P.G & RESEARCH DEPARTMENT

OF

BOTANY

PG SYLLABUS

Effect from the Academic Year 2016-2017

J.J.COLLEGE OF ARTS & SCIENCE

(*AUTONOMOUS*)

(Reaccredited at 'A' Grade by NAAC)

PUDUKKOTTAI – 622 422

J.J.COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), PUDUKKOTTAI
DEPARTMENT OF BOTANY
CBCS PATTERN – M.Sc. BOTANY REVISED SYLLABUS
(2016-2017 onwards)- (Revised Course Structure)

Sem.	Sub.Code	Course	Subject Title	Hours/ Week	Credit	Internal	External	Marks
I	P1RBOCC1	CC1	Plant Diversity I (Phycology, Lichenology & Bryology)	6	5	25	75	100
	P1RBOCC2	CC2	Plant Diversity II (Pteridophytes, Gymnopserm & PaleoBotany)	6	5	25	75	100
	P1RBOCC3	CC3	Microbiology & Plant Pathology	6	5	25	75	100
	P1RBOCC4P	CC4P	Practical- I (CC1, CC2 & CC3)	6	5	40	60	100
	P1RBOEC1	EC1	Biofertilizers and Mushroom technology	6	3	25	75	100
			Total	**30**	**23**	**140**	**360**	**500**
II	P2RBOCC5	CC5	Anatomy, Embryology & Microtechniques	6	5	25	75	100
	P2RBOCC6	CC6	Taxonomy of Angiosperms & Economic Botany	6	5	25	75	100
	P2RBOCC7	CC7	Cell Biology & Molecular Genetics	6	5	25	75	100
	P2RBOCC8P	CC8P	Practical-II (CC5,CC6 & CC7)	6	5	40	60	100
	P2RBOEC2	EC2	Ethno Botany and Pharmacognosy	6	3	25	75	100
			Total	**30**	**23**	**140**	**360**	**500**
III	P3RBOCC9	CC9	Plant Ecology, Conservation Biology, Phytogeography & Forestry	5	5	25	75	100
	P3RBOCC10	CC10	Plant Breeding & Horticulture	5	5	25	75	100
	P3RBOCC11	CC11	Plant Physiology & Biochemistry	5	5	25	75	100
	P3RBOCC12	CC12	Plant Biotechnology	5	5	25	75	100
	P3RBOCC13P	CC13P	Practical – III (CC9, CC10, CC11 & CC12)	5	5	40	60	100
	P3RBOEC3	EC3	Research Methodology and Biostatistics	5	3	25	75	100
			Total	**30**	**28**	**165**	**435**	**600**
IV	P4RBOCC14	CC14	Bio-instrumentation	6	5	25	75	100
	P4RBOCC15PW	CC15	Project Work	18	8	-	-	100
	P4RBOEC4	EC4	Food processing Technology	6	3	25	75	100
			Total	**30**	**16**	**50**	**150**	**300**
			Grand Total		**90**			**1900**

J.J.COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), PUDUKKOTTAI
DEPARTMENT OF BOTANY
CBCS PATTERN – M.Sc. BOTANY SYLLABUS
(2016-2017 onwards)

	Sl.No.	Code	Subject Title – Core Course
Semester-I	1.	P1RBOCC1	Plant Diversity I (Phycology, Lichenology & Bryology)
	2.	P1RBOCC2	Plant Diversity II (Pteridophytes, Gymnopserm & Paleo Botany)
	3.	P1RBOCC3	Microbiology & Plant Pathology
	4.	P1RBOCC4P	Practical- I (CC1, CC2 & CC3)
Semester-II	5.	P2RBOCC5	Anatomy, Embryology & Microtechniques
	6.	P2RBOCC6	Taxonomy of Angiosperms & Economic Botany
	7.	P2RBOCC7	Cell Biology & Molecular Genetics
	8.	P2RBOCC8P	Practical-II (CC5,CC6 & CC7)
Semester-III	9.	P3RBOCC9	Plant Ecology, Conservation Biology, Phytogeography & Forestry
	10.	P3RBOCC10	Plant Breeding & Horticulture
	11.	P3RBOCC11	Plant Physiology & Biochemistry
	12.	P3RBOCC12	Plant Biotechnology
	13.	P3RBOCC13P	Practical – III (CC9, CC10, CC11 & CC12)
Sem. IV	14.	P4RBOCC14	Bio-instrumentation & Biophysics
	15.	P4RBOCC15PW	Project Work

Sl. No.	Sem.	Code	Subject Title	Mode
1.	I	P1RBOEC1	Biofertilizers and Mushroom technology	**Elective Courses Opted**
2.	II	P2RBOEC2	Ethno Botany and Pharmacognosy	
3.	III	P3RBOEC3	Research Methodology	
4.	IV	P4RBOEC4	Food processing Technology	
5.	I	--	Vermitechnology	**Other Elective Courses Offered for choice**
6.	II	--	Organic Farming	
7.	III	--	Computer application in Biology	
8.	IV	--	Nursery technology	

SEMESTER I: CORECOURSE- I

Plant Diversity I – Phycology, Lichenology and Bryology

Course Code : P1RBOCC1 **Max Marks : 100**
Hours/Week : 6 **Internal Marks : 25**
Credits : 5 **External Marks : 75**
Objectives:

- ✓ To impart the knowledge about
  - the occurrence, distribution, structure and life history of lower plants such as algae, lichens and bryophytes

Unit- I: Phycology -General aspect

Light and electron microscopic structure of prokaryotic and eukaryotic algae, pigments, reserve foods, cell wall, flagella, chloroplast, pyrenoid and their biological importance. Detailed study about thallus organization, cell structure, reproduction (asexual and sexual) and life cycle. Classification of algae by Fritsch (1935). Phylogeny of algae.

Unit-II Phycology -General aspect

Comparative study and salient features of major classes – Chlorophyta, Xanthophyta, Bacillariophyta, Phaeophyta, Rhodophyta. Ecological significance of algae - Symbiotic, Pollution indicators, Algal blooms and Algicides.

Unit-III Phycology: Lab Technology and Economic importance

Laboratory culture methods – Isolation and culture of algae from different sources – fresh water algae (Chu-10 medium and Pringsheims) and marine algae (Guillard's F/2 medium) - Cultivation methods for macro and micro algae- SCP- Economic importance of algae.

Unit- IV Lichenology

General features, distribution, thallus organization and reproduction; classifications of lichens by Miller (1984) –Structure and life cycle of *Parmelia* and *Usnea* - Economic importance.

Unit- V Bryology

General features, origin, range of vegetative structure, evolution of gametophytes and sporophytes, reproduction (including vegetative); classification (Watson, 1964), general features of major groups (Marchantiales, Jungermanniales, Anthoceretales, Sphagnales, Funariales and Polytrichales); economic and ecological importance.

TEXT BOOKS:

1. Vashista B.R, Sinha A.K & Singh V.P (2004) – Algae – S.Chand& Company Ltd. New Delhi.
2. Sharma,O.P.(1986) - Text book of Algae - Tata McGraw-Hill, New Delhi.
3. Kumar, H.D & Singh H.N. (1982) - A text book on Algae - Affiliates East - West Press, Madras.
4. Vashista B.R & Sinha (2004) – Fungi – S.Chand& Company Ltd. New Delhi.
5. Vashista B.R & Sinha (2004) – Bryophyta – S.Chand& Company Ltd. New Delhi.

REFERENCES:

1. Bold, H.C & M.J. Wyne (1978) - Introduction to Algae - structure & reproduction – Prentice Hall, New Jersey.
2. Fritsch, F.E (1935) - The structure & reproduction of the Algae (2 vols.) – Cambridge University Press, England.
3. Prescott, G.W. (1969) - The Algae: A Review - Nelson.
4. Hale, Jr.M.E. (1983) - Biology of Lichens - Edward Arnold, Maryland.
5. PremPuri, 1973 - Bryophytes - A Broad Perspective, Atma Ram & sons, New Delhi.
6. Smith,G.M. Cryptogamic Botany Vol. II
7. Verdoon,F R. Manual of Bryology
8. Waston, E. V. The Structure and Life of Bryophytes

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SEMESTER I: CORECOURSE- II

Plant Diversity – II Pteridophytes, Gymnosperm and Paleobotany

Course Code : P1RBOCC2 **Max Marks : 100**
Hours/Week : 6 **Internal Marks : 25**
Credits : 5 **External Marks : 75**

Objectives:

- ✓ To impart the knowledge about
  - the occurrence, distribution, structure and life history of lower plants such as Pteridophytes and Gymnosperm
- ✓ To study the paleontology of the plant forms and their importance

Unit I – Pteridophytes – General aspects

General features and origin of Pteridophytes – classification (Reimers 1954, Sporne) – general features of major groups: Psilopsida, Lycopsida, Sphenopsida and Pteropsida.

Unit II – Pteridophytes and their evolution

Pteridophytes Range of variation in sporophytes – brief account of anatomy of sporophytes, stelar structure and evolution.Reproduction and life history, sporangial evolution, heterospory and seed habit, evolution of gametophytes and sex organs within pteridophytes – Apospory and Apogamy.

Unit III - Gymnosperms – General aspects

Concept of pro-gymnosperms, classification of gymnosperms (K.R. Sporne, 1967) – A general account on the morphology, distribution, anatomy and reproduction of the major groups of gymnosperms: Pteridospermales, Bennetitales Pentoxylales and Cordaittales.

Unit IV – Gymnosperms- type study

A general account on the morphology, distribution, anatomy and reproduction of the major groups of gymnosperms: Cycadales, Coniferales, Ginkoales, and Gnetales – economic importance of gymnosperms.

Unit V – Paleobotany

A general account of geological time scale, Fossils: types, methods of fossilization. A brief account on fossils of Algae, Fungi, Pteridophytes and Gymnosperms. Role of fossils in oil exploration. Evidences –from Paleobotany for evolution, morphology Anatomy and Embryology.

TEXT BOOKS:

1. Vashishta.P.C.(2004)-Pteridophyta -S.Chand& Co. Ltd, New Delhi
2. Parihar,N.S -The Biology and Morphology of Pteridophytes, Central Book Depot, Allahabad.
3. Rashid.A. (1986) - An Introduction to Pteridophyta, Vani Educational Books, New Delhi.
4. Sporne K.R. (1972) – The morphology of Gymnosperm - BII Publications, Madras.
5. Vashita P.C. (1990) – Gymnosperms – S. Chand & Co. Ltd., India.
6. M.P.Arora 1990. Evolutionary biology, Himalaya Publication House, Delhi. C.I.A. Arnold – An Introduction to Palaeobotany.

REFERENCES:

1. Smith,G.M (1955) - Cryptogamic Botany Vol. II, Tata Mcgraw Hill Publishing Co., Ltd., New Delhi.
2. Sporne K.R, 1972. Pteridophytes.
3. SundaraRajan,S. - Introduction to Pteridophyta - New age International Publishers Ltd., Wiley Eastern Ltd., Madras.
4. Sharma, O.P. (1990) – Text Book of Pteridophyta, , Macmillan Indian Ltd., India
5. Chamberlain. C. – Gymnosperm structure & evolution, Univ. Chicago Press.
6. M.Kimura, 1983-The natural theory of molecular evolution, Cambridge University Press, Cambridge.
7. W.R.Atchlay& D.S. Woodnuff 1981. Evolution and speciation, Cambridge University

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SEMESTER I: CORECOURSE- III

MICROBIOLOGY AND PLANT PATHOLOGY

Course Code : P1RBOCC3 **Max Marks : 100**
Hours/Week : 6 **Internal Marks : 25**
Credits : 5 **External Marks : 75**

Objectives

- ✓ To acquire knowledge on sub-microscopic organisms and their classifications
- ✓ To get informations on technologies used for cultivation of various organisms in large scale.
- ✓ To study the classifications and biology of fungi
- ✓ To study the plant pathogen's their life cycle, symptom and control measures

Unit- I –Microbiology- Sub-microscopic organisms

History and scope of microbiology – Five kingdom concept by Whittaker (1969) - Salient features, Classification and ultra structure of virus. Isolation and purification of viruses – replication, transmission and economic importance of viruses.

Unit- II- Microbiology – Bacteria

General characters – Bergey's (1984-1991)- classification – Ultra structure, nutrition, growth, reproduction of Eubacteria, Archaebacteria, Cyanobacteria and Actinobacteria. Culture techniques and economic importance of bacteria.

Unit- III Mycology

General features, distribution, mode of nutrition, thallus organization, cell structure, fruit bodies, heterothallism, heterokaryosis, parasexuality, physiological races, classification (Alexopoulus and Mims); Salient features and economic importance of major classes (Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes)- Spore dispersal mechanisms – General account on Mycorrhiza.

Unit- IV Plant Pathology General Aspects

Scope and importance of plant pathology – Koch's postulates – Classification of plant diseases - organisms and causal factor for plant diseases – Definitions of symptomology, Etiology, Epidemic diseases – Host pathogen interaction – Mycotoxins – Aflatoxins.

Unit- V Plant Pathology – Common plant diseases

Common diseases in plants – symptoms etiology and control measures of Little leaf of Brinjal, Rice blight, Tikka disease, Wilt of cotton, and Ring rot of potato.

Text Book

1. Dubey, R.C and Maheswari D.K., (2007). A text Book of Microbiology. S.Chand and CO. Ltd. New Delhi.
2. Pelezar J Chen ECS and Krieg R Microbiology. Tata McGraw Hill, New Delhi.
3. Pandey B.P. (2005). A text book of Plant Pathology, Pathogen and Plant Diseases. S.Chand and Co. Ltd. New Delhi.

References

1. Martin Alexander Introduction to Soil Microbiology. Wiley Eastern, New Delhi.
2. Ketchum Microbiology. John Wiley & Son.
3. Frazier NC Food Microbiology. Tata McGraw Hill, New Delhi.

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SEMESTER I: CORECOURSE- IV
PRACTICAL I – PLANT DIVERSITY I & II
(Algae, Fungi, Lichen, Bryophytes, Pteridophytes, Gymnosperms Paleobotany and Microbiology and Plant Pathology)

Course Code: P1RBOCC3 **Max Marks: 100**
Hours/Week: 6 **Internal Marks: 40**
Credits: 5 **External Marks: 60**

Algae
Microscopic observation of algal types and their slides included in the syllabus.
Sectioning of available algal specimens included in the syllabus.
Identification of algal types in the algal mixture (only microscopic types).

Fungi
Microscopic observation of slides of genera include in the syllabus.
Sectioning of different plants infected by fungal strains included in the theory syllabus.

Lichen
Microscopic observations of anatomical structure of *Usnea*.

Bryophytes Morphological and anatomical study of representatives of the following: Marchantiales, Jungermanniales, Anthoceretales, Sphagnales, Funarials and Polytrichales.

Pteridophytes
A study of the morphology, anatomy of the vegetative and reproductive parts of the sporophytes and gametophytes (wherever available) of living genera included in the syllabus and analysis of their slides.

Gymnosperms A study of the morphology, anatomy of the reproductive parts (wherever available) of living genera included in the syllabus

Paleobotany
Observation of slides of fossil forms given in the syllabus.
Microbiology
Isolation of microbes from soil and water – serial dilution and plating technique
Isolation of Rhizobium from root-nodules of legumes
Gram staining of bacteria found in curd and root nodule
Microbial analysis of milk by methylene blue reduction test

Plant Pathology
Little leaf of Brinjal,
Rice blight,
Tikka disease,
Wilt of cotton,
Ring rot of potato

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SEMESTER I: ELECTIVECOURSE- I

BIOFERTILIZERS AND MUSHROOM TECHNOLOGY

Course Code :P1RBOEC1 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :3 **External Marks : 75**

Objectives

- ✓ To realize the microorganisms can use as Biofertilizers.
- ✓ To have knowledge on technologies for production of bioinoculum.
- ✓ To get full confident to became an entrepreneur.

Unit- I General aspect and Symbiotic Nitrogen Fixers:

An introduction to Biofertilizers – Microbes used as bio-fertilizer – Classification – Symbiotic N_2 Fixers: Rhizobium, Blue green algae and *Azolla* – Isolation, characterization, and Identification- application – large scale production.

Unit – II Non-Symbiotic Nitrogen and Phosphate Fixers

Isolation, Identification large scale production, crop response, and field application of *Azospirillium, Azotobacter, Clostridium, Klebseilla*and *Anabaena.* **Phosphate solubilizers:** Isolation, characterization, mass inoculums production, field application of *Bacillus firmus* and *Pseudomonas*- Phosphate solubilization mechanism.

Unit-III Mycorrhizal Biofertilizers:

Introduction, Scope and general account on mycorrhizae – Classification - Method of Collection and isolation (Wed sieving and decanting method) – Culture of mycorrhizae in Modified Melin-Norkrans (MMN) - Field application of Ecto and Endo mycorrhizae.

Unit- IV Mushroom Technology – General aspects

General introduction, Scope and importance of Mushroom cultivation – Identification of edible and poisonous mushroom –structure, formation and development of Basidiocarp (*Agaricus*). Importance and nutritive value of mushroom- Different recopies of mushroom - soup, Cutlet, Omlette, Samosa and Pickle.

Unit- V Mushroom Technology – Cultivation Methods

Isolation and culture of spores - culture media preparation, mother spawn preparation, multiplication of spawn, inoculation techniques, bed preparation, casing and cropping. Cultivation of Button mushroom *(Agaricus)*, Milky mushroom *(Calocybeindica)*, Oyster mushroom *(Pleurotussajor-caju)*, Paddy straw mushroom *(Volvariellavolvacea)*.

Text Books:

1. Kannaiyan S, 2003. Biotechnology of Biofertilizers, CHIPS, Texas (Unit- I-V).
2. Subbu Rao, N.S, 2000. Biofertilizers in Agriculture, Oxford & IBH Publishing Co, New Delhi (Unit- 1-II).
3. http://www.fnca.mext.go.jp/english/bf/bfm/pdf/4_4_Phosphate_Solubilizers0403.pdf(Unit- III- V)
4. Free e-Book: http://www.fnca.mext.go.jp/english/bf/bfm/pdf/Biofertilizer_Manual.pdf
5. Hand Book on Mushrooms. Nita Bhalla. (2006)4th Edition (Vol-I &Vol-II). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi (Unit- IV-V).
6. Mushroom Production and Processing Technology. Pathak, V.N and Yadav, N. (2000). Agrobios, Jodhpur (Unit- IV-V).

References:

1. Mushroom Cultivation. Tripathi, C.P. (2005). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

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SEMESTER II: CORE COURSE- V

ANATOMY, EMBRYOLOGY AND MICRO-TECHNIQUES

Course Code :P2RBOCC5 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

To understand the concept of plant internal structure and reproductive mechanism

Unit I – Anatomy

General account and theories of organization of meristems – light and electron microscopic structure of cell walls – structural diversity and phylogenitic specialization of xylem and phloem – distribution, structure and significance of specialized plant tissue types –Nodal anatomy - vascular differentiation in the primary body of stem, root and leaf – root stem transition – cambial variants – floral vasculature.

Unit II – Wood Anatomy

Structure, identification, classification and uses of woods – physical, chemical and mechanical properties of wood – defects in wood – natural defects – knots – reaction wood – compression and tension wood - wood preservation – Any four Commercial woods of India and South India.

Unit III – Embryology

Microsporogenesis, pollen stigma compatibility, megasporogenesis and female gametophyte, Sexual Incompatibility, nutrition of embryo-sac, endosperm types, Apomixis, agamospory and apospory – polyembryony and apomixis in plant improvement.

Unit IV- Microtechniques

Introduction – importance of micro techniques – types of microtomes; camera lucida – microscope – micrometer – ocular micrometer – stage micrometer – microphotography.

Unit V- Staining and Fixation

Collection and preparation of materials - Fixation – dehydration – clearing agents – embedding and block making – sectioning – mountings – different types of staining – double staining – safranin, fast green stain, triple staining method.

TEXT BOOKS:

1. Easu K Plant Anatomy, Wiley Eastern Ltd, New Delhi.
2. Kollmann Wood Science and Technology, Vol I &II.
3. Bhojwani SS and Bhatnagar SP, The Embryology of Angiosperms, Vikas publishing house Pvt. Ltd., New Delhi
4. Pattel LR, Bhalachander BL and Jeeraji H An introduction to microtechnique, S. Chand & S. Chand & Co. Pvt. Ltd., New Delhi.

REFERENCES:

1. Gutter G Plant Anatomy, Edward Arnold Publications Ltd., London
2. FahnA Plant Anatomy, Pergoman press, Oxford.
3. Maheswari P An introduction to the Embryology of Angiosperms, Tata McGraw Hill Publishing Co, Ltd., New Delhi
4. John E. Sass. Botanical Microtechniques, Oxford & IBH Publishing Co.
5. Krishnamurthy K.K. Methods in Plant Histochemistry.

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SEMESTER II: CORE COURSE- VI

ANGIOSPERM TAXONOMY AND ECONOMIC BOTANY

Course Code :P2RBOCC6 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

- ✓ To promote a knowledge of plants by rendering of easy to discover
- ✓ To provide an understanding about the components of biodiversity to conserve and sustainable uses

UNIT I -History and principles of classification:

Detailed account of the system of classifications proposed by Linnaeus, Bentham & Hooker, Bessey and Cronquist (including merits and demerits). Phylogeny of Angiosperm.

UNIT II -Modern trends in Classification:

Numerical taxonomy, Chemotaxonomy and Serotaxonomy. Biosystematics: Botanical Survey of India (BSI) - Organization, function and contribution. National and International Herbaria. Taxonomic literature – taxonomic index, Flora, monographs and revisions.

UNIT III- Methods of plant Identification:

Types of keys; rules for construction of Keys; advantages and disadvantages. Nomenclature: Typification, Priority, Publication, Author citation, codes of ICBN and retention, choice and rejection of names. Taxonomy in relation to anatomy, Palynology, Embryology and Cytology.

UNIT IV -Detailed account of the following families, their economic importance:

Ranuculaceae, Caryophyllaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Sapotaceae, Aizoaceae. Boraginaceae, Convolvulaceae, Scrophulariaceae, Bignoniaceae, Chenopodiaceae. Polygonaceae, Loranthaceae, Orchidaceae, Comrnelinaceae, Alismataceae, Cyperaceae and Poaceae.

Unit- V - Economic Botany

Study of botanical name, Family and morphology of the useful parts and utility of the following:

1. Cereals and Millet – Rice, Wheat, Ragi
2. Legumes – Soybean, Square bean (Winged bean), Horse gram, Ground nut.
3. Sugar yielding plants – sugar cane and sweet potato
4. Spice and Condiments – Turmeric, Cinnamon, Pepper, Nutmeg
5. Fibre- Cotton and Coir
6. Dye- Indigo and Henna
7. Rubber- Para rubber
8. Gums – Gum Arabica,
9. Resins - - Asafoetida
10. Oil- Coconut oil, Sesame oil, Palm oil
11. Medical- Ocimum & Neem
12. Food additives and colors- Saffron

TEXT BOOKS

1. Sharma, O.P, Plant Taxonomy, Published by Tata McGraw-Hill publishing Company Limited,
2. New Delhi (1996).
3. C.Jeffrey. An Inroduction to plant Taxonomy, Second Edition, Cambridge University Press,Cambridge (1982).
4. Pandey BP Taxonomy of Angiosperms. S. Chand & Co. Pvt. Ltd., New Delhi
5. Pandey, S.N, and Chandha, A.1999. Economic Botany. Vikas Publishing House Pvt.

REFERENCE

1. Gamble, J.S. and Fisher, L.E. F. The Flora of the presidency of Madras (Vol. I - III),
1. Botanical Survey of India, Calcutta (1967).
2. Lawrence, G.H.M. The Taxonomy of vascular plants (Vol.I-IV). Central Book Depot,
3. Allahabad(1955).
4. Mathew,K.M. The Flora of Tamil Nadu Carnatic. The Rapinat Herbarium, Trichy(1983).
5. Singh, V and Jain,V.K. Taxonomy of Angiosperms. Rastogi Publication, Meerut(1989).
6. Sivarajan, V.V, Introduction to principles of plant Taxonomy. Oxford and IBH, New Delhi.(1989).
7. Subramaniyam, N.S. Modern Plant Taxonomy. Vikas Publishing House, New Delhi (1995).

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SEMESTER II: CORE COURSE- VII

CELL BIOLOGYAND MOLECULAR GENETICS

Course Code :P2RBOCC7 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :5 **External Marks :75**

Objectives:

- To acquire the basic knowledge on the fundamentals of the cell biology.
- To study the cell divisions and cell cycle.
- To understand the concept of Heredity and variation in plants**.**

UNIT I Cell theory:

Cell as a basic unit - classification of cell types - cell theory - organization of plant and animals cells - comparison of microbial, plant and animal cells. An Overview of Cells: prokaryotic and eukaryotic cells, cell size and shape, Mycoplasma Phages and Viriods.

UNIT II Composition of Cells:

Cell organelles - Plasma membranes (Structure, models, functions, channels, pumps and receptors) - Plasmodesmata. Ultra structure of organelles: plastids, mitochondria, ribosome, ER and golgi body. Nucleus - Nuclear Envelope, Nucleolus - Chromosomes (types).

UNIT III Mitochondria, Chloroplast:

Semi-autonomous nature of mitochondria and chloroplast, chloroplast DNA, Peroxisomes assembly. Cell division (mitosis, meiosis) – Cell cycle. DNA – Denaturation and renaturation, C- Value paradox and the reasons, Circular and super helical DNA, Gene amplification – PCR, DNA finger printing – DNA replication – Polymerases, Primers and Mechanism – Molecular methods of DNA replication (Prokaryotes).

Unit-IV Gene Expression and Regulation

RNA- Types – Molecular organization- Genetic code – Gene expression – transcription mechanism in prokaryotes and post transcription processing – enzyme system in transcription – transcription process in eukaryotes, Translation – initiation, elongation, termination and post translational process – Gene regulation in prokaryotes and eukaryotes.

UNIT V Genetics

Basic account on Mendelian genetics, gene interactions – linkage and crossing over, gene mapping, Sex linkage - Sex limited and sex linked inheritance, Sex determination in plants. Cytoplasmic inheritance – male sterility. Polyploidy – types and their origin. Mutation – Biochemical basis of mutation, induction of mutations, mutagenic agents – physical and chemical mutagens. General account of population genetics (Hardey Weinberg's Law).

TEXT BOOKS

1. P.S.Verma and V.K. Agarwal- S. Genetics- Chand & Co., Pvt. Ltd., New Delhi (2009).
2. Gardner, Simmons and Snustad. Principles of Genetics-John Wiley and Son (Asia) Pvt, Ltd. (2006).
3. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott.
4. Gupta, P.K. (2015) - A Text Book of Cell & Molecular Biology, Rastogi Publications.

REFERENCES

1. Gardner, E.J. and Shusted, D.P. Principles of Genetics 7th Edn. John Wiley &Sons, N.Y.,
2. Chichester, Brisbane, Toronto, Singapore (1984).
3. Gupta, P.K, Genetics, Rastogi Publishers, Meerut, India (2000).
4. Rost, T.L. Gifford, Jr. & Ernest, M. (1977) – Mechanism and control of cell division – Academic Press, N.Y.

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SEMESTER II: CORE COURSE- VIII

Practical – II

(Anatomy, Embryology and Micro-techniques;
Angiosperm Taxonomy and Economic Botany; Cell and Molecular Genetics)

Course Code :P2RBOCC8P **Max Marks : 100**
Hours/Week :6 **Internal Marks : 40**
Credits :5 **External Marks : 60**

Taxonomy

- Examination of polypetalous, gamopetalous, monochlamydeous, dichlamydeous and monocotyledonous flowers showing various stages of hypogyny, perigyny and epigyny.
- Study of plants belonging to the families given in the theory syllabus.

Anatomy

- Dissection of shoot apex in *Hydrilla* and whole mount
- Examination of LS of shoot and root apices through slides
- Demonstration of primary pit-fields in Onion epidermal peel
- Examination of different types of pits – secondary wall thickening – annular, helical, scalariform and pitted thickening.
- Wood structure of TS, TLS and RLS – showing variations in vessel elements, fibers, axial parenchyma and ray parenchyma.
- TS and LS of phloem stained with aniline blue or Lacmoid blue or Coumassie brilliant blue.
- Identification of different types of stomata – monocot and dicot types

Economic Botany

- Identification of economically important plants studied in syllabus.

Embryology

- Slides showing developmental stages of anthers, embryo sacs, endosperm and embryo.
- Dissection of endosperm haustoria – Cucurbitaceae – Cucumis.
- Dissection of embryo – Tridax / Crotalaria.
- Methods of testing pollen viability using Acetocarmine - acid-test

Ethanobotany and Pharmacognosy

- Field study (local & outside) – submission of field reports with photographs and ethanobotanical importance.

Cell and molecular biology

- Squash and smear techniques – onion root tip and Rheo flower buds.
- Study of karyotypes and ideogram using suitable plant materials.
- Cell organelles – plastids, Mitochondria, Golgicomplex, ER, Nucelus, Ribosomes (Microphotographs showing the structure)
- Ergastic inclusions – raphides (calcium oxalate) and Cystolith (calcium carbonate crystals) - different type of starch grains.

Genetics

Working out the problems in genetics and drawing of genetic charts.

SEMESTER II: ELECTIVE COURSE- II
ETHNOBOTANY AND PHARMACOGNOSY

Course Code :P2RBOEC2 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :3 **External Marks : 75**

Objective:

- ✓ To understand the concept of mechanical importance of plants

Unit- I Ethnobotany – History and Development

Introduction to ethnobotany – history and development of ethnobotanical study – current scope and potential applications. Parts of medicinal plants- Cultivation collection and processing of Herbal drugs. Utilization of medicinal and aromatic plants in India.

Unit- II – Ethnobotanical method of study

General ethnobotanical techniques. Anthropological field methods, linguistic and other symbiotic analysis, plant collection and taxonomy. Archaeobotanical methods of information systems. Traditional botanical knowledge and substances of wild plant resources – the documentation and interpretation. Collection of ethnoboanical evidence, the dynamics and distribution of traditional botanical knowledge.

Unit- III Conservation of Medicinal Plants

Conservation of medicinal plants in-situ, ex-situ – conservation of herbal plant by conventional and non-conventional methods – export and import of medicinal plants.

Unit- IV Pharmacognosy – Introduction and Classification

History- Definition and scope of Pharmacognosy - Traditional Indian system of Medicine – Ayurveda, Siddha, Unani, Naturopathy. Definition of drug, classification, natural drugs – Morphological classification, chemical classification and Chemo taxonomical classification.

Unit- V Drug preparation and Marketing

Collection and preparation of natural drug for market – Macroscopic characters – Therapeutically and Pharmaceutical use of the drugs, *Feronia* - *Nux-vomica*, *Vinca*, *Oscimum* and Neem. Phytochemically compounds used in non-medicinal application, phytochemistry and pharmacology of traditional medicine.

TEXT BOOKS:

1. Kokate, C.K., Purohit, A.P., and Gokahale, Phamacognosy, Nirali Prakasan, 2002.

2. Dubey, R.C. A Text book of Biotechnology (2006).

REFERENCE:

1. Peter B. Kaufman et al., Natural Products from plants. CRC Press (1999).

2. Tyler, V.E., Brady, L.R. and Robbers, J.E, Pharmacognosy. 9th ed. Lea and Fibiger, Philadelphia (1981).

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SEMESTER III: CORE COURSE- IX
PLANT ECOLOGY, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY AND FORESTRY

Course Code :P3RBOCC9 **Max Marks : 100**
Hours/Week :5 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

- ✓ To study the plant ecosystem and their impact on society
- ✓ To get knowledge on principles and importance of conservation of biological resources.
- ✓ To basic idea on remote sensing and their application in botany

Unit- I- Plant Ecology – General aspects

Ecology - Concepts and dynamics of ecosystems, types of ecosystem, food web, food chain and energy flow tropic level, ecological pyramids, productivity and bio-geochemical cycles (N,P, C, S). Ecological amplitude of a species and adaptation – Ecads, ecotypes, ecospecies and ecological niche, Raunkiaer's (1934) life forms.

Unit- II- Plant Ecology- Pollution

Environmental pollution – air, water, soil, thermal, noise and radiation. Effect and control measures of air, water and soil pollution. Causes and consequences of Green house effect and Ozone depletion. Sources and characteristics of wastes (Sugar mills and Distilleries) and Non-degradable plastics Effect of waste on receiving bodies and its treatment.

Unit- III – Conservation Biology

Conservation Biology - Significance of conservation. Current practices in conservation, habitat or ecosystem approaches, social approaches – Chipco movement, *In-situ*, National parks, Sanctuaries, Sacred groves) and *Ex-situ* (Cryopreservation, Gene Banks, Zoo, Botanical gardens Seed Banks, Pollen Banks, Tissue culture and biotechnological strategies), eco-restoration and environmental education.

Unit- IV- Phytogeography

Phytogeography - Types of forests, range, dispersal and migration barriers, continental drift hypothesis – age and area hypothesis, endemism, peninsular, and inland floras. Introduction to Remote Sensing and its uses.

Unit – V- Forestry

Introduction to various types of forests in world and in India. Forest products: Major and Minor products with special reference to Tamil Nadu. Importance of forests on environment. NTFP- Non Timber Forest Products. Forest based industries with special reference to Tamil Nadu.

TEXT BOOK

1. Odum, E.P. (1975) – Ecology (2nd Edn.,) – Oxford & IBH Publishing Co., New Delhi
2. Sharma P.D (2005) – Ecology and Environment –Rastogi Publications, Meerut, India
3. Agrawal, K.C. (1987) – Environmental biology – Agro – botanical Publications, India.

REFERENCE

1. Vashista, P.C. (1974) – A text book of Plant Ecology – Vishal Publications, Jullunder City, India.
2. Cain, S.A. (1944) – Foundation of Plant Geography – Harper & Brothers, N.Y.
3. Good, R. (1953) – The Geography of flowering Plants (2nd Edn.,) – Longmans, Green & Co., Inc., London.
4. Margalef, R. (1968) – Perspectives in Ecological Theory – University of Chicago Press, Chicago.
5. Frankel, O.H., A.H.D. Brown and Burdon J.J. 1995. The conservation of Plant Diversity, Cambridge University Press, Cambridg,e UK.
6. Heywood V.H. 1995. Global biodiversity Assessment, UNEP. Cambridge University Press, Cambridge, UK.
7. K.V.Krishnamurthy 2003, An Advanced Text Book on Biodiversity. Oxford and IBH Book Company, New Delhi.
8. Virchow D *Conservation of genetic resources*, Springer Verlag, Berlin.

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SEMESTER III: CORE COURSE- X
PLANT BREEDING AND HORTICULTURE

Course Code :P3RBOCC10 **Max Marks : 100**
Hours/Week :5 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objectives

- ✓ To study the methods of plant breeding and various aspects in horticultural technology
- ✓ To understand the concept of strengthening the capacity of the architecture of the plants
- ✓ To get theoretically knowledge on landscape designing

Unit- I Plant Breeding

Objectives – genetic variability and its role – centers of origin of crop plants. Nature and scope of plant breeding – Basic principles in plant breeding – Selection of characters – Self and cross breeding techniques. Exploitation of hybrid vigour in plant breeding and production of hybrids. Genetic basis and application in plant breeding - Role of auto and allopolyploidy. Androgenesis, Gynogenesis. Modern methods of plant breeding.

Unit- II Horticulture general aspects

Importance of Horticulture - Brief history, classification of horticultural crops, climate, soil, water and nutritional needs of horticulture. Plant propagation methods – cutting, layering, grafting, budding, stock and scion relationship – Essentials of Nursery Management: Soil management - garden soil, physical and chemical properties of soil, organic matter, compost, maintenance of soil condition; Water management - water quality and irrigation.

Unit- III Nursery technology

Green house, mist chamber, shed root and shade house – seed collection, storage, quality, drying and cleaning. Seed pretreatment – physical and chemical methods, sterilization of seed, seed sowing, watering, fertilizing, mulching. Procurement of polypots, manure, clay and sand. Preparing seed beds, mother beds and seed viability test– sowing seeds in poly pots and beds, transplanting, weeding, protection from pests and diseases.

Unit- IV Growth Control in Horticultural Crops

Physical control- pruning and thinning; biological control- graft combination; chemical control- use of plant growth substances; Plant Propagation; Plant Improvement; Commercial horticulture: Horticultural production systems, orchard, vegetable farming, floriculture; Ornamental Gardening; Landscape Horticulture; Amenity Horticulture: trees, shrubs, turf culture.

Unit-V Landscape gardening:

Components of beauty in the landscape – Garden types – Principles of layout of garden – Lawn making- Landscape garden designing: Formal and Informal gardening - Garden features - Walls, Fencing, Steps, Garden drives and paths, Hedges, Edges, Arches, Pergola, Flower beds, Topiary, Borders. Establishment of garden and Green houses.

TEXT BOOKS

1. Pratibha, P. Trivedi, Home gardening, ICAR Publication, New Delhi (1987).
2. Gardener Basic Horticulture. Mac Millan, New York
3. A hand book on Horticulture , H.D Kumar.
4. Sundarajan JS, Muthuswamy JK, Shanmugavelu G and Balakrishnan R *A guide on horticulture*. Thiruvenkadam Printers, Coimbatore.

REFERENCES

1. Lex Lauries and Victor H Rice Floriculture-Fundamentals and practices. Tata McGraw Hill, New Delhi.
2. Gardener Basic Horticulture. Mac Millan, New York.
3. Randawa Ornamental horticulture in India. Today & Tomorrow Publications, New Delhi. Introduction to Horticulture. TMH Publication.
4. Chaturvedi AN Technology of forest nurseries.
5. Khanna Bandhu Publications, Dehra Dun. Katoch CD Forest Nursery Handbook, Periodical Experts Book Agency, New Delhi.
6. Siyag PR Afforestation Manual. Tree Craft Communications, Jaipur.

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SEMESTER III: CORE COURSE- XI
BIOCHEMISTRY AND PLANT PHYSIOLOGY

Course Code :P3RBOCC11 **Max Marks : 100**
Hours/Week :5 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

To understand the concept and mechanism of plant chemistry and physiological functions

Unit-I – Biochemistry General aspects and Carbohydrates

Structure and properties of atoms and molecules – types of bonds – Electrolyte – pH and buffers –Ionization of weak acids and bases – determining pKa value. Carbohydrate: Classification, Stereo isomerism – optical isomerism - structure of mono, di and oligo polysaccharides - Lipids – Classification – simple lipids – compound, structural, derived and lipids.

Unit- II- Biochemistry- Protein and Enzymology

Amino acids – structure – classification – function – chemistry and biosynthesis of amino acids - Protein – classification – importance - Primary structure of protein–protein biosynthesis – Enzymes – General characters – nomenclature – classification – isolation and purification – enzyme action – coenzymes and isoenzymes – Nucleic acids – physical and chemical properties of nucleic acids and synthesis.

Unit- III Plant Physiology - Transport

Plant water relations –water transport process, diffusion, osmosis, water potential, chemical potential, absorption of water – Ascent of sap. Transpiration and its significance – factors affecting, mechanism of stomatal movement. Mineral Nutrition: Nutrient uptake and role of cell membrane, ion pump and carrier, salt stress on crop production.

Unit- IV Plant Physiology – Photosynthesis and Respiration

Photosynthesis: Ultra structure of photosynthetic apparatus , photochemical reactions, electron transport pathway in chloroplast membrane, photophosphorylations, C_4 carbon cycle, crassulacean acid metabolism, photorespiration. Respiration: Glycolysis, TCA cycle and electron transport in mitochondria, oxidative phosphorylation, pentose phosphate pathway – cyanide resistant respiration.

Unit V- Nitrogen metabolism

Nitrogen metabolism: Biological nitrogen fixation, reduction of nitrogen into ammonia, nif genes, regulation of nitrate reductase and nitrogenase, nitrate and ammonium assimilation. Growth and development: Physiological role and mode of action of plant growth regulators – auxins, cytokinins, gibberellins, abscisic acid and ethylene.

TEXT BOOKS

1. Freifelder, D, Essentials of modern biochemistry-Jones & Barlett (1985).
2. Lehninger, A.L, Biochemistry - Worth Publishers (1985).
3. Veerakumari. L., Biochemistry – M.J.P, Publishers, Chennai (2004).
4. Subramanian, M.A. Biophysics Principles and techniques, M.J.P Publishers, Chennai
5. Jain, V. K. Fundamentals of plant physiology, 5th Edition.S. Chand & Company LTD., New Delhi (2010).

REFERENCES

1. Taiz and Zeiger, Plant physiology , Sunderland: Sinauer Associates.
2. Salisbury FB Ross CW Plant Physiology, CPS Publishers and Printers, New Delhi Gill PS Plant Physiology, S. Chand & Co., New Delhi
3. Nobel, PS Introduction to Biophysical Plant Physiology. W. H. Freeman and Company,San Francico (1970).

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SEMESTER III: CORE COURSE- XII
PLANT BIOTECHNOLOGY

Course Code :P3RBOCC12 **Max Marks : 100**
Hours/Week :5 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

- ✓ To obtain some basic and important plane or idea on organization of plant tissue culture laboratory.
- ✓ To acquire knowledge on the concepts of plant cells, tissue and organ culture.
- ✓ To educate the theoretical knowledge on secondary metabolite production
- ✓ To learn and gain the knowledge about the plant tissue culture for transgenic plant production.
- ✓ To make the student, to understand conservation of biological resource by plant biotechnology.
- ✓ To get knowledge on secondary metabolite production to meet the global competence.

UNIT-I

Plant tissue culture I: Introductory - Scope and importance - laboratory organization – types of nutrient medium - growth regulators (Auxins, Cytokinin and Gibberellins) - sterilization techniques – Explant collection, preparation - totipotency - Direct and Indirect organogenesis. Somatic embryogenesis – Hardening and acclimatization.

UNIT - II

Plant tissue culture II: Haploid production - Ovule - Pollen cultures. Isolation, fusion and culture of Protoplast - Somatic hybridization. Somaclonal variation - applications and limitations – Screening procedures. Synthetic seeds - Cryopreservation and *ex situ* conservation of germplasm.

UNIT - III

Secondary metabolite production: Commercial production of secondary metabolites – control mechanisms – alkaloids - biodegradable plastics, therapeutic proteins, lysosomal enzymes. Immobilized cells, biotransformations, applications, and limitations. Production of therapeutic antibodies and edible vaccine from plants.

UNIT IV

Herbal biotechnology and genetic diversity: Identification, cultivation and harvesting of herbal plants. Production of medicinal products from herbal plants. Role of plant tissue culture in forestry. Conservation of Biodiversity - Plant genome organization - Selection of molecular markers (RAPD, SNP & SSR).

UNIT-V Agricultural biotechnology:

Ti- & Ri- plasmid – Reporter genes, promoters. Gene transfer methods (Virus-mediated, Direct gene transfer through protoplasts, Particle bombardment), Chloroplast transformation - Transgene stability - Genetic engineering of crop plant for insect resistance, fungus resistance, virus resistance, stress resistance. Management of transgenic plants.

TEXT BOOKS

1. Satyanarayanan, U. 2010. Biotechnology, Books and allied (p) Ltd.,
2. Bhojwani, and Razdan, M.K, 2009. Tissue Culture Theory and Practice.
3. Chawla, H.S. Biotechnology in crop improvement. International Book distributing Company (2007).
4. Guptha, P.K. Elements of Biotechnology. Rastogi and Co. Meerut, (2006).

REFERENCES

1. Fu, T-J., Singh, G and Curtis, W.R. (Eds). 1999. Plant Cell and Tissue Culture for the Production of Food ingredients. Kluwer Academic/Plenum Press.
2. Hammond, J., McGarvey, P. and Yusibov, V. (Eds.). 2000. Plant Biotechnology. Springer Verlag.
3. Henry, R.J. 1997. Practical Application of plant Molecular biology. Chapman and hall.
4. Paul Christou and Harry Klee. 2004. Hand Book of Plant Biotechnology. Vol I& II. John Wiley & Sons. Ltd.

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SEMESTER III: CORE COURSE- XIII
PRACTICAL –III
(Plant Ecology, Conservation Biology, Phytogeography and Forestry; Plant Breeding, Horticulture and Landscape Designing; Biochemistry and Plant Physiology; Plant Biotechnology)

Course Code :P3RBOCC13P **Max Marks : 100**
Hours/Week :5 **Internal Marks : 40**
Credits :5 **External Marks : 60**

Plant Breeding, Horticulture and Landscape design

1. Charts depicting mass selection, pure line selection, backcross breeding and double cross in Maize
2. Study of different kinds of plant propagation
3. Basic propagation techniques - Cutting, Layering ,grafting micro grafting

Plant Ecology, Conservation and Phytogeography and Forestry

1. Analysis of vegetation by quadrat / line transect method Estimation of primary production in the given water sample by the light – dark bottle method
2. Estimation of carbonate, bicarbonate and chloride content in water samples
3. Study of vegetation by satellite maps

Plant Physiology Experiments

1. Estimation of water potential in different tissues
2. Estimation of Chlorophyll a, Chlorophyll b and total chlorophyll by Arnon method
3. Determination of carotenoids
4. Estimation of titrable and total acidity
5. Estimation of proteins by Biuret and Lowry's method
6. Determination of Ascorbic acid content (Titrimetric method)

Biochemistry Experiments

1. Extraction and estimation of starch
2. Extraction and estimation of lipids
3. Determination of reducing sugars in fruits (grapes)
4. Estimation of aminoacids by paper chromatography

Plant Biotechnology

1. Plant tissue culture techniques – Direct and Indirect organogenesis (Leaf, Node and Internodes explants)
2. Isolation of total gemomic DNA from plant tissue.
3. Agarose gel electrtophoresis
4. Spotters related to PCR.

SEMESTER III: ELECTIVE COURSE- III
RESEARCH METHODOLOGY AND BIOSTATISTICS

Course Code :P3RBOEC3 **Max Marks : 100**
Hours/Week :5 **Internal Marks : 25**
Credits :3 **External Marks : 75**

Objectives

- ✓ To impart scientific, statistical and analytical knowledge for carrying out research work effectively.
- ✓ To get knowledge to prepare research documents for publication
- ✓ Can screen the correct journals to publish the research findings
- ✓ To get knowledge on research proposal preparation and apply to the sponsoring agencies.
- ✓ To appreciate the benefits through socio-research networks.

Unit- I

Methods of research in Biological sciences- Objective – thrust areas and research priorities in Biotechnology to meet global competency- Origin of the research problem - Collection of information: Internet –library – index card preparation - Experimental approach. Research documents: preparation and publication (presentation). Articles: Original – review – short communication.

Unit – II

Thesis writing - Proof correction – symbols used for correction- preparation for Oral and poster presentation – communication skills for effective presentation - preparation of Power Point presentations. Standards of journals: national and international – online and printed – paid and unpaid – peer reviewed journal – SCI journals – impact factor- h-index. Search engines: Elsiever, Springer, Pubmed, google scholar, Academic journals, online digital library.

Unit- III

Social network for research community: Research gate, Research Pages, Frontiers Research Network, Elsevier Lab. Writing research grant proposal and reports – Sponsoring agencies – (DBT, UGC, DST, CSIR and ICMR). Research ethics – Intellectual property Rights – Overcome the difficulties in biological research.

Unit- IV

Definitions, Scope and importance of Biostatistics, probability analysis – variable in biology, collection, classification and tabulation of data, graphical and diagrammatic

representation, scale diagram, histogram, frequency polygan and frequency curves. Measure of central tendency – arithmetic mean, median and mode - calculation of mean, median, mode in series of individual observations.

Unit- V

Measure of dispersion – standard deviation and standard Error. Simple correlation, correlation coefficient, regression, simple linear regression, basic ideas of significance test, hypothesis testing, level of significance, test based student 't', 'chi' square and goodness of fit, ANOVA.

TEXT BOOK

1. Gurumani N Research Methodology for Biological Sciences, MJP Publishers, Chennai
2. Ramakrishnan P Biostatistics, Saras Publication, Nagercoil Arora PN and Malhon PK Biostatistics, Imalaya Publishing House, Mumbai.
3. Palanichami S and Manoharan M Statistical methods for biologists, Paramount publications.

REFERENCES

1. Connor & Peter Woodford, Writing Scientific Paper in English Pitman, Medical Pub. Co.Ltd., England, 1979.
2. Khan, I.A., and Khannum, A., Fundamentals of Biostatistics, Vikas Pub., Hyderabad, 1994.
3. Kothari, C.R., Research Methodolgy – Methods and Techniques, Wiley Eastern Ltd., New Delhi, 1991.
4. Sree Ramulu, V.S., Thesis Writing, Oxford & IBH Pub., New Delhi, 1988.
5. Zar, J.H. Biostatistics Analysis, Prentice Hall International, England Cliffs, New Jersy, 1984.

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SEMESTER IV: CORE COURSE- XIV
BIOPHYSICS AND BIO-INSTRUMENTATION

Course Code :P4RBOCC14 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :5 **External Marks : 75**

Objective:

- ✓ To understand the concept of principles and working knowledge of instrumentation

Unit- I – Biophysics General aspects

Bioenergetics, laws of thermodynamics, entropy, enthalpy, ATP bioenergetics. Photobiology – dual nature of light, characteristics of solar radiation, solar energy, absorption spectra in molecules, energystatus and de-excitation of atoms.

UNIT II - Bio-Instrumentation- Microscopy

Microscopy – Light, Dark and phase contrast microscopes – Brief account on Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). Sample preparation for electron microscopic study.

UNIT III - Bio-Instrumentation-Centrifuges

pH and pH meter : Sorensen's pH scale – Electrolytic dissociation of water – Acid and Bases – Buffers – Properties – Phosphate and Tris Buffers. pH meter – Principle – Calomel electrode, Glass electrode and combined electrode – Factors affecting pH measurement – Applications. Centrifuges – Principle – Types of Centrifuges – Types of centrifugation.

UNIT IV - Bio-Instrumentation – Chromatography

Chromatography- Basic principles– Paper Chromatography- Thin layer chromatography– Gas Chromatography– High performance liquid chromatography- Gas Chromatography with Mass spectrum.

UNIT V - Bio-Instrumentation- Spectroscopy and Electrophoresis

Spectroscopy – X-ray spectroscopy – Colorimeter – UV-Vis spectroscopy – Flame photometry. Spectrophotometer – Atomic absorption- spectrophotometer – NMR and ESR. Electrophoresis – Polyacrylamide Gel Electrophoresis – Agarose Gel Electrophoresis – Immuno electrophoresis- Gel documentation system. Enzyme assay Blotting technique.

TEXT BOOK

1. N. Gurumani. Research methodology for biological Science, MJP, Publishers, Tripliicane, Chennai (2011).
2. P.Palanivelu, An introduction to Analytical Biochemistry a practical and theoretical manual.

REFERENCES

1. Gupta, S.P, Metrology of Study and Scientific work Research, Narosa Publishing House.Life Science Book House, Madurai(1990).
2. Jayaraman, J., Statistical Methods-Sultan Chand & Sons(1985).
3. Plummer, D.T., An Introduction to Practical Biochemistry, Tata McGraw-Hill Publishing Co. Ltd., New Delhi (1978).
4. Clark, J.N, Hand book of Basic Microtechnique, McGraw Hill Book Co., London, (1964).

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SEMESTER IV: ELECTIVE COURSE- IV
FOOD PROCESSING TECHNOLOGY

Course Code :P4RBOEC4 **Max Marks : 100**
Hours/Week :6 **Internal Marks : 25**
Credits :3 **External Marks : 75**

Objective

To study the Principle and technologies of food processing and preservation

Unit I

Concept of food and nutrients, physiochemical properties and principles of food, colloidal - Emulsions – Foams. Concept of different food groups. Energy value of food and its determination, energy expenditure – energy utilization in cells and energy balance.

Unit II

Food additives, antioxidants, preservatives, stabilizers, bleaching and maturing agent. Sweeteners, anti caking agents coloring and flavoring substance Food adulteration: Types of adulterants- methods of Detection. Dietary fiber- Definition, types of fiber in plant foods, sources, composition, role of dietary fiber and resistant starch in nutrition.

Unit III

Therapeutic diets – Principles & objectives of diet therapy. Review of hospital diets- Regular diet, liquid diet, light diet, soft diet, pre and postoperative diet. Diet planning and use of exchange list in nutrient calculation. Drugs- Introduction, Classification, biotransformation and excretion of drugs, routes of drug administration.

Unit IV

Physical principles in food processing – thermal processing, refrigeration, freezing, dehydration, ionizing radiation. Chemical principles in food processing – preservation/ processing by sugar, salt, curing, smoking, acid and chemical. Equipments for novel food processes Food packaging equipment- fillers, closures, sealers, wrappers, aseptic packaging equipment and palletizers.

Unit V

Food Quality assurance – Quality assurance programme –Quality plan, documentation of records, product and specifications process control, corrective action, and total quality process. Quality parameters- physical, chemical, functional, microbial; Rapid diagnostic methods of food quality – instruments and kits, ISO – 9000 serious, Food laws and Food safety and standards acts.

Text Books

1. Khader,V. Text book of Food science and Technology. Published by India Council of Agricultural Research, NewDelhi 110012, 2001
2. Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles, New Age International Publishers, New Delhi, 2004.
3. Reddy Y.S, Newer concept and applications for food industry. Gene tech Books, New Delhi 110002, 2006

References

1. Begum, R. A text book of foods, Nutrition and Dietetics. Second revised edition, Sterling Publishers (P) Ltd, New Delhi, 1991.
2. Joshi, S. A Nutrition and dietetics. Third edition, Tata McGraw Hill education pvt ltd, New Delhi, 2010
3. Manual Mudambi, S. R., Rajagopal M. V., Fundamentals of food and Nutritions, 2nd edition, Wiley Eastern Ltd, New Delhi 1990.
4. Swaminathan, M. Essential of food and Nutrition, Vol.I. Bangalore Printing and Publishing Co. Ltd Bangalore.
5. Singh, R.P. Introduction to Food Engineering 3rd edition. Academic Press, London. 2004.

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