bergen Boeken, London.
3. Arnold, C.D. 1947. An introduction to Paleobotany. Mc Graw Hill Publications, New York.
4. Seward A.C. 1991. Fossil plants. Today and Tomorrow Publishers, New Delhi.

PBO-4

SEMESTER-I **13PBO103**

DEVELOPMENTAL BIOLOGY

(Plant Anatomy, Embryology and Tissue Culture)

Objectives:

- To understand basic concepts and modern development in biology, and
- Then apply these concepts and definitions in new areas of developmental biology

Total hours: 90 **Credit**: 4

UNIT I **(18 HOURS)**

Secondary xylem-structure - distinction from primary xylem, tylosis. Dendrochronology, sap wood and heart wood. Arrangement of vessels in secondary xylem of dicots. Compression wood and tension wood. Phylogenetic trends of specialization of xylem and phloem.

UNIT II **(18 HOURS)**

Vascular cambium – origin, types, structure cytology, seasonal activity and part played by cambium in wound healings. Anomalous secondary thickening in Aristolocaceae, Nyctaginaceae and Piperaceae. Nodes - types and evolution.

UNIT III **(18 HOURS)**

Development of anther, physiology of anther tapetum, pollen wall morphogenesis, Pollen sterility, pollen-stigma compatibility, megasporogenesis, female gametophyte and nutrition of embryo sac.

UNIT IV **(18 HOURS)**

Fertilization, control of fertilization, development of dicot and monocot embryo, classification of endosperm. Apomixis and Parthnocarpy.

UNIT V **(18 HOURS)**

History**,** Scope, Importance, Basic techniques of Tissue Culture. Organization of tissue culture lab. Regeneration of plants from Callus-organogenesis and Embryogenesis method. Application of Tissue culture- Germplasm Storage and Somoclonal Variations.

TEXTBOOKS

1. Bhojwani S. S. and Bhatnager S.P. 1997. The embryology of Angiosperms. Vikas Publishers House, Chennai.
2. Fahn, A. Plant Anotamy. 1985 Pergman press, London.
3. Dubey. R.C. 1996. A Text Book of Biotechnology. Rastogi Publications, Meerut.
4. Kumaresan, V.K. Text Book of Biotechnology. 2009. Saras Publications, Kanyakumari.

REFERENCES

1. Esau, K. 1991. Anatomy of seed plants. (7^{th} Ed.). Wely Eastern Ha, Chennai.
2. Eames A. J. and Mac Daniels. 1976. An introduction to plant Anatomy. Tata Mac Graw Hill, New Delhi.
3. Johri, B.M., K.B. Ambegaokar and P.S. Srivastava. 1992. Vol. I. Embryology of Angiosperms. Springer – Verlac, New York.
4. Maheswari, P. 2006. Introduction to embryology and Angiosperms. Tata Mac Graw Hill, New Delhi.

PBO-5

SEMESTER-I **14PBO2CL**

C.Pr.1 PLANT DIVERSITY – I & II DEVELOPMENTAL BIOLOGY

Total hours: 90 **Credit**: 3

PLANT DIVERSITY – I

Algae

Scenedesmus, Pediastrum. Pithophora, Caulerpa, Chara, Codium, Ectocarpus, Padina, Amphiroa, Ceramium, Gelidium, Gracelaria, Nostoc, Lyngbya, Scytonema and *Diatoms*.

Fungi

Plasmodiophora, Alternaria, Phytophthora, Penicillium, Aspergillus, Peziza, Polyporus.

Bacteria

Isolation and identification of bacteria from air, soil & water. Gram staining, bacterial culture technique – streak- agar in slant culture demonstration.

Lichen

Usnea

Pathology

Late blight of Potato, Powdery Mildew of Grapes, Black rust of Wheat, Blast disease of Paddy, Bunchy top of Banana and White Rust of Amaranthus.

PLANT DIVERSITY – II

Bryophytes

Lunularia, Reboulia, Dumortiera, Fossombronia, Pellia, Targionia, Sphagnum, Bryum.

Pteridophytes

Selaginella, Adiantum, Pteris, Salvinia, Azolla. *Hymenophyllum* **Gymnosperms**: *Cupressus, Podocarpus, Araucaria, Ephedra*.

Fossils

Rhynia, Asteroxylon, Sphenophyllum, Lagenostoma *Ankyropteris, Botryopteris, Heterangium, Pentoxylon, Medullosa, Cycadeoidea, Cordaites*.

Field trip

`Three days field visit- Observations of species in natural habits and collection of specimens.

DEVELOPMENTAL BIOLOGY

Anatomy

Study of suitable examples to illustrate features in anatomy mentioned in theory syllabus, with the help of section, peelings and macerations.

Embryology: With the help of permanent slides to study

1. Stages in development of microsporangium and male gametophyte.
2. Configurations of ovules, 2, 4 nucleate embryo sac, mature embryo sac.
3. Types of endosperm.
4. Stages in embryogeny 2 or 3 celled, globular, proembryos mature embryos of monocot and dicot. Interpretation of embryological drawings.

Tissue Culture

1. Preparation of M. S. Medium, Sterilization, Methods and Equipments
2. Study about Transgenic Plants.

PBO-6

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

COIMBATORE – 641 029

PG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2013-14 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

PRACTICAL – I

I. Algal mixture	**- 06 Marks**
II. Micro preparation of Algae (5 × 4)	**- 20 Marks**
III. Differential staining of bacteria	**- 05 Marks**
IV. Embryo mounting	**- 04 Marks**
V. Spot at sight (6 × 2)	**- 12 Marks**
VI. Basic requirements of the medium	**- 03 Marks**
Submission of record	**- 10 Marks**
TOTAL	**- 60 Marks**

PBO -7

SEMESTER – II **14PBO204**

BIOINFORMATICS

Objectives

- To understand the role of Bioinformatics in various fields
- To understand the structure of biological databases and their utilities.
- To impart knowledge about various tools to manipulate the biological databases.

Total hours: 90 **Credit**: 5

UNIT I **(18 HOURS)**

Central dogma of molecular biology. Gene structure and information content. Promoter sequences. Genetic code, open reading frames and introns and exons. Classification of Biological Databases: Sequence, Structural databases, Specialized and Literature databases.

UNIT II **(18 HOURS)**

Gene finding: content based, comparative and site based methods, tools and problems in gene finding. Regulation of gene expression in prokaryotes and eukaryotes. Transcription factors.

UNIT III **(18 HOURS)**

Protein structures: primary, secondary, tertiary and quaternary structures, domain, motifs and protein families. Protein prediction.

UNIT IV **(18 HOURS)**

Sequence alignment – alignment – definition, types, local, global, pairwise and multiple sequence alignment. Scoring methods – matrices, PAM, BLOSUM and Gap Penallty, Dotplot, dynamic programming, sequence similarity search using BLAST and FASTA.

UNIT V **(18 HOURS)**

mRNA – Recent trends in Bioinformatics. Biomolecular visualization, phylogenetic analysis and computer aided drug designing. Applications of Bioinformatics in various fields.

TEXTBOOKS

1. Mani, K and N. Vijayaraj. 2002. Bioinformatics for beginners. Kalaikathir Achakam, Coimbatore.
2. Dan E. Krane and Michael L. Raymer. 2006. Fundamental concepts of bioinformatics. Dorling Kindersley (India) Pvt Ltd.

REFERENCES

1. Cold Spring Harbor. 2004. Bioinformatics – Sequence and Genome Analysis. (2nd Ed.) Laboratory Press,
2. Arthur M. Lesk. 2002. Introduction to Bioinformatics. Oxford University Press, UK.
3. David W. Mount. 2001. Bioinformatics-Sequence and Genome analysis. Cold Spring Harbor Laboratory Press.
4. D.R. Westhead, J.H. Parish and R.M. Twyman. 2003. Instant Notes in Bioinformatics.

PBO-8

SEMESTER-II **14PBO205**

CYTOLOGY, GENETICS, PLANT BREEDING AND BIOSTATISTICS

Objectives

- To study the cell structure and cell organelles.
- To know about the genes and gene interaction.
- To know the methods of plant breeding and crop improvement.

Total hours: 90 **Credit**: 5

UNIT I **(18 HOURS)**

Cytology – Ultra Structure of Cell. Plasma membrane, Cell organelles, Mitochondria, Endoplasmic reticulum, Golgi apparatus, Chloroplast, Ribosome, Nucleus and chromosomes, chromosomal aberrations – numerical and structural variations.

UNIT II **(18 HOURS)**

Genetics - Mendel's law of inheritance – Interaction of genes, Quantitative inheritance - Sex determination in plants; theories of sex determination. Sex Linkage. Sex influenced and sex limited characters. Gene mutation–Detection of mutation – CLB method, Muller 5 – method. Biochemical mutants in Bacteria and *Neurospora*.

UNIT III **(18 HOURS)**

Molecular basis of mutation – physical and chemical mutagens. Multiple alleles and pseudo alleles. Fine structure of gene- IS element-Transposons. Uniparental inheritance - *Chlamydomonas*. Cytoplasmic male sterility- Maize. Population genetics - gene frequencies- Factors affecting gene frequencies- mutation, selection, migration, genetic drift. Gene mapping.

UNIT IV **(18 HOURS)**

Plant breeding – Aim and objectives of plant breeding. Methods of breeding in self pollinated cross pollinated and asexually propagated plants. Breeding plant for disease resistance. Heterosis. Mutation breeding. Achievements of plant breeding with special reference to the following crops. Rice, Wheat, Sugarcane and Cotton.

UNIT V **(18 HOURS)**

Biostatistics - Measures of central tendencies. Mean (only arithmetic) and mode, mean deviation, standard deviation and standard error. Probability of distribution (Binomial, Poison and normal) tests of statistical significance- chi-square test, student t-test, theories of probabilities. Analysis of variance, Correlation and Regression. (Simple and multiple).

TEXTBOOKS

1. Verma, P.S. and Agarwal, V. K. 1998. Cytology. (1st Ed.). S. Chand & Pvt.Ltd., New Delhi
2. Veerbala Rastogi. 2004. A text book of genetics. Kedarnach & Ramnath, Meerut.

REFERENCES

1. De Robertis. 1975. Cell Biology. (6th Ed.) Saunders Philadelphia
2. Gardener, E.J. Peter Suns tad, D. 1975. (5th Ed.). Principles of genetics. John Wiley & Sons Inc.
3. Strick Berger M.W.1997. Genetics. (2nd Ed.) MacMillan, New York.
4. Gupta, P.K. 1985 – 91. Genetics. (2nd Ed.). Rastogi Publications.
5. Allard, R.W.1960. Principles of Plant breeding. John Wiley & Sons Inc.
6. Shukla R. S. and P. S. Chandel. 1996. Cytogenetics – Evolution and Plant Breeding. S. Chand & Pvt.Ltd. New Delhi.
7. S.P. Gupta, S.P. 2001. Statistical methods. Sultan Chand & Sons, Educational Publishers, New Delhi.

PBO-10

SEMESTER-II **12PBO206**

ECOLOGY, BIOENERGETICS AND NATURAL RESOURCE MANAGEMENT

Objectives

- To understand the ecosystem organization
- To know the causes of environmental deterioration and possible measures for recovering of environment, and environmental education in India.
- To have the knowledge on resources available for the benefit of mankind.

Total hours: 105 **Credit**: 5

UNIT I **(21 HOURS)**

Population and community Ecology - Ecology – concepts and applications, biotic community concepts, characteristics and structure of population, ecological variants, and methods of studying plant communities.

Unit II **(21 HOURS)**

Ecosystem ecology - Structural and functional characteristics of ecosystem, major ecosystems of world, biogeochemical cycle – cycling and reservoir pool, gaseous and sedimentary patterns of cycling, nutrient cycling and agricultural patterns in tropical and temperate regions, plant indicators of conditions, uses and processes.

UNIT III **(21 HOURS)**

Bioenergetics - Energy dispersion, law of thermodynamics, concept and energy flow models, productivity concept, turn over – primary production processes in C_4 and CAM plants, adaptations in C_4 plants for efficient primary production. Productivity in different ecosystems, measurement of primary production.

UNIT IV **(21 HOURS)**

Environmental Pollution and Education - Air, water, soil, noise and radiation pollution – causes and possible control measures. Climatic change. Global warming, green house effect, ozone depletion, Acid rain. Environmental education-principles, Environmental education programmes in India. Environmental organizations and agencies, Man and Biosphere (MAB) and National and International organizations.

UNIT V **(21 HOURS)**

Natural Resource Conservation and Management - Biodiversity - International and National scenarios, importance. Ecological principles and applications in conservation of biodiversity. *Ex situ* and *in situ* conservation of species. Biosphere reserves, sanctuaries, national parks, world hot spots. Remote sensing-principles and tools. Soil conservation – erosion and control. Water standards, quality and management. Surface water and ground water development. Water conservation and waste water reuse. Disaster Management - Bhopal tragedy and Tsunami.

TEXTBOOKS

1. Sharma, P.D. 2000.Ecology and Environment. Rastogi Publications, Meerut.
2. Kumar, H.D. 1994. General Ecology. Vikas Publishing Co. New Delhi.

REFERENCES

1. Odum, E.P. 1971. Fundamentals of Ecology. N.B.Saunders Co. Ltd. Philadelphia.
2. Krebs.1985. Ecology. C.J, Haper & Row, New York.
3. Ambasht, R.S.1988. Text book of plant ecology. Lanka Publishers, Varanasi.
4. Misra, K.C. 1980. Manual of plant ecology. Oxford and IBH Publishing Co., New Delhi.
5. Alan Wellburm. 1988. Air pollution and acid rain – the biological impact. Longman Scientific and technical, Singapore.
6. Varshney, C.K. 1989. Water pollution and Management. S.P. Printers, Noida.
7. Weaver and Clements. 1929. Plant Ecology. Tata McGraw Hill Publishing Co. New Delhi.
8. Sinha, R.K. and Dalbir Singh. 1997. Global Biodiversity. INA Shree Publishers, Jaipur.
9. Biology of Fresh Water 1981. By Mason, C.F. Longman, London.

PBO-12

SEMESTER-II **12PBO2CM**

C.Pr.2. Cytology, Genetics, Plant Breeding, Biostatistics and Ecology

Total hours: 60 **Credit**: 3

Cytology, Genetics, Plant Breeding, Biostatistics

1. Ultra structure of cell organelles (electron microscopic photographs).
2. Study of mitosis and meiosis with different materials.
3. Simple problem in genetics - monohybrid cross, Dihybrid cross, Interaction of genes, Blood grouping, Sex determination, Sex linked inheritance, Gene mapping, Population genetics.
4. Training in hybridization techniques using potted plants.
5. Statistics problems.

Ecology

1. To determine the quantitative characters in the community by using quadrat method.
   a) Frequency b) abundance c) density d) basal cover e) IVI.
2. Synthetic characters: Similarity index, FICC, dominance index, diversity index.
3. Raunkiaer's life form classes and percentage distribution of species in vegetation.
4. Stratification, Zonation – Demonstration.
5. Soil analysis – Physical – bulk density, water-holding capacity, soil moisture. Chemical - nitrate and carbonate.
6. Field visit – Report preparation on vegetation types, conservation measures under taken in biosphere reserves/ national parks/ sanctuaries etc.

PBO-13

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

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PG MODEL QUESTION PAPER (PRACTICALS)

End Semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2013-14 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

PRACTICAL – II

I. Genetics/Biostatistics problem of (4 × 4)		**- 16 Marks**
II. Any two stages of Mitosis (2 × 2)		**- 04 Marks**
III. Ecology Experiment		**- 10 Marks**
IV. Spot at sight (5 × 4)		**- 20 Marks**
Submission of record		**- 10 Marks**
	TOTAL	**- 60 Marks**

PBO-14

SEMESTER-II **14PBO2CN**

C.Pr.3. BIOINFORMATICS

Total hours: 30 **Credit**: 3

1. Biological data retrieval from Nucleic acid databases – NCBI & DDBJ
2. Data retrieval from Protein databases – SwissProt & PDB.
3. Use of literature databases – Virtual library and PubMed.
4. Similarity search using BLASTs and FASTA
5. 3-D Molecular visualization using RASMOL
6. Phylogenetic analysis using Clustal-X.
7. Gene prediction using GenScan & GenMark (HMM)
8. Protein Structure prediction using ExPASy Tools
9. Protein secondary structure prediction using GOR.
10. Transmembrane protein prediction using TmPred.

PBO-15

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

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PG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2013-14 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

PRACTICAL – III

I. Writing Algorithms for A, B & C (10 + 10 + 05)	**- 25 Marks**
II. Results for A, B & C (06 + 06 + 03)	**- 15 Marks**
III. Viva-voce for A, B & C (04 + 04+ 02)	**- 10 Marks**
Submission of record	**- 10 Marks**
TOTAL	**- 60 Marks**

PBO-16

SEMESTER-III **13PBO307**

TAXONOMY AND BIOSYSTEMATICS

Objectives

- To study about the classification and nomenclature of Angiosperms.
- To understand the theory and practices in plant systematics.

Total hours: 105 **Credit**: 4

UNIT I (21 HOURS)

Historical account of the classification of angiosperms up to the present day. Systems of classification- Detailed study of Bentham and Hooker, Bessey, Hutchinson and Cronquist – merits and demerits. ICBN- history, principles, typification, principles of priority and their limitations, effective and valid publication, author citation, retention, choice and rejection of names, names of hybrids.

UNIT II (21 HOURS)

Taxonomic literature- flora, monograph, icones, journals, supporting literature. Keys- dichotomous keys, uses. Botanic gardens. Sources of taxonomic information- embryology, cytology, chemotaxonomy, serotaxonomy and molecular taxonomy.

UNIT III (21 HOURS)

Description and economic importance of the following families - Menispermaceae, Polygalaceae, Caryophyllaceae, Portulacaceae, Oxalidaceae, Tiliaceae, Meliaceae, Vitaceae, Rhamnaceae, Sapindaceae, Rosaceae, Combretaceae, Onagraceae, Lythraceae, and Aizoaceae.

UNIT IV (21 HOURS)

Oleaceae, Gentianaceae, Convolvulaceae, Boraginaceae, Bignoniaceae, Pedaliaceae, Nyctaginaceae, Aristolochiaceae, Loranthaceae, Dioscoreaceae, Commelinaceae, Araceae, and Cyperaceae.

UNIT V (21 HOURS)

Biosystematics- aim and scope. Biosystematics categories. Phenotypic plasticity. Turreson's work. Population concept, speciation. Species and genus concept. Gene ecology. Numerical taxonomy.

TEXTBOOKS

1. Subramaniam, N.S. 1997. Modern plant taxonomy. Vikas Publishing House, New Delhi.
2. Sharma, O.P. 1986. Plant taxonomy –Rastogi Publications, New Delhi.
3. Sivarajan, V.V. 1986. Introduction to principles of plant taxonomy. Oxford & IBH Pvt. Company.

REFERENCES

1. Lawrence, H.M. 1951. Taxonomy of vascular plants. Macmillan & Co.
2. Bennet, S.S.R. 1986. An introduction to plant nomenclature. International Book Distribution India.
3. Henry, A.N. and Chandra Bose. 1982. An aid to the International code of Botanical nomenclature. BSI, Calcutta.
4. Jain, S.K. and R.R. Rao. 1977. A hand book of field and herbarium methods. Today & Tomorrow Pvt. Ltd.
5. Pandey, B.P. 1997. Taxonomy of angiosperms. Chand & Co. Ltd., New Delhi.
6. Vasudevan Nair, R. 1997. Taxonomy of angiosperms. APH Publishing Corporation, New Delhi.
7. Sokal, S.R. & P.H. Sneath. 1973. Principles of numerical taxonomy. N.H. Freemen and Co.
8. Gurcharan Singh. 2004. Plant systematic – theory and practices. Oxford and IBH Publishers, New Delhi.
9. Naik, V.N. 1984. Taxonomy of Angiosperms. TATA Mc Graw Hill, New Delhi.

PBO-18

SEMESTER-III **13PBO308**

C. P. 8. BIOTECHNOLOGY AND NANOBIOLOGY

Objectives:

- To know the principles employed in the production of bioproducts.
- To have the comprehensive understanding about the tools available for the production of biogoods.
- To have a basic knowledge on Nanobiology.

Total hours: 105 **Credit**: 4

UNIT I **(21 HOURS)**

Scope and importance of biotechnology. Isolation, sequencing and synthesis of genes. Gene transfer methods in plants – *Agrobacterium* mediated gene transfer, Ti plasmid. Transgenic plants. Biosensors and biochips.

UNIT II **(21 HOURS)**

Isolation and culturing of microorganisms for the production of organic acids (ethanol) and antibiotics (*Penicillium*) by microbial fermentation. Biotechnology in paper industry, biohydro-metallurgy and biomineralisation, biofertilizers, bioinsecticides and application of genetically engineered bacteria.

UNIT III **(21 HOURS)**

Genetic engineering: Gene cloning, DNA sequencing methods, Green Fluorescence Protein, hybridoma and monoclonal antibodies. Intellectual Property Rights (IPR), Intellectual Property Protection (IPP) and patenting of biological materials. Molecular probing, DNA finger printing, Hybridization technology.

UNIT IV **(21 HOURS)**

Definition – Historical aspects, classification of nanomaterials, Nature and nanotechnology. Properties of nanoparticles – Increased surface, Targeting photonic quantum properties, increased strength. Principle, mechanism and applications – SEM, AFM, TEM. Types of nanoparticles - Metallic, Semiconductors and Polymeric types. Common nanoparticles – Carbon nanotubes, bucky balls. Methods of synthesis of nanoparticles – top down approach and bottom up approach.

UNIT V **(21 HOURS)**

Application of nanoscience and nanotechnology in agriculture, drug delivery, cancer chemotherapy, medical implants, and environmental applications.

TEXTBOOKS

1. Gupta, P.K. 1998. Biotechnology and Genetics. Rastogi Publications, Meerut.
2. Gregory, L. Timp. 1998. Nanotechnology (1st Ed.). American Institute of Physics.

Bharat Bhusan. 2006. Hand Book of Nanotechnology. (1st Ed.).Springer.

REFERENCES

1. Callow, J.A., Ford Lloyd, B.V. and Newbury, H.J. 1997. Biotechnology and Plant Genetics Resources: Conservation and Use. CAB International, Oxon, UK.
2. Gupta, P.K. 1998. Elements of Biotechnology. Rastogi Publications.
3. Ignachimuthu, S. 1995. Basic Biotechnology. Tata Mc Graw-Hill Publishing Company Ltd., Madras.
4. Kartha, K.K. 1985. Cryopreservation of plant cells and organs. CRC Press Boca Raton, Florida, USA.
5. Santharam, S. and J.F. Montgomery 1999. Biotechnology, Biosafety and Biodiversity. Oxford and IBH Publishing Co. New Delhi.
6. Meyyan, R.P. and V. Kumaresan. 2004. Genetics and Biotechnology. Saras Publication, Nagercoil.

PBO-20

SEMESTER-IV **14PBO309**

PHARMACOGNOSY

Objectives

- Apply the knowledge gained and be able to advise the community, on issues concerning cultivating, harvesting and processing of medicinal plants and their products.
- Classify crude drugs morphologically, taxonomically, chemically or pharmacologically.
- To know the methodology of plant analysis.

Total hours: 105 **Credit**: 4

UNIT I **(21 HOURS)**

Scope of Pharmocognosy and modern medicines. Indian medicinal system – Siddha, Ayurvedha, Unani and Homeopathy.

UNIT II **(21 HOURS)**

Morphological and histological studies and therapeutic and pharmaceutical uses of the following drugs; Bark:- *Cinnamomum zeylanicum;* Leaves:-Raspberry *Rubus idoeus*, Flower:- *Syzygium aromaticum*, Fruit:- *Citrus limon*, Seed:- *Trigonella foenum - graceum*; Rhizome:- *Zingiber officinale*, Gum:- *Acacia senegal*, Gum resin:- *Commiphora spp*, Fixed oil:- *Ricinus communis*, Essential oil:- *Eucalyptus globules*.

UNIT III **(21 HOURS)**

Method of plant analysis: - Phytochemical tests and application of plant derived alkaloid, flavonoids, terpenoid and steroids. A general procedure for solvent extraction. Separation of the compounds by TLC technique.

UNIT IV **(21 HOURS)**

A brief account of medicinal plants and their chemical constituents, plants remedies for *Diabetes,* anti-fertility, rheumatism, drugs acting on central nervous system, cardiovascular and cancer.

UNIT V **(21 HOURS)**

Cultivation and role of medicinal Plants: - *Catharanthus roseus, Digitalis purpurea, Aloe vera, Withania sominifera, Papavar somniferum.* Recommendations for promoting traditional medicinal plants cultivation in India.

TEXTBOOKS

1. Trease, G.E. and Evans, W.C.1985. Pharmocognosy. (12th Ed.). English Language books Society, Baillie Tindall.
2. Wallis, T.E. 1985. Textbook of Pharmocognosy (5th Ed.). CBS Publishers & Distributors, New Delhi.

REFERENCE

1. Satoskar, R.S., S.D. Bhandarkar and Nimala N. Rege. 2005. Pharmocognosy and pharmacotherapueatics. (12th Ed.). Popular Prakashan Pvt., Ltd., Mumbai.
2. Jain, S.K. 1996. Ethnobotany in human welfare (Ed.). Deep Publishers, New Delhi.
3. Nadkarni, K.M.1954. Indian Materia medica. Karnataka Printing Press, Mumbai.
4. James A. Duke. 1996. The Green Pharmacy. Scientific Publishers, Jodhpur.
5. Guha Bakshi, Sensararma and Pal. 2001. A Lexicon of Medicinal Plants in India. Nayaprokas, Kolkatta.
6. Shah, C.S. and J.S. Qadry. 1996. A Textbook of Pharmocognosy. Unique Offset Printers, Ahemedabad.

PBO-21

SEMESTER-III **12PBO3CO**

C.Pr.4. Taxonomy, Biosystematics, Biotechnology & Nanobiology

Total hours: 60 **Credit**: 3

Taxonomy

Study of the characters of the above mentioned families, Economic importance. Field visit for plant collection at least for three days. Preparation of artificial keys and submission of herbarium sheets (50) collection of local plants only.

Biotechnology

1. Production of ethanol by using microbes.
2. Study of biofertilizers and pesticides.
3. Electrophoresis (Gel electrophoresis) Demonstration
4. Nanoparticle
5. Nanotube
6. Nanorods

Instruments

SEM – Scanning electron microscope

AFM – Atomic Force Microscope

STM – Scanning Tunneling Microscope

TEM – Transmission Electron Microscope

PBO-22

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

COIMBATORE – 641 029

PG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2013-14 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

PRACTICAL – IV

I. Specimens identification (2 × 2)	**- 04Marks**
II. Identification of the family (4 × 2)	**- 08 Marks**
III. Find out the binomial and family (2 × 3)	**- 06 Marks**
IV. Industrial biotechnology (wine)	**- 06 Marks**
V. Spotters (5 ×3)	**- 15 Marks**
V. Herbarium	**- 05 Marks**
Submission of record	**- 10 Marks**
TOTAL	**- 60 Marks**

PBO-23

SEMESTER-II **13PBO410**

BIOCHEMISTRY & BIOPHYSICS

Objectives

- To understand the dual nature of light, role of electrons and radiation.
- To know the biological importance of the macromolecules.
- To learn about the hormones and vitamins and their role.

Total hours: 105 **Credit**: 5

UNIT I **(21 HOURS)**

Carbohydrates: Classification, Stereo isomerism – optical isomerism - structure of mono, di and polysaccharides. **Lipids**: Classification and Structure- simple lipids, derived lipids and compound lipids. **Proteins:** Classification, structure of proteins-primary, secondary, tertiary and quaternary structure and their importance, Globular and Fibrous proteins.

UNIT II **(21 HOURS)**

Amino acids: Classification, Structure and function. Isoelectric pH, peptide bond. Non protein amino acids – chemistry, determination and biosyntheis of amino acids. **Nucleic acids:** Nitrogen bases, Nucleotides. DNA and RNA: Structure and types. **Enzymes:** General characters – nomenclature - classification – isolation and purification - enzyme action – Michaelis Mentons evidences – coenzymes and isoenzymes, Enzyme kinetics, enzyme inhibition.

UNIT III **(21 HOURS)**

Vitamins: Structure and biochemical properties of water soluble and fat soluble vitamins and their coenzyme activity. Coenzymes and their structures.

Hormones: Plant hormones - Growth regulating substances and their mode of action.

UNIT IV **(21 HOURS)**

Electromagnetic radiation - nature, absorption, absorption spectrum and action spectrum, law of absorption, interaction with matter, role of electrons in absorption of light, electron multiplicity. Excitation, de-excitation & path of de-excited electrons. Bioluminescence, Fluorescence and Phosphorescence.

UNIT V **(21 HOURS)**

Radioactivity and biological traces: alpha, beta and gamma radiations. Radioactive isotopes and half-life period. **Ionization and detection** - biological effects of ionizing radiation – uses of biological traces in metabolic studies. autoradiography, Geiger- Muller counter and Scintillation counter.

TEXT BOOKS

1. Janin, K.L. Sunjay Jain and Nitin Jain, 2009. Fundamentals of Biochemistry, S.Chand and Company Ltd, New Delhi.
2. Daniel, M. (1989). Basic Biophysics for Biologists, Agro-Botanical Publishers, Bikaner, India.
3. Srivastava, H.S. 1999. Elements of Biochemistry. Rastogi publications, Meerut.
4. Palanisamy, S. Principles of biophysics, Palani Paramount Publications
5. Asokan, P. 2002. Analytical Biochemistry (Biochemical Techniques). Chinna Publications, Chennai.

REFERENCES

1. Weel, J.H. 1990. General Biochemistry. Wiley Eastern Ltd.
2. Albert L. Lehninger Principles of Biochemistry. ICAR, Delhi.
3. Voet & Voet, 2000, Fundamentals of Biochemistry, John Wiley, New York.
4. Zubay, 1995, Biochemistry, Brown Publishers.
5. L. Stryer, 2002, Biochemistry,W.H. Freeman.
6. Satyanarayana, V. 2005. Essentials of Biochemistry. Arunabha Sen & Allied Pvt., Ltd

PBO-25

SEMESTER-IV **14PBO411**

- PLANT PHYSIOLOGY

Objectives

- To study the structure of atom and chemical bonds.
- To know the secondary metabolites in plants.
- To study about water potential and its components.

Total hours: 105 **Credit**: 4

UNIT I **(21 HOURS)**

Water relations – diffusion, Osmosis and Imbibition, water potential. Absorption of water, Active and Passive absorption. Transpiration - its kind, significance and factors. Physiology of stomatal movements.

UNIT II **(21 HOURS)**

Ascent of sap. Path and Mechanism of ascent of sap. Vital theories, Transpiration pull and collision of water theory. Mineral salt absorption. Translocation of organic solutes.

UNIT III **(21 HOURS)**

Mechanism of photosynthesis – Light reaction, Carbon fixation in C_3 & C_4 plants. Outline of CAM pathway. Photorespiration, Respiration, glycolysis, Krebs cycle & Pentose phosphate pathway, ATP synthesis.

UNIT IV **(21 HOURS)**

Nitrogen metabolism – Source of Nitrogen, Nitrate and Nitrite reduction. Biological Nitrogen Fixation – Symbiotic & Non-Symbiotic. Synthesis of amino acids.

UNIT V **(21 HOURS)**

Phytohormones – Fruit ripening – Introduction, Climatic and non-climatic fruits, Role of ethylene in fruit ripening, symptoms of fruit ripening, Environmental control of fruit ripening. Circadian rhythms, biological clock, secondary metabolites, stress physiology - water & salt. Plant movements, Phytochrome and cryptochrome response in plants.

TEXTBOOKS

1. V. K. Jain. 1999. Fundamentals of Plant Physiology. S.Chand and Company Ltd, New Delhi.
2. Verma, V. 2001. Plant physiology. Emkay Publication, New Delhi.

REFERENCES

1. Devlein, R.E. 1986. Plant Physiology. CBS Publishers and Distributors, New Delhi.
2. Srivastava, H.S. & N.Shankar. 2005. Plant physiology & Biochemistry. Rastogi publications, Meerut.
3. Ray Noggle, G. and George J. Fritz. 2002. Introductory plant Physiology. Prentice Hall of India, Pvt., Ltd., New Delhi.
4. Hess, D. 1975. Plant Physiology. Narosa Publishing house, New Delhi.
5. Hewilt, E.J. and Cutting, C.V. 1979. Nitrogen Metabolism in Plants. Academic Press London.

PBO-26

SEMESTER-IV **13PBO4CP**

C.Pr.5.PLANT PHYSIOLOGY, BIOCHEMISTRYANDBIOPHYSICIS

Total hours: 60 **Credit**: 3

Plant Physiology

1. Measurement of stomatal index and frequency.
2. Measurement of membrane permeability as affected by chemicals and temperature.
3. Separation of photosynthetic pigments by TLC
4. Estimation of photosynthetic pigments by Arnon's method.
5. Estimation of leghaemoglobin content of root nodules.
6. Measurement of Hill reaction.

Demonstration

7. Determination of relative water content of leaf material.
8. Preparation of knop's solution – Hydroponics study.
9. Warburg manometer – principle and application.

Biochemistry

10. Effect of pH and temperature on the enzyme activity of peroxidases, amylase and catalase.
11. Preparation of phosphate & citrate buffers.
12. Estimation of carbohydrates, proteins, amino acids & lipids.

Biophysics (Book diagrams)

13. Nature of EMR, Flourescence, Phosphorescence, Radiationless transition and Delayed light emission.
14. Radioactive emission (alpha, beta & gamma), Autoradiography, Geiger-Muller counter and Scintillation counter.

PBO-27

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

COIMBATORE – 641 029

PG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2013-14 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

PRACTICAL – V

I. Physiology experiment	**- 12 Marks**
II. Biochemistry experiments	**- 12 Marks**
III. Physiology setup	**- 05 Marks**
IV. Explain the principle (Biophysics)	**- 06 Marks**
V. Spotters (5 × 3)	**- 15 Marks**
Submission of record	**- 10 Marks**
TOTAL	**- 60 Marks**

PBO-28

SEMESTER-I **13PBO1E1**

Major Elective - I FOREST RESOURCES AND UTILIZATION

Objectives

- To understand the importance and value of trees in urban and community settings, and to know the factors affecting their health and survival.
- To understand the economic value of forests and know many of the products they provide to people and society.

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

Forest cover and national status. Factors for the deterioration of forest cover. Major forest types in India.

UNIT II **(15 HOURS)**

Forest and climate, forest as carbon sink, forest and water, forest and soil, forest and air.

UNIT III **(15 HOURS)**

Major forest products- Timber, charcoal. Minor forest products resource of fibers and flosses, bamboos and canes, essential oils, including those from grasses, Tannins and dyes, gums , resins and oleo resins, drugs, spices, poisons and insecticides, edible products , minerals and miscellaneous products.

UNIT IV **(15 HOURS)**

Forest industries- composite wood industries, match industry, Pulp and paper industry, furniture and other timber utilizing industries. Industries utilizing forest products resins, leaves in Beedi making industries, Railway sleepers.

UNIT V **(15 HOURS)**

Conservation and plantation forestry – reserve forests, commercial forestry, social forestry, agro forestry and energy plantations. Biomass conversion – technologies – pyrolysis and gasification for thermal and electric applications.

TEXTBOOKS

1. Sharma, V.B. 1998. Trees and Environment. APH Publishing Corporation, New Delhi.
2. Sagreiya, K.P. 1994. Forests and Forestry. National book Trust, India, New Delhi.
3. S.S Negi, 2002. Forest products and their utilization. International book distributiors, 9/3 Rajpur road, Dehradun.
4. Tribhawan Mehta, 1981. A hand book of Forest Utilization. Periodical Expert Book Agency. New Delhi.

REFERENCES

1. Subrahmanyam, N.S. and A.V.S.S. Sambamurty. 2004. Ecology. Narosa Publishing House. New Delhi.
2. Sharma, P.D. 2004. Ecology and Environment. Rastogi Publications, Meerut.
3. Arvind Kumar. 2004. Biodiversity and Environment. APH Publishing Corporation, New Delhi.
4. Singh, M.P. and Vinita Vishwakarma. 1997. Forest Environment and Biodiversity. Daya Publishing House, New Delhi.

PBO-29

SEMESTER-I **13PBO1E**

Major Elective - I - SEED TECHNOLOGY

Objectives

- To understand the importance and value of Seed.
- To know the seed dormancy and their significance

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

Seed production- Genetic and Agronomic principles- Disease and Insect control – Nutrition – Irrigation – Harvesting – Storage.

UNIT II **(15 HOURS)**

Seed germination test – (using paper, sand and soil) seed viability – Tetrozolium test, Embryo Excision method – Seed vigor Test – Concept – Direct and indirect vigor test. Seed health testing-objectives – Methods of seed health test for Fungi, virus and insects.

UNIT III **(15 HOURS)**

Seed drying – Sun drying-Forced air drying, Process and equipments. Determination of seed moisture methods- one and two stage determination. Seed testing and quality control- Principles and importance. Sampling rules.

UNIT IV **(15 HOURS)**

Seed treatment – Significance – packaging- Certification – Storage and marketing- Demand forecast, marketing structure, marketing organization, arrangement for storage of seed, factors affecting seed marketing.

UNIT V **(15 HOURS)**

Seed dormancy – Primary and Secondary dormancies – Significance – Factors involved – Methods to break dormancy.

TEXTBOOKS:

1. Agrawal, R.L. 1997 Seed Technology. Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta
2. Dahiya, B.S & Rai K.N 1998 Seed Technology. Kalyani publishers. Calcutta

REFERENCE

1. Dhirendra khara & Mohan S.Bhale 2000 Seed technology, Scientific Publishers Jothpur, India
2. Lawrence O.copeland, Miller B. McDonald 1936 Principles of seed science and Technology IV Edition Springer Pvt Ltd , New Delhi.
3. Agarwal P.K, M.Dadlani 1980 Techniques in seed science and Technology, South Asian publishers, Ned Delhi.

PBO - 30

SEMESTER-II **14PBO2E2**

Major Elective – II – MODERN METHODS OF PLANT ANALYSIS AND BIOINSTRUMENTATION

Objectives

- To know the estimation of the macromolecules
- To study the principles of Microscopy
- To study the applications of TEM in Botany
- To learn about the Bioinstrumentation and their operation techniques.

Total hours: 105 **Credit**: 5

UNIT I **(21 HOURS)**

Extraction and Estimation - Chlorophylls, Carbohydrates (Anthrone method) amino acids by ninhydrin method and Protein by Lowery method. Estimation of moisture and determination of ash content of plant samples; Preparation of triple acid extract; Estimation of Nitrogen (Micro Kjeldahl Method), Phosphorus and Potassium. Micrometry - stage and ocular meter. .

UNIT II **(21 HOURS)**

Microscopy: Compound microscope – Principle, Resolving power, Working Distance, oil immersion objective, magnification, Kohler illumination. Instrumentation – Ocular, objectives, stage, Sub-stage condenser and light source. Types- Bright field, dark field, phase-contrast, Fluorescence microscopy. General process for the preparation of microslides for LM and specimen preparation of STEM.

UNIT III **(21 HOURS)**

Chromatography – Definition, basic principles of separation and types - Thin layers, column and gas liquid chromatography; GC-MS and HPLC, HPTLC. **Electrophoresis -** Principles - components of electrophoresis unit, Gel electrophoresis – Polyacryl Amide Gel Electrophoresis (PAGE) - Electrophoresis of proteins, Southern, Northern & Western blotting, PCR and its types. RFLP, RAPD, AFLP and ELISA.

UNIT IV **(21 HOURS)**

Instruments – Principles, techniques and applications of Geiger Muller Counter and Scintillation Counter. Spectrophotometer, colorimeter & difference of constructions. Beer -Lamberts law, biological applications of visible and UV spectrophotometers. Atomic absorption spectrophotometer.

UNIT V **(21 HOURS)**

Instruments - Principle and electrodes of pH meter. Centrifugation techniques- Definition, Major types- Desk top, high speed and Ultracentrifuge. Factors affecting sedimentation rate and application of centrifugation.

TEXTBOOKS

1. Gurumani, N. 2007. Research Methodology. MTP Publishers. Chennai.
2. Veerakumari, L. 2009. Bioinstrumentation, MJP Publishers, Chennai.
3. Paech, K and M.V. Tracey, 1979. Modern methods of Plant Analysis. Vol I-VII. Narosa publishing house New Delhi.

REFERENCES

1. David Plummer. 1987. An introduction to practical biochemistry. Tata Mc Graw Hill. New Delhi
2. Metcalfe. 1997. Atomic absorption & emission spectroscopy. John Wiley & Sons. New Delhi
3. Jeyaram, J. 1987. Laboratory manual in Biochemistry. Wiley Eastern Ltd. New Delhi
4. Johansson, A. and Donald Alexander. 1940. Plant Microtechniques. Mac Graw Hill. New Delhi
5. Stock, R. & Rice, C.B.F. 1980. Chromatographic methods. Chapman & Hall, Calcutta.
6. John A Hellebust and J.S. Craisie. 1978. Hand Book of Physiological and Biological Methods. Cambridge University Press, London.

PBO-32

SEMESTER-II **13PBOOE2**

Major Elective – II-FOOD SCIENCE AND NUTRITION

Objectives

- To learn about the nutrient value and processing and plant products
- To study about the food adulteration.
- To know about the product of vegetables, pulses and beverages taking over from plants.

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

Introduction of food science – Classification according to function, food groups (ICMR) – Classification; Cereals and Cereal products – Composition and Nutritive value and processing of Rice, Wheat, Maize; Fermented products- Bread- ingredients; Unfermented products- Cakes- Classes and ingredients.

UNIT II **(15 HOURS)**

Pulses- Nutrient value and processing and products of Black gram, Soya bean- Medicinal values of pulses. Nuts and Oilseeds- Coconut, Groundnut-Nutritive value, processing and products, role of nuts and oilseed in cooking;

UNIT III **(15 HOURS)**

Vegetables- classification-Composition and nutritive value – Storage; Fungi as food- Mushroom- Algae– *Spirulina*. Role of vegetables in cookery. Fruits- Classification, Composition and nutritive value – storage of fruits- Enzymatic browning- Prevention – Non enzymatic browning.

UNIT IV **(15 HOURS)**

Sugar- Nutritive value- Properties – Sugar related products- Role of sugar in cookery. Spices- General function of spices-Asafotida, Clove, Garlic, Turmeric-role of spices in cookery

UNIT V **(15 HOURS)**

Beverages – classification- coffee, Tea, Cocoa- processing- adulterants; Fruit beverages – types. Food adulteration – Types of adulterants. Food preservation – Principles and Methods.

TEXTBOOKS

1. Swaminathan,M. 2006. Hand book of food and nutrients. The Bangalore printing & Publishing Co Ltd, India

REFERENCES

1. Sumati R Mudambi 2001 Fundamentals of foods and nutritions , New age International publishers, New Delhi.
2. Mahtab s. Bamji, N. Pralhad Rao and Vinodini Reddy 2003 Text book of Human nutrition Second Edition, Oxford &IBH Publishing Co.Pvt, New Delhi.

PBO - 33

SEMESTER-III **13PBO3N1**

Non Major – Elective – 1- HORTICULTURE

Objectives

- To learn about the propagation methods of horticulture plants.
- To study about the gardening and its maintenance.
- To know about commercial floriculture and flower arrangement.

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

Divisions and importance of Horticulture. Methods of plant propagation- layering, cutting, grafting, budding – advantages and disadvantages. Fertilizers- organic, inorganic and biofertilizers- Irrigation- types, advantages.

UNIT II **(15 HOURS)**

Gardening- types of garden – Landscape gardening - Lawn making, glass house, rockery, kitchen garden. Plant growing structures- hot beds - cold frames - green houses- hydrophonics.

UNIT III **(15 HOURS)**

Garden plants- trees, shrubs and climbers, annuals, biennials, and herbaceous perennials- succulent and cacti- ornamental palms- bulbous plants- orchids. Pomology- establishment of orchard. Training, pruning and transplanting. Cultivation of fruits- Citrus and Sapota.

UNIT IV **(15 HOURS)**

Cultivations of plantation crops- Coffee and Rubber. Cultivation of vegetables- Brinjal and Chilly. Cultivation of flowers- Rose and Chrysanthemum.

UNIT V **(15 HOURS)**

Extraction of Jasmine concrete and papain. Cut flowers- flower arrangement and dry decorations- bonsai. Growth regulators in horticulture. Preservations of fruits and vegetables.

TEXTBOOKS

1. Kumar, N. 1999. An introduction to horticulture. Rajalakshmi Publication, Nagarcoil.
2. Chaha, K.L. 2001. Handbook of horticulture. ICAR, New Delhi.

REFERENCES

1. Bose, T.K., J. Kabir, P. Das and P.P. Joy. 2001. Tropical Horticulture. Naya Prakash Publications, Calcutta.
2. George Acquaach. 2003. .Horticulture - Principles and practices.
3. Edwin Biles. 2003. The complete book of gardening. Biotech book, New Delhi.
4. Singh, S.P. 1999. Advances in Horticulture and Forestry - Scientific Publishers, Jodhpur.
5. Sharma, V.K. 2004. Advances in Horticulture: Strategies, Production, Plant Protection and Value Addition - Deep and Deep Publications, New Delhi.
6. Bhattacharjee, S.K. 2006.Advances in Ornamental Horticulture –Pointer Publications, Jaipur.
7. Desh Beer Singh and Poonam Wazir. 2002. Bonsai-An Art. Scientific Publishers, Jodhpur.

PBO-34

SEMESTER-III **13PBO3N1**

Non Major – Elective – 1- LIMNOLOGY

Objectives

- To study of morphological and anatomical characters of aquatic flora.
- To understand the temperature and transparency of plankton
- To find the Gross and net productivity in plants.

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

Definintion, facts of limnology – scope and importance of limnology. The structure of freshwater aquatic system – lentic – lakes, their distribution, origin and forms, morphology, sonation, physical, chemical and biological structure, water shed. Ponds – swamps and estuaries. Lotic – stream, springs and rivers – discharge, temperature, nutrient, biotic categories and drift.

UNIT II **(15 HOURS)**

Physical factors influencing lotic and lentic type of vegetation, light, heat, water movements. Chemical factors – Oxygen and CO_2, Nitrogen, Phosphorus, and other nutrients, alkalinity and pH.

UNIT III **(15 HOURS)**

Water pollution and eutrophication – effluent water, nature, treatment, and uses. Fresh formation and flora of India. Conservation and management of fresh water bodies.

UNIT IV **(15 HOURS)**

Fresh water formation. Planktonic communities – phyto and zoo planktons. Littoral communities, algae and zoo planktons, large plants benthas formation organisms - a knowledge of the adaptations of the above mentioned formations.

UNIT V **(15 HOURS)**

Fresh water ecosystem – Energy and production, community concept, diversity, community succession, food chains and biogeochemical aspects of ecosystems, energy flow in ecosystem and community metabolism. Productivity – primary, biomass and efficiency of primary production, secondary production. Biomass and efficiency. Gross and net productivity.

TEXT BOOKS

1. The text book of limnology. Cole. The C.V. Morby Company

REFERENCES

1. Limnology. Charles R. Goldmen, Alexander, Jorne. International students Edition.
2. Limnology – Wezel. Sauders College Publishing Co

PBO-35

SEMESTER-IV **14PBO4N2**

Non Major – Elective – II MEDICINAL PLANTS

Objectives

- To learn about the history of traditional medicine and Ethnobotany.
- To understand the cultivation practices of medicinal plants.

Total hours: 75 **Credit**: 5

UNIT 1 **(15 HOURS)**

Ethnobotany-definition – sub divisions-methodology-major tribes in southern India-regional studies-Ethnobotany in human welfare-food-medicine. Role of tribes in medicinal plants conservation-crop protection.

UNIT II **(15 HOURS)**

Traditional medicine – History, Traditional medicines versus modern medicines – Biopyracy – bioprospecting – recommendation for promoting traditional medicines in India. Role of NBA, AYUSH, NMPB, CDRI, FRLHT- Role of biotechnology in medicinal plant conservations

UNIT III **(15 HOURS)**

Vegetable drugs – classification-identification-sources-collection and processing of vegetable drugs-role of growth regulators - drug deterioration and their control measures. Herbal home remedies in Tamil Nadu.

UNIT IV **(15 HOURS)**

Drugs containing glycosides, tannins, lipids, alkaloids, terpenoids- Nutraceuticals and cosmeceuticals - Natural pesticides.

UNIT V **(15 HOURS)**

Cultivation of medicinal plants – important tips for medicinal cultivation. - Medicinal plants in trade- cultivation practices and medicinal uses of *Cinchona officinalis, Mentha arvensis, Phyllanthus emblica, Cymbopogan martini, Zingiber officinale, Digitalis purpurea* and *Gloriosa superba.*

TEXTBOOK

1. Purohit and Vyas. 2005. Medicinal plant cultivation- A scientific approach, Agrobios, Jodhpur.
2. Rajiv, K. Sinha & Shweta Sinha, 2001. Ethnobiology. Surabi Publications, Jaipur.

REFERENCES

1. Anonymous 1970- The pharmocopoea of India – Govt. of India, New Delhi.
2. Jain. S.K.(Ed.) 1996. Ethnobiology in human welfare. Deep. Pub. New Delhi
3. Jain, S.K. 1989. Methods and approaches in Ethnobotany, Society of Ethnobotanist, Lucknow.
4. Jain, S.K. 1987. A manual of Ethnobotany. Oxford publication, Jodhpur.
5. Trease G.e. and Evans, W.C. 1978. Pharmacognosy Bailliere Trinda, London.
6. Kokatae, C.K. A.P. Purohit and S.B Gokhale 2007. Pharmacognosy. Nirali Prakashan, Pune.
8. Jain, S.K. (Ed). 1981. Glimpses of Ethnobotany. Oxford & IBH Publications.

PBO-36

SEMESTER-IV **13PBO4N2**

Non Major – Elective – II INDUSTRIAL MICROBIOLOGY

Objectives

- To know the valuable products are prepared from microbes.
- To understand the techniques of fermentation.
- To find the economic aspect and future.

Total hours: 75 **Credit**: 5

UNIT I **(15 HOURS)**

History and scope of industrial microbiology, characterization and classification of micro-organisms. Importance of microbial enzymes in industry. Maufacture of vitamins – Riboflavin (B_2) and Antibiotics – introduction – classification of antibiotics – Penicillin, Streptomycine- tetracyclines- Griseofulvin

UNIT II **(15 HOURS)**

Growth of industrial fermentations. Pasteur and Fermentation. Fermentation techniques- Principle types of Fermentor - Introduction, Factors involved in Fermentor Design, Fermentor Configurations and principle operating characteristics of fermentors.

UNIT III **(15 HOURS)**

Production of Single Cell Protein (SCP) – Introduction- bacterial proteins, Actinomycetous proteins, Yeast proteins, Fungal proteins and algal proteins. Economic Aspects and Future

UNIT IV **(15 HOURS)**

Fermented foods - Introduction – Microbial spoilage of foods, some important fermented foods, preservations of foods, foods spoilage and some fermented foods. Yeast – Introduction- production of Brewers' Yeast. Production of Baker's yeast, Production of food and fodders yeast. Uses of yeast and yeast products.

UNIT V **(15 HOURS)**

Sewage and sewage disposal- introduction – objective of sewage treatment-collection of sewage – sewage treatment methods. Microbial insecticides – Introducation – history – useful microbes – biomass production – formulation – economics – safety. Advantages and disadvantages – future prospects

TEXT BOOKS

1. A.H. Patel 2008. Industrial Microbiology, MacMillan India Ltd.

2. I.C. Casida 1968. Industrial Microbilogy, Wiley Eastern Ltd.

REFERENCES

1. Casido J.R. 1968. Industrial Microbilogy. Wiley Eastern Ltd.
2. Chal O.S. 1991. Food, Feed and Fuel from Biomass. IBH. New Delhi.
3. Paul, A. and Ketchum. 1968. Microbiology. John Wiley & Sons USA
4. Palczer, M.J. (Jr)., Chan, E.C.S and Kreig, N.R. 1993. Microbiology 3rd Edn. Tata McGraw Hill. New Delhi.
5. Staniner, Doudurоff and Adelbergi. General Microbiology.

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PROJECT WORK AND VIVA-VOCE

MARK DISTRIBUTION

	MARKS
CIA	**40**
Project Report*	**140**
Viva	**20**
Total	**200**

*** Viva-voce shall be evaluated by both Internal & External examiners jointly**.