MOTHER TERESA WOMEN'S UNIVERSITY COLLEGE, KODAIKANAL

Common Course structure for UG programmes under CBCS

B.Sc., BOTANY (candidates admitted from 2018 – 2019 onwards)

Objectives of the course:

This course will enable the students

1. To gain knowledge of the importance of plants in conserving food and fuel.
2. To acquire skills in drawing by actual observation at its original and natural condition.
3. To know the nutritive value of food and maintain „Health and Care Problems"
4. To create awareness in the understanding of extinct plants.
5. To create awareness of natural resources and methods of conservation.
6. To develop skill in students of growing various horticultural plants thereby to raise a nursery.
7. To train in techniques of Vegetative propagation and gardening.
8. To motivate for self-employment by knowledge and practicing in the preparation of bio-fertilizers.
9. „earn while learn" can be done with the acquirement of basic knowledge in growing some medicinal plants.
10. To gain knowledge for exploration of new plants of unknown value and known plants of unknown value of their secondary metabolites.
11. To gain a knowledge of the techniques of producing desirable plants through the study of molecular biology and genetic engineering.

DEGREE OF BACHELOR OF SCIENCE IN BOTANY

BRANCH-V-BOTANY CBCS PATTERN

1. Eligibility for Admission

A candidate who has passed Higher Secondary Examination in Academic or vocational stream with Botany under higher secondary board of examination, Tamil Nadu or an examination accepted as Equivalent thereto by the syndicate subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc degree examination of this university after a course of study of three academic years.

2. Duration of the Course

The course for the degree of Bachelor of Science shall consist of three academic years divided into six semesters.

3. Course of study

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

Mother Teresa Women's University, Kodaikanal
ALLOCATION OF PAPERS AND CREDITS (SEMESTER-WISE) FOR B.Sc., BOTANY PROGRAMMES AS PER THE TANSCHE RULES 2018-19 ONWARDS

c., BOTANY Course Structure under Choice Based Credit System (CBCS)

P. No.	Paper Code	Course Title	Hours	Credits	Continuous Internal Assessment (CIS)	End Semester Exam (ESE)	Total
		Semester I					
1.	ULTA11	Part-I- Tamil	6	3	25	75	100
2.	ULEN11	Part-II-English	6	3	25	75	100
3.	UBOT11	Core I (Theory)- Plant Diversity I(Viruses, bacteria, Algae and Fungi, Lichens)	5	4	25	75	100
4.	UBOT12	Core II (Theory)- Plant Diversity II (Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)	5	4	25	75	100
5.	UBOA11	Allied Theory I – Zoology	5	4	25	75	100
6.	UVAE11	Value Education	3	3	25	75	100
Total			**30**	**21**			**600**
		Semester II					
7.	ULTA22	Part I-Tamil	6	3	25	75	100
8.	ULEN22	Part II-English	6	3	25	75	100
9.	UBOT21	Core III (Theory)- Taxonomy of Angiosperms and Economic Botany	6	4	25	75	100
10.	UBOP21	Practical I- Lab in Plant Diversity	5	4	25	75	100
11.	UBOA21	Allied Practical I –Lab in Zoology	5	4	25	75	100
12.	UEVS21	Environmental Studies	2	2	25	75	100
Total			**30**	**20**			**600**
	Semester III						
13.	ULTA33	Part I-Tamil	6	3	25	75	100
14.	ULEN33	Part II- English	6	3	25	75	100

15.	UBOT31	Core IV (Theory)- Cell and Molecular Biology	5	4	25	75	100
16.	UBOA32	Allied Theory II –Chemistry	5	4	25	75	100
17.	UBOE31	Elective I – Choice1 : Biochemistry Choice2 :Cultivation of commercial flower and fruit crops	4	3	25	75	100
18.	UBON31	Non Major Elective Course I Choice1 : Biofertilizers Choice2 : Food preservation and Adulteration	2	2	25	75	100
19.	UBOS31	Skill Based Studies I- Mushroom Technology	2	2	25	75	100
Total			**30**	**21**			**700**
	Semester IV						
20.	ULTA44	Part I-Tamil	6	3	25	75	100
21.	ULEN44	Part II-English	6	3	25	75	100
22.	UBOT41	Core V (Theory)- Plant Anatomy	4	4	25	75	100
23.	UBOP42	Practical II- Taxonomy of Angiosperms and Economic Botany	4	4	25	75	100
24.	UBOA42	Allied Practical II- Lab in Chemistry	3	4	25	75	100
25.	UBOE42	Elective II – Choice 1:Seed Technology Choice 2:Plant tissue culture	3	3	25	75	100
26.	UBON42	Non Major Elective course II Choice1:Biodiversity Conservation Choice2:Forestry	2	2	25	75	100
27.	UBOS42	Skill Based Studies II- Food processing and Preservation	2	2	25	75	100
Total			**30**	**25**			**800**
	Semester V						
28.	UBOT51	Core VI(Theory)- Plant Physiology	5	4	25	75	100
29.	UBOT52	Core VII (Theory)- Genetics and Evolution	5	4	25	75	100
30.	UBOT53	Core VIII (Theory)- Ecology and Geography	5	4	25	75	100
31.	UBOT54	Core IX (Theory)- Plant pathology and Microbiology	5	4	25	75	100
32.	UBOT55	Core X (Theory)- Horticulture and plant breeding	5	4	25	75	100

33.	UBOE53	Elective III – Choice1:Bioremediation	3	3	25	75	100

		Choice2:Herbal Technology					
34.	UBOS53	Skill Based Studies III- Biofertilizers and Biodegradable waste management	2	2	25	75	100
Total			**30**	**25**			**700**
	Semester VI						
35.	UBOT61	Core XI (Theory)- Plant Embryology	5	4	25	75	100
36.	UBOT62	Core XII (Theory)- Biostatistics Bioinstrumentation and Biophysics	5	4	25	75	100
37.	UBOT63	Core XIII (Theory)- Plant Biotechnology	5	4	25	75	100
38.	UBOP63	Practical III –Lab in Plant Physiology and Anatomy	5	4	25	75	100
39.	UBOP64	Core Practical IV – Lab in Plant pathology and Microbiology	5	4	25	75	100
40.	UBOE64	Elective IV – Choice1:Silviculture Choice2: Biodiversity conservation	3	3	25	75	100
41.	UBOS64	Skill Based Studies IV- Medicinal and Aromatic Plants	2	2	25	75	100
42.	UEAS61	Extension Activity - NSS/YRC/RRC	-	3	25	75	100
Total			**30**	**28**			**800**
Grand Total				**140**			**4200**

SEMESTER – I

CORE – I (Theory)- PLANT DIVERSITY – 1

(Viruses, Bacteria, Algae, Fungi and Lichens) - UBOT11

Credits :4 **Hours :5**

Objectives

- Able to recognize the major group of microorganisms and know their important features.
- Have a better understanding of the Classification, Structure Reproduction and Economic importance of major microorganisms such as bacteria, fungi, viruses, algae and lichens.
- Recognize members of the major groups of algae and fungi.
- Have acquired knowledge on diversity of various organisms.

UNIT I

History of Viruses – Classification (Harrison *et al*.1971) Structure and chemical composition and reproduction of Double strand DNA viruses, Double strand RNA viruses, cauliflower mosaic virus – Tobacco mosaic viruses and bacteriophage replication-lytic and lysogenic cycles .

UNIT II

Classification of bacteria (Bergey, 1923), Morphology and ultra-structure of bacterial cell – organization of Bacterial cell wall layer, motility- cilia, flagella and pili – Nutrition, Growth and reproduction of bacteria. Economic Importance of Bacteria

UNIT III

Algae - General characteristics of the various divisions of algae (F.E. Fritsch) Habit and habitats of Freshwater, Marine and Soil algae. Economic Importance (Human relevance) of algae. Methods of reproduction of the following Classes : Chlorophyceae (Volvox*), Phaeophyceae-(Sargassum),* Rhodophyceae (Polysiphonia), cyanophyceae (Nostoc)

UNIT IV

A study of the General Characteristics and mode of life of main classes of Fungi (C, J Alexopoulos). Methods of isolation and culture of fungi. Economic importance of fungi. Study of the structure and reproduction of Phycomycetes (Albugo), Ascomycetes (Peziza), Basidiomycetes (Polyporus,Agaricus), Deuteromycetes (Fusarium).

UNIT V

Occurrence, classification, structure, reproduction and uses of lichens. Type – Usnea. Economic importance of lichens

REFERENCES

1. Mandahar , C.l (1987). Introduction to plant viruses, S. Chand & Company, Pvt Ltd, New Delhi
2. Sharma, P. D. (1992). Microbiology, Rastogi & Co., Meerut
3. Power and Dagainwala. (1994). General Microbiology, Himalayan publishing House,New Delhi
4. D.R.Vashistra (2005). Algae. S. Chand Limited.
5. Kumar, H.D and Singh, H.N. (1982) .A text book of Algae. Affiliated East West Press, New Delhi.
6. Alexopoulus, C.J. Mims, CW. (1979). Introductory Mycology , Wiley Eastern ltd., New Delhi
7. Dharani Dhar Awasthi(2000). A Handbook of Lichens Vedams eBooks (P) Ltd.New Delhi.

CORE – II (Theory)-PLANT DIVERSITY – II

(Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)- UBOT12

Credits :4 **Hours :5**

Objectives

- Understand the major groups of plants such as bryophytes, gymnosperms, pteridophytes and Paleobotany.
- Have knowledge on distinguishing features of bryophytes as a group and their different phyla in this group.
- Have knowledge in classification, structure, reproduction and economic importance of Gymnosperms.
- Exhibit knowledge on "alternation of generation".

UNIT I

Bryophytes - General Characteristics, Classification, Morphology, Occurrence, Structure and reproduction of Riccia and Marchantia and Polytrichum, Anthoceros ,Development of sex organs, gametophyte and sporophyte.

UNIT II

Pteridophytes - General characteristics and classification by Smith, morphology, structure, Reproduction and life-histories of the following genera; Psilotum, Lycopodium, Selaginella, Equisetum and Adiantum. Stelar evolution in pteridophytes.

UNIT III

Gymnosperms- general characteristics and classification of Gymnosperms by Sporne, Morphology, structure and mode of reproduction and life- histories of the following: Cycas, Pinus and Gnetum. Economic importance of Gymnosperms: Oil, resin, timber, etc.

UNIT IV

Paleobotany- fossils and methods of fossilization- Geological time-scale-an elementary knowledge of the computation of the age of fossils-Radio-Carbon dating.

UNIT V

A brief study of Rhynia, Lepidodendron, Lepidocarpon.

REFERENCES

1. Vashishta, Sinha A.K, Adarsh Kumar. (2011). Bryophytes, S.Chand &Company ltd., New Delhi
2. Sharma, O.P. (1990). Textbook of Pteridophyta, MacMillan India Ltd., New Delhi
3. Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate pub and Distributer, New Delhi
4. Arora M.P. (1990). Evolutionary biology, Himalaya Publication House, Delhi.

ALLIED THEORY I- ZOOLOGY - UBOA11

Credits :4 **Hours :5**

Objectives

- Understand the major phyla of invertebrates
- Have knowledge on classification and identification of chordate
- Able to understand the Human physiology
- Explore their knowledge in Developmental biology

UNIT I

Salient features and typical examples of the nine phylum under invertebrates groups. Life history, transmission and control measures of Plasmodium. Corals and their importance, Pearl oyster cultivation and techniques, Larval forms of echinoderms and affinities with that of Chordates.

UNIT II

Salient features and typical examples of the chordates and Prochordates upto classes. Identification and significance of any 4 edible fishes, Migration in fresh water and marine fishes, Snakes – Identification of poisonous and non-poisonous Snakes – Mechanism of bite, first aid for snake bite.

UNIT III

Physiology-Respiratory system, circulation-types, composition, properties and functions of blood. Human-cardiac cycle, ECG, blood pressure, factors contributing to heat problems. Excretion-kinds of excretory products,mechanism of urine formation in mammals, kidney failure and transplantation.

UNIT-IV

Muscles, types of muscles, muscle proteins, mechanism of contraction, cori cycle. Nervous tissue, structure, types of neurons, synaptic transmission of impulses, neurotransmitters, receptors, Physiology of mammalian eye, ear.

UNIT V

Developmental biology-spermatogenesis and oogenesis, fertilization mechanism, blastulation and gastrulation. Embryonic membranes and their functions in chick, placentation in mammals, puberty, menstrual cycle, contraception, Artificial insemination, cryopreservation, IVF, bioethics.

REFERENCES

1. Agarwal V.K. (2000) Invertebrate zoology – S. Chand and Company Ltd., publications.
2. Kotpal R.L. (2003) Modern text book of zoology – Invertebrates, Rostogi publication.
3. Jordan, E.L & Verma, P.S. (2000) Chordate Zoology, S.Chand & Co, New Delhi.
4. Sambasivaiah, Kamalakara Rao and Augustine Chellappa, 1990. A text book of Animal Physiology and Ecology, S.Chand &Co., Ltd., New Delhi-110 055
5. Parameswaran, Anantskrishnan and Ananta Subramaniam, 1975. Outlines of Animal Physiology, S.Viswanathan (Printers & Publishers) Pvt. Ltd.,
6. William S.Hoar, 1976. General and comparative physiology, Prentice Hall of India Pvt. Ltd
7. Jain P.C, 1998. Elements of developmental biology. Vishal Publication, New Delhi

SEMESTER – II

CORE - III (Theory)-TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY-UBOT21

Credits :4 **Hours :6**

Objectives

- Know the various classification of taxonomy
- Have knowledge on plant identification and in binominal nomenclature
- Understand the economic importance of various groups of angiosperms
- Able to know the various families under angiosperms

UNIT I
Morphology: Stem, root modification, inflorescence, phylotaxonomy

UNIT II

Taxonomy and it‟s importance. Systems of classification – artificial system (Linnaeus), Natural (Bentham and Hooker‟s),Phylogenetic system (Engler and Prantle) and Modern system (Taktajan‟s 1980). (Only outline of classification with merits and demerits need be indicated).

UNIT III

A brief outline of modern methods of plant identification: Chemotaxonomy, numerical taxonomy, serotaxonomy and molecular techniques.Binomial Nomenclature. A brief reference of citation of authors, Type concept. Techniques of herbarium preparation and its uses. Flora and its uses.

UNIT IV
A detailed study of the following families and the economic importance of types wherever applicable. Rutaceace, Leguminoesae, Curcubitacea, Apiaceae, Rubiaceae, Solanaceae, Amaranthaceae, Euphorbiaceae.

UNIT V

Asteraceae, Apcoynaceae, Asclepiadaceae, Acanthaceae, Verbenaceae, Orchidaceae, Liliaceae, Zingiberaceae and Poaceae. Study of economic plants and their main products with reference to families included in the syllabus.

REFERENCES

1. Lawrence, G.H.M. 1951 – Taxonomy of vascular plants.
2. Singh V and D.K.Jain, 1981, Taxonomy of angiosperms, Rastogi Publication, Meerut.
3. Panday, B.P. 1997, Taxonomy of angiosperms, S. Chand & Co., (P)Ltd.,
4. Pandey. B.P. 1980. Economic Botany, S.Chand & Co. Ltd. New Delhi
5. Sen, 1992, Economic Botany, New Central Book Agency, Culcutta
6. Vasudevan Nair R. 1997. Taxonomy of Angiosperms, APH Publishing Corporation
7. V.V. Sivarajan, (1984) ,Principles of Plant Taxonomy – Edited by N.K.B. Robson. 1984.

CORE PRACTICAL- I

LAB IN PLANT DIVERSITY- UBOP21

Credits :4 **Hours :5**

Objectives

- Microscopic identification of the vegetative structure of algae, fungi and lichens
- Cross sectional study of Pteritophytes and Bryophytes
- Have a general knowledge on technical terms of Angiosperms
- Obtain an basic idea about the thallus diversity of various organisms

1. Study of thallus diversity in Algae : Chlorella, Volvox, Odegonium
2. Study of thallus diversity in fungi : Yeast, Agaricus, Aspergillus / Penicillium
3. Study of Lichen diversity : Crustose, Foliose, Fruticose.
4. Study of Bryophyte diversity : Riccia, Funaria
5. Study of Pteridophyte diversity (Sporophytes) : Selaginella,Lycopodium
6. Study of Gymnosperm diversity (Sporophyte): Cycas, Pinus
7. Study of Angiosperm diversity with reference to habit – herbs, shrubs, trees, climbers, epiphytes and parasites. (with one example of each)
8. Study of Angiosperm diversity with reference to external adaptations : hydrophytes, mesophytes, xerophytes and halophytes.(one example of each)

REFERENCES

1. Mandahar , C.l (1987). Introduction to plant viruses, S. Chand & Company, Pvt Ltd, New Delhi
2. Kumar, H.D and Singh, H.N. (1982) .A text book of Algae. Affiliated East West Press, New Delhi.
3. Alexopoulus, C.J. Mims, CW. (1979). Introductory Mycology , Wiley Eastern ltd., New Delhi

4. Dharani Dhar Awasthi .(2000). A Handbook of Lichens Vedams eBooks (P) Ltd.New Delhi.
5. Vashishta, Sinha A.K, Adarsh Kumar. (2011). Bryophytes, S.Chand &Company ltd., New Delhi
6. Sharma, O.P. (1990). Textbook of Pteridophyta, MacMillan India Ltd., New Delhi
7. Johri , RM, Lata S , Tyagi K (2005), A text book of Gymnosperms , Dominate pub and Distributer, New Delhi.
8. Singh, V. & Singh, D.K (1983) – Taxonomy of Angiosperms, Rastogi Publication, Meerut

ALLIED PRACTICAL I – LAB IN ZOOLOGY-UBOA21

Credits :4 **Hours :5**

Objectives

- Understand the life cycle of plasmodium
- Have knowledge on identification of poisonous and non-poisonous snakes
- Exhibit idea on identification of fresh and marine water fishes.
- Have a basic knowledge of physiology.

1. Life cycle of plasmodium
2. Identification of poisonous and non poisonous snakes

Cobra
Russel‟s Viper
Krait
Worm snake
Water snake

3. Identification of Fresh water and Marine fishes

Catla catla
Rahu
Shark

4. Monitoring Blood Pressure
5. Monitoring Heart beat
6. Structure of human eye, ear
7. Development of Chick embryo

REFERENCE

1. Ekambaranatha Iyer (1993) Manual of Zoology – vol . I. Invertebrata. S. Viswanathan (Printers & Publisher) Chennai.
2. Ekambaranatha Iyer (1993) Manual of Zoology Vol.II,Viswanathan (Printers & Publishers), Chennai.
3. Agarwal V.K. (2000) Invertebrate zoology – S. Chand and Company Ltd.,publications.
4. Jordan, E.L & Verma, P.S. (2000) Chordate Zoology, S.Chand & Co, New Delhi.
5. Sambasivaiah, Kamalakara Rao and Augustine Chellappa, 1990. A text book of Animal Physiology and Ecology, S.Chand &Co., Ltd., New Delhi-110 055
6. William S.Hoar, 1976. General and comparative physiology
7. Jain P.C, 1998. Elements of developmental biology

SEMESTER – III

CORE IV(Theory)-CELL BIOLOGY AND MOLECULAR BIOLOGY- UBOT31

Credits :4 **Hours :5**

Objectives

- Exhibit a clear and concise idea on transcription and translation of both prokaryotes and eukaryotes.
- Able to explain the cell division and cell cycle and mechanisms behind DNA damage repair
- Have knowledge on Mitochondrial and Chloroplast Genome
- Exhibit a basic knowledge of genetics in cell and molecular biology

UNIT I

The plant cell: Structure and function of cell wall, membrane, chloroplast, mitochondria, ribosomes, peroxisomes, golgi apparatus, nucleus, nucleolar organizer and ER.

UNIT II

Cell cycle – mitosis and meiosis, pairing, crossing over and cytokinesis.

UNIT III

Chromosomes: Morphology and chemistry, Chromatin organization – C- value paradox.

Watson and Crick model of DNA, DNA synthesis, DNA replication and enzymes involved, DNA damage and repair, Transposons and Plasmids.

UNIT IV

General principles of Gene Regulation, Gene Regulation in prokaryotes, Operon concept, *lac* Operon, Positive and negative control, Catabolite Repression, Gene Regulation in Eukaryotes, Transcriptional, RNA splicing- Translational and Post translational modification in eukaryotic cells. Enzymes involved in transcription.

UNIT – V

Mitochondrial genome and Chloroplast genome structure and function. – import of protein into Mitochondria and chloroplast.

REFERENCES

1. Pawar, Cell Biology, Himalaya Publishing House, Mumbai
2. Derobertis E.D. and De Robertis E.M.F. 2002. Cell and Molecular Biology 8th Edition. Lee and Fab International edition, Philadelphia.
3. Cooper G. 1996. The cell – A molecular approach. ASM Press, Washington
4. Buchanan B.B. Gruissem W., Jones R.L. (2008). Biochemistry and Molecular Biology. American Society of Plant Physiologist, Maryland, USA.
5. Sheeler P and Binachi D 2004. Cell and Moecular Biology, Third edition, Wiley New York, USA.
6. Lewin, B. 2000. Gene VII. Oxford University Press, New York, USA.

ALLIED THEORY II – CHEMISTRY- UBOA32

Credits :4 **Hours :5**

Objectives

1. To understand the handling of chemicals and errors in chemical analysis
2. To get knowledge in chemical bonding and hybridization
3. To acquire knowledge in volumetric analysis
4. To understand the basic concept of chemistry of biomolecules

Unit 1: Handling of chemicals and Data analysis

a) Storage and handling of chemicals: Handling of acids, ethers, toxic and poisonouschemicals. Antidotes, threshold vapour concentration and first aid procedure.
b)Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relativeerrors. Methods of eliminating and minimizing errors.
c) Separation techniques–Solvent extraction. Principle of adsorption and partitionchromatography, column chromatography, thin layer chromatography (TLC), paperchromatography and their applications.

Unit 2: Chemical bonding

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing the formation of ionic bond.
b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based onhybridization.
c) Coordinate Bond: Nature of coordinate bond. Coordination complexes.Werner's theory.Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin
d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogen bonding.Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and RNA.
e) van der Waal's forces: Dipole – dipole and dipole - induced dipole interactions.

Unit 3: Volumetric analysis

a) Methods of expressing concentration: normality, molarity, molality, ppm.
b)Primary and secondary standards: preparation of standard solutions
c)Principle of volumetric analysis: end point and equivalence points.
d)Strong and weak acids and bases - Ionic product of water , pH, pKa, pKb. Buffer solutions - pH of buffer solutions. Mention of Henderson equation & its significance.

Unit 4: Kinetics

a) Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions.
b)Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry.

Unit 5: Chemistry of biomolecules

a) Fats – Occurrence and composition. Hydrolysis of fats.
b) Vitamins – Source, provitamin, properties and classification. Structure and function of vitamin A, C, D, K and E
c)Hormones – Thyroxin, adrenaline and sex hormones (structure and functions only)

Text Book

1. R. Gopalan, S. Sundaram, *Allied Chemistry,* Sultan Chand and Sons, 1995.

Reference Books

1. U. Sathyanarayana, *Biochemistry,* Books and allied (p) Ltd, 1999.
2.B.R.Puri and L.R.Sharma, *Principles of physical chemistry,* Shoban Lal Nagin Chand and Co. 33rd ed., 1992.

ELECTIVE-I BIOCHEMISTRY- UBOE31

Credits: 3 **Hours:4**

Objectives

- Have knowledge on classification, structure and properties of carbohydrates, proteins, lipids and Nucleic acid.
- Exhibit a brief idea on enzyme classification and nomenclature
- Able to understand the chemistry of plant pigment
- Have knowledge on principles of biochemistry

UNIT 1

Atoms and molecules, primary chemical bonds – covalent bond, hydrogen bond and hydrogen bond in water, Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, pH, Buffers, Oxidation –Reduction, isomerism.

UNIT II

Carbohydrates: Classification, structure and properties of functional groups. Proteins: Structure and function; Primary, secondary, tertiary and alpha helix structures. Amino acids: Structure, classification and properties. Extraction and purification of proteins and protein Synthesis:

UNIT III

Lipids: Classification, properties, saturated and unsaturated fatty acids, plant waxes, cholesterol and lecithin. Nucleic acids: Structure and properties of DNA and RNA. Isolation and amplification of DNA.

UNIT IV

Enzymes: Classification and nomenclature of enzymes, enzymes as biocatalyst. Nature and properties of enzymes, functions and factors affecting enzyme activities. Enzyme action and substrate concentration – inhibitors, cofactors.

UNIT V

Chemistry of plant pigments – Hormones – definition – classification – peptide and steroid hormones – basic function. Secondary plant product – alkaloids flavonoids, terpenoids and phenol

REFERENCE

1. Harper's Illustrated Biochemistry, 27th Edition (2006.) R.K. Murray, D.K. Granner and V.M Rodwell, The McGraw-Hill companies, Inc.

2. Lehninger Principles of Biochemistry (2006) by D.L. Nelson and M.M. Cox, Macmillan worth Publishers.

3. Biochemistry (2007) by Jeremy M.Berg, John L. Tymoczke and Lubert Stryer, W.H. Freeman and Company, USA.

4. Geoffrey Zubay (1995) Principles of Biochemistry,4th Edition Macmillan Publishing Co., New York.

5. Wey, P.M. and J.B Harbone, 2000. Plant biochemistry. Panima Educational Book agency, New Delhi.

ELECTIVE-I CHOICE 2:CULTIVATION OF COMMERCIAL FLOWER AND FRUIT CROPS -UBOE31

Credits: 3 **Hours:4**

Objectives

- Have knowledge on genetic inheritance of flowers.
- Able to understand the breeding techniques.
- Acquire knowledge on the achievements of commercial flowers.
- To understand and learn about the different molecular approaches in cultivation.

UNIT I

Genetic inheritance -- of flower colour, doubleness, flower size, fragrance, post harvest life.

UNIT II

Breeding methods suitable for sexually and asexually propagated flower crops and ornamental plants-- introduction, selection, domestication, polyploid and mutation breeding for varietal development, Role of heterosis, Production of hybrids, Male sterility, incompatibility problems, seed production of flower crops.

UNIT III

Breeding constraints and achievements made in commercial flowers - rose, jasmine, chrysanthemum, marigold, tuberose, crossandra, carnation, dahlia, gerbera, gladioli, orchids, anthurium, aster, heliconia, liliums, nerium.

UNIT IV

Growth regulation aspects of propagation, embryogenesis, seed and bud dormancy, fruit bud initiation, regulation of flowering, off season production.

UNIT V

Flower drop and thinning, fruitset and development, fruit drop, parthenocarpy, fruit maturity and ripening and storage, molecular approaches in crop growth regulation- current topics.

REFERENCES:

1. Bhattacharjee SK. 2006. Advances in Ornamental Horticulture. Vols. I-VI. Pointer Publ.
2. Bose TK & Yadav LP. 1989. Commercial Flowers. Naya Prokash.
3. Chadha KL & Choudhury B.1992. Ornamental Horticulture in India. ICAR.
4. Chadha KL. 1995. Advances in Horticulture. Vol. XII. Malhotra Publ. House.
5. Chaudhary RC. 1993. Introduction to Plant Breeding. Oxford & IBH.
6. Singh BD. 1990. Plant Breeding. Kalyani.
7. Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.
8. Roberts J, Downs S & Parker P. 2002. Plant Growth Development. In: Plants (I. Ridge, Ed.), pp. 221-274, Oxford University Press.
9. Salisbury FB & Ross CW. 1992. Plant Physiology. 4th Ed. Wadsworth Publ.

NON MAJOR ELECTIVE-I : CHOICE I BIOFERTILIZERS - UBON31

Credits: 2 **Hours:2**

Objectives

- To know the types of soil and soil fertility
- To attain knowledge on microbial fertilizers and biopesticides
- To understand and learn about organic farming

Unit-I : Introduction to Soil Ecology: Definition, Types, Nutrients forms in soil - Function, Deficiency and Factors influencing soil fertility.

Unit-II: Biofertilizers: Definition and types, Characteristics of biofertilizers - Rhizobium, Azotobactor, Azospirillum, Phosphate solubilising microorganisms, cyanobacteria, Azolla. Mycorrhizal fungi as biofertilizers

Unit – III : Organic farming : Scope, definition and Concept of organic farming. Nutrient management in organic farming. Green manuring, composting- principles, composting methods and Vermi composting.

Unit IV: Biopesticides: Integrated pest & disease managements in Vegetables and Crops. Bacteria, Fungi as biocontrol agents, Inorganic pesticides, disadvantages of their use.

Unit –V: Production Technology: Strain selection, sterilization, growth and fermentation, mass production of various biofertilizers. Biofertilizers - Storage, shelf life, quality control and marketing.

Reference books:

1. Dubey, R.C, 2005,A Text book of Biotechnology S.Chand & Co, New Delhi.
2. John JothiPrakash, E,2004,Outlines of Plant Biotechnology. Emkay, New Delhi.
3. Sathe, T.V, 2004, Vermiculture and Organic Farming. Daya publishers.
4. SubhaRao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
5. Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming, AktaPrakashan, Nadiad
6. Palaniappan S.P, Annadurai K.A 2004, Organic Farming: Theory and Practice,Scientific publishers.
7. Parvatha P, 2014, Organic farming for sustainable Horticulture, Reddy Springer Singapore.
8. Sharma A.K, 2005, A hand book of Organic Farming, Agrobios.
9. Tarafdar J.C,2008,Organic Agriculture –Indian Society of Soil Science & Scientific Publishers (India)

NON MAJOR ELECTIVE-I : CHOICE 2

FOOD PRESERVATION AND ADULTERATION - UBON31

Credits: 2 **Hours:2**

Objectives

- To understand the fundamental about the food preservation techniques
- To attain knowledge about microorganisms in food
- To know and learn about the food adulterants

Unit I

Fundamentals of Food Preservation -Concept - Importance of food preservation -Principles of food preservation -Techniques of food preservation.

Unit II

Microorganisms in food -Introduction -Types of Microorganisms -Conditions for growth. -Food spoilage & their control

Unit III

Preservation by preservatives -Concept and definition -Types -Natural preservatives -Synthetic preservatives

Unit IV

Adulterants - Detection of common food adulterants - Spices, Grains, Coffee, Tea , Oil fats. Food colours Milk.

Unit V

Food Safety: Aspects of food safety- HACCP, GMP, role of FDA, Agmark, ISI Concept of sanitation and hygienic production of food. Legal aspects in food safety.

Reference:

1. Kalila, MnoranjanSood, Sangita. Food Preservation and processing, 2012. Kalyani Publishers; Kalyani Publishers
2. Martin Ray Adams, Maurice O. Moss, Peter McClure. Food Microbiology,4th Edition.1995.Royal Society of Chemistry.UK
3. Frazier, W.C. and Dennis, C. Westhoff. Food Microbiology, 1995. Tata McGraw Hill Publlishing Company, New Delhi.
4. B Sivasankar . Food processing and preservation. 2009. PHI learning private Ltd, New Delhi.

SKILL BASED STUDIES- I- MUSHROOM TECHNOLOGY- UBOS31

Credits:2 **Hours:2**

Objectives

- Have knowledge on general identification characteristics of mushroom
- Understand the types of edible mushroom
- Have idea on growing conditions of mushroom
- Exhibit an idea on harvesting methods.

UNIT I

Introduction - history - scope of edible mushroom cultivation - Types of edible mushrooms available in India - Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus.

Unit II

Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization - preparation of test tube slants to store mother culture – culturing of Pleurotus mycelium on petriplates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

UNIT III

Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag, Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

UNIT IV

Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

UNIT V

Food Preparation

1. Types of foods prepared from mushroom; Soup, Cutlet, Omelette, Samosa, Pickles, Curry. Muchurian and salads.
2. Research Centres - National level and Regional level.

3 Cost benefit ratio - Marketing in India and abroad, Export Value.

REFERENCES

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Dept. of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. The Bangalore Printing and Publishing. 3. Tewari, Pankaj Kapoor, S.C., (1988).Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

SEMESTER - IV

CORE – V (Theory) PLANT ANATOMY AND EMBRYOLOGY - UBOT41

Credits :4 **Hours :4**

Objectives

- Able to distinguish the monocot and dicot plants
- Have knowledge on physiological and genetic aspects of ecological adaptations of plants.
- Able to identify the reproductive parts of a flower and can describe the function of each part.
- An understanding of basic anatomy and embryology of plant

UNIT I

Classification and structure of tissues; Simple tissue: Structure occurrence and function (parenchyma, collenchyma, sclerenchyma) Complex tissues Definition Structure, Origin and function (Xylem & Phloem, tracheary elements and Sieve elements)

UNIT II

Secretory tissues: (glands, glandular hairs, nectaries, hydathodes, schizogenous and lysigenous ducts, resin ducts, mucilage ducts, kinoveins, laticifers) Vascular bundle: Types (conjoint, collateral, bi-collateral, open closed, radial, concentric amphicribal and amphivasal.) Stomatal types

UNIT - III

Meristems: Classification, distribution, structure function. Theories: Tunica – Corpus and quiescent centre. Root apex: Histogen theory & Korper-Kappe theory.Simple permanent tissues: Parenchyma, Collenchyma, Sclerenchyma. (fibres and sclereids)

UNIT VI

Complex tissues: Xylem – tracheids, vessels, Xylem fibres and xylem parenchyma. Secondary Xylem, Annual rings, Heart wood and sap wood. Phloem: Sieve elements, companion cells, phloem fibre and phloem, parenchyma. Secondary phloem. Vascular tissue systems: different types of vascular bundles and their arrangement in root and stem.

UNIT – V

Primary and secondary structure of dicot stem. Anomalous secondary growth in stems of Boerhaavia and Nyctanthes. Primary and secondary structure of dicot root. Primary structure of monocot stem and root. Anomalous secondary growth in Dracaena. Structure of Dicot and Monocot leaf. Nodal anatomy – Uni, tri and multilacunar node.

REFERENCES

1. Vashista, P.C. (1968). A text Book of plant Anatomy, S.Negin & Co.
2. Esau, K. 1960. Plant Anatomy, Wiley Eastern Private Limited. New Delhi.
3. Bhojwani, S..S and Bhatnagar, S.P. The Embryology of Angiosperms, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Dwivedi. J.N, 1988. Embryology of Angiosperms. Rastogi and Co. Meerut.
5. Maheswari, P. 1971. An Introduction to the Embryology of Angiosperms. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
6. Swamy, B.G.L., and Krishnamurthy, K.V. From flower to fruit. Tata McGraw. Hill Publishing Company Limited. New Delhi.

CORE PRACTICAL II – TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY- UBOP42

Credits :4 **Hours :4**

Objectives

- Have a wide knowledge on taxonomical identification of plant species belongs to angiosperms
- Have a brief idea on Horticulture such as Cutting/ Layering / Grafting
- Know about the economic utility of plants

1. Taxonomical studies of selected Plant species included in the families
    - Malvaceae
    - Fabaceae
    - Rutaceae
    - Curcurbitaceae
    - Apiaceae
    - Solanaceae
    - Zingiberaceae
    - Poaceae
2. Study of economic utility of plants belonging to the families mentioned above.
3. Horticulture: Identification of the following: (Cutting/ Layering / Grafting)
4. Submission of a tour report and 25 herbarium sheets (Specimens collected from Tour, locally available plants during the Internal practical Examination. Submission of Herbarium for Angiosperms families mentioned above in practical syllabus

REFERENCES

1. Lawrence, G.H.M. 1951 – Taxonomy of vascular plants.
2. Singh V and D.K.Jain, 1981, Taxonomy of angiosperms, Rastogi Publication, Meerut.
3. Panday, B.P. 1997, Taxonomy of angiosperms, S. Chand & Co., (P)Ltd.,
4. Pandey. B.P. 1980. Economic Botany. S.Chand & Co. Ltd. New Delhi
5. Sambamurthy, A.V.S.S. and Subrahmanyam, N.S. 1989. A Text Book of Economic Botany, Wiley Eastern Ltd., New Delhi.

6. Vasudevan Nair R. 1997. Taxonomy of Angiosperms, Tata McGraw Hill., NewDelhi
7. V.V. Sivarajan, (1984), Principles of Plant Taxonomy –Edited by N.K.B. Robson.

ALLIED PRACTICAL II- LAB IN CHEMISTRY- UBOA42

Credits :4 **Hours :3**

Objectives

- Understands the basics of acid-base indicator
- To acquire knowledge in the pH adjustments of different buffers and solution
- To gin knowledge in buffer preparation
- To solve problems using molarity and normality calculations.
- To be able to perform various titration
- Acids and bases indicators
- pH adjustments- Acid, Base, Neutral
- Buffer preparation
- Molarity and Normality
- Titration between a strong acid against NaOH
- Titration between sodium hydroxide against oxalic acid.
- Titration between KMnO4 against ferrous sulfate
- Titration between sodium thiosulfate and potassium dichromate

REFERENCES

1. Upathayah , (2006), Biophysical Chemistry –, 3rd edition, reprinted 2006.
2. Keith Wilson & John Walker, (2000), Practical Biochemistry – Principles and Techniques, Cambridge University Press; 5 edition
3. D. Friefelder, (1982), Physical Biochemistry, W.H.Freeman & Company, Newyork, USA.
4. K.E. van Holde, W.C. Johnson, P.S. Ho, (2006), Principles of Physical Biochemistry, Prentice Hall, 2nd Edition.

ELECTIVE II-SEED TECHNOLOGY- UBOE42

Credits: 3 **Hours:3**

Objectives

- Can understand the structures of seed, formation and seed development.
- Have knowledge about the production of high quality seeds
- Know about the various metabolic changes at germination;
- Acquire a basic knowledge on seeds

UNIT I

Seed processing - Importance of seed processing in the pathway of seed improvement, physical characteristics used to separate seeds. Preparing seeds for processing. licensing of machines.

UNIT II

Seed drying : Importance and advantages of seed drying ,moisture content and methods of seed moisture measurements, Theory of seed drying (wet dry seeds),advantages of mechanical drying equipments dehumidification and drying of heat sensitive seeds , relative humidity and equilibrium, moisture content of seeds.

UNIT III

Seed processing machines : Principle, construction, working, adjustments, cleaning and uses of seed processing machines viz. i) Air screen cleaner cum grader ii) Specific gravity separator, aspirators, pneumatic aspirators, stoner iii)Roll mill iv) Magnetic separators v) Spiral separators, dropper best separator, electrostatic separators

UNIT IV

Seed Treatment: Principle, construction, working, adjustments and uses of slurry seed treater mist -o- matic seed treated, storage and labeling of treated seeds, seed users safety.
Seed conveyors and elevators

UNIT V

Seed storage – structures and their management: Packing and marketing of seeds, bagger weigher, bag closing ,portable and conveyor type of bag closer, labeling and maintaining lot identify, lot numbers, seed pellets, handling and stacking, maintenance of seed processing record.

REFERENCES

1. K.A. Jeffs, (1986), Seed treatment, CIPAC Publishers,
2. D.S. Bindra- Plant Protection and equipments.
3. Billy R. Gregg, Alvin G.Law,S.S. Virde,J.S. Balis-Seed Processing. published by National Seeds Corporation, New Delhi, and Mississipi State University and USAID.
4. S.M. Henderson & R. Perry, (1976), Agricultural process Engineering, Avi Publishing Co Inc.; 3rd Revised edition
5. Carl W. Hall, (1967), Drying Farm crops, Agricultural Consulting Associates; 6th printing edition
6. A Chakravarty, (1989), Post Harvest Technology & cereals , oil seeds. pulses & Oxford & IBH Publishing Co Pvt.Ltd
7. Waren L.Melabe,Julien C. Smith & Peter Harviot , (2004), Unit operation in chemical engineering. McGraw-Hill Education; 7 edition
8. ICAR, (1961), Handbook of Agriculture, Directorate of Information and Publication of Agriculture (DIPA),
9. Hunt D, (1977), Farm power & machinery management, Iowa State University Press.
10. Prem Singh and Arya – Vegetable breeding and seed production; Kalyani Publ.Ludhiana.

ELECTIVE II- CHOICE 2:PLANT TISSUE CULTURE - UBOE42

Credits: 3 **Hours:3**

Objectives

- Learn about the various techniques in plant tissue culture.
- Have knowledge about the production of high quality plants.
- Know about the various factors affecting morphogenesis.
- Acquire a basic knowledge on plant tissue culture

Unit-I

Introduction - History, Scope and Concepts of basic techniques in plant tissue culture. Laboratory requirements and organization. Sterilization - filter, heat, wet and chemical. Media preparation - inorganic nutrients, organic supplements, carbon source, vitamins, gelling agents, phytohormones and growth regulators; composition of commonly used culture media (MS and Gamborg‟s)

Unit-II

Cell, tissue and organ culture - Isolation of single cells, selection and types of cells. Tissue explants and organs for culture - Cell suspension cultures - batch, continuous. Synchronization of suspension culture, cellular totipotency, Cytological, cytochemical and vascular differentiations

Unit-III

Elite and ornamental Plants for propagation in vitro, Selection of superior biotypes of orchids, roses, jasmine, Hibiscus and crotons; Clonal propagation of elite germplasms, clonal propagation strategies for commercial exploitations.

Unit-IV

Micropropagation - Factors affecting morphogenesis and proliferation rate; technical problems in micropropagation. Organogenesis - formation of shoots and roots, production of virus free plants by meristem and shoot-tip culture

Unit-V

Somatic embryogenesis - Process of somatic embryogenesis, structure, stages of embryo development, factors affecting embryogenesis; production of artificial seeds; Cryopreservation.

REFERENCES

1. Bhojwani S.S., Razdan M. K (2005) Plant tissue culture: Theory and practice, Studies in plant science 5,North Holland, Elsevier, New Delhi

2. Adrian, J and Assoumani M (1983) Gums and hydrocolloids in nutrition. In: M. Rechcigl (Ed), hand book of nutritional supplements, Vol. II. Agricultural use. CRS Press, Boca Raton, FL.

3. Aiken M.M and Yeoman M.M (1986) A rapid screening technique for the selection of high yielding capsaicin cell line of Capsicum frutescensMill. In: P. Morris et al (Eds.) Secondary Metabolism in Plant Cell Cultures. Cambridge University Press, London

4. Anderson S.B, Christiansen I and Faresveit B (1990) Carrot (Daucus carota L.): In vitro production of haploids and field trials. In: Y.P.S. Bajaj (Ed.) Biotechnology in Agriculture and Forestry, Vol. 12. Haploids in crop improvement I. Springer, Berlin.

5. Smith R.H (2000) Plant Tissue Culture: techniques and Experiments, Second edition, Academic Press, USA

NON MAJOR ELECTIVE COURSE II – CHOICE1: BIODIVERSITY CONSERVATION - UBON42

Credits :2 **Hours :2**

Objectives

- To gain Knowledge of fundamental concepts within conservation and biodiversity;
- To understand and learn the main threats to biological diversity, climate changes and invasive species on biodiversity
- Have a knowledge on Conservation Strategies and Sustainable Management of Bioresources

UNIT I

Biodiversity –Definition, Types of Biodiversity: Species, Genetic and Ecosystem diversity – Alpha, beta, and gamma diversity – Biodiversity and ecosystem function – Megadiversity zones.

Unit II

Biodiversity Hot Spots in India – Ecologically Sensitive Areas (ESA) in India - Use of Biodiversity: Source of food, medicine, raw material, aesthetic and cultural uses.

UNIT III

Threats to Biodiversity - Natural and anthropogenic threats to biodiversity - IUCN Threat Categories – Red Data Book - Species extinctions – Endangered and endemic species of flora and fauna in India.

UNIT IV

Conservation Strategies - Current practices in conservation: Habitat or Ecosystem Approaches – Species based Approaches – In-situ conservation: Afforestation, Botanical gardens, Zoos, Biosphere Reserves, National Parks, Sanctuaries. Ex-situ conservation: Cryopreservation, Gene Banks, Seed Banks, DNA Banks, Tissue Culture.

Unit V

Sustainable Management of Bioresources- National Biodiversity Authority (NBA) – Functions of State Biodiversity Board (SBB) and Biodiversity Management Committee's (BMC) – The role of WWF, FAO, UNESCO, UNDP and UNEP for biodiversity conservation

REFERENCES

1. Chaudhuri AB and Sarkar DD (2003) Megadiversity Conservation, Flora, Fauna and Medicinal Plants of India's Hot Spots. Daya Publishing House, New Delhi.

2. Dadhich LK and Sharma AP (2002) Biodiversity –Strategies for Conservation, APH Publishing Corporation, New Delhi.

3. Gary K Meffe and Ronald Carroll C (1994) Principles of Conservation Biology. Sinauer Associates Inc., Massachusetts.

4. Groombridge B (Ed.) (1992) Global Biodiversity Status of the Earths Living Resources. Chapman & Hall, London

NON MAJOR ELECTIVE COURSE II - CHOICE2: FORESTRY - UBON42

Credits :2 **Hours :2**

Objectives

- To know and learn forest ecosystem
- To understand Agroforestry management
- To have knowledge about the world forests

Unit I

Forests - definitions, role, benefits - direct and indirect. History of Forestry. Classification of forests - High forests, coppice forests, virgin forest and second growth forests, pure and mixed forests. Basic concepts on Forest types of India.

Unit II

Agroforestry - farm forestry, social forestry, joint forest management - concepts, programmes and objectives. Important acts and policies related to Indian forests.

Unit III

Global warming – climate change- forestry options for mitigation and adaptation - carbon sequestration.

Unit IV

Introduction to world forests – forest biomes- geographical distribution and their classification, factors influencing global forests distribution - productivity and increment of world forests.

Unit V

Forest resources and forestry practices in different eco-regions of the world. General problems of forest development and economy. Trade patterns of forest based raw materials.

REFERENCES

1. Beazley, M. (1981). The International Book of Forest. Mitchell Beazly Publishers, London.
2. Grebner, D.L., Bettinger, P and Siry, J.P. (2012). Introduction to Forestry and Natural Resources. Academic Press.
3. Khanna, L.S. (1989). Principles and Practice of Silviculture. Khanna Bandhu, New Delhi.
4. Mather, A.S. (1990). Global forest resources. Belhaven, London. Persson, R. (1992). World forest resources. Periodical experts, New Delhi.

SKILL BASED STUDIES II-FOOD PROCESSING AND PRESERVATION- UBOS42

Credits:2 **Hours:2**

Objectives

- Choose the right method and equipment for the preservation and processing of the various foods
- Acquire the skill for producing and preserving some common foods
- Aware of the food standards and quality factors
- Explore the knowledge about preserving food

UNIT- I

Introduction of food processing. Principles and applications of food processing. Milk &milk products processing (Cheese, butter, ice cream, milk powder).

UNIT -II

Processing and Preservation methods,Curing, Drying, Canning and Bottling, Additives

UNIT III

Freezing and Refrigeration, Controlled atmosphere storage, Aseptic packaging, Fermentation

UNIT-IV

Pasteurization, Vacuum Packing, Jellying, Salt

UNIT-V

Food packaging – Food distribution – Government monitoring and regulation – HACCP. Botulism – major diseases in canned foods – controlled use of microorganisms.

REFERENCES

1. Joshi, V.K. and Pandey, A. Ed. 1999. Biotechnology. Food Fermentation, (2 Vol. set). Education Publ. New Delhi.
2. Dey, S. 1994. Outlines of Dairy Technology. Oxford Univ. Press, New Delhi.
3. MaCrae, R., Robinson, R.K. and Sadler, M.J. Ed. 1993. Encyclopedia of Food Science, Food Technology and Nutrition Academic Press, London.

4. Robinson, R.K. (2 vol. set). 1986. Modern Dairy Technology, Elsevier Applied Science, UK.
5. Rosenthal, I. 1991. Milk and Milk Products. VCH, New York.
6. Warner, J.M. 1976. Principles of Dairy Processing. Wiley Eastern Ltd, New Delhi.

SEMESTER V

CORE – VI (Theory) - PLANT PHYSIOLOGY- UBOT51

Credits :4 **Hours :5**

Objectives

- Have a brief knowledge on macro and micro nutrients and transpiration
- Exhibit a brief and concise knowledge on photosynthesis and electron transport system
- Acquire knowledge on nitrogen fixation and plant growth regulators
- Learn about the basic techniques in Plant physiology

UNIT – I

Absorbtion of water and minerals. Transpiration: types, mechanism of stomatal movement. Factors affecting transpiration. Gutation. Mineral nutrients: Criteria of essentiality of mineral elements and their roles. Macro - (N, P, K, Mg, Ca) and Micro (Zn, Mo, B) elements.

UNIT – II

Photosynthesis: Photosynthetic pigments, Emerson‟s enhancement effect, and Photoelectron transport and photophosporylation. Calvin cycle. CAM cycle. Factors affecting photosynthesis.

UNIT – III

Respiration: Aerobic and anaerobic respiration Glycolysis, Kreb‟s cycle, Electron transport system, Oxidative phosporylation. Factors affecting respiration.

UNIT – IV

Nitrogen fixation: Examples of biological nitrogen fixers and symbionts. Significance of nitrogen fixation in agriculture, nitrogen cycle, mechanism of biological N2 fixation.

UNIT – V

Growth: Plant growth regulators- auxins, gibberellins, cytokinins, ethylene, abscissic acid, application of plant hormones in agriculture. Physiological effects: Phototropism, vernalization and photoperiodism and Senescence.

REFERENCE

1. Pandey, S.N.1991 – Plant Physiology,Tata McGraw Hill Publishers, New Delhi.
2. Verma,V.,1991-A Text Book of Plant Physiology, Emkay Publications,NewDelhi.
3. Malik, C.P. 1999 – Plant Physiology, Kalyani Publishers, Ludhiyana.
4. Gill, D.S.2000 –Plant Physiology, S.Chand and co., New Delhi.
5. Salisbury, F.B. and Ross, C.W. 1986- Plant Physiology, CBS Publishers and Printers, New Delhi.
6. Jayaraman, J. 1992 – Techniques in Biology. A College level Study, Higginbotham‟s (Private) Ltd, Chennai.

CORE – VII (Theory)- GENETICS AND EVOLUTION- UBOT52

Credits :4 **Hours :5**

Objectives

- Understands the basics of mendelian genetics
- Know about the linkage, crossing over, chromosomal theory of inheritance
- Understand the various evolutionary concepts on diversity of life
- Acquire knowledge on gene mutation

UNIT I

Genetics-Monohybrid and Dihybrid Ratios(Mendel‟s Laws). Deviation from mendelian ratio: Incomplete dominance (Mono-and dihybrid), lethal factor, complementary factor and epistasis (dominant), Multiple factor Hypothesis, multiple alleles.

UNIT- II

Linkage, crossing over, recombination, cytological proof of crossing over, mapping of genes on the chromosomes, sex linkage-Drosophila (eye colour) and humans(colour blindness), cytoplasmic inheritance. Chromosome theory of inheritance. Sex Linked Inheritance, Sex linked diseases.

UNIT III

Sex determination in Drosphila, humans and plants – changes in chromosome structure, number and behaviour, their genetic effects, polyploidy, types.

UNIT IV

Gene action. Gene units-cistron,recon, Muton, codon and operon. Gene mutation, physical and chemical mutagens. Mutation rate –its role in evolution.

UNIT V

Evolution-Evolutionary concepts in explaining the diversity of life. Theories of Lamarck, Charles Darwin, and the modern synthetic theories.

REFERENCE

1. Winchester, A.M. (1958) : Genetics(3rd Edition) Oxford & IBH Publishing House, Calcutta, Bombay, New Delhi.
2. Chandrasekaran, S.N. & Parathasarathy , S.V. (1965) : Cytogenetics and Plant Breeding P. Varadhachari & Co., Madras.
3. Savage, J.M. (1969) : evolution (2nd Edition) Amarind Publishing (P)Ltd., New Delhi, Bombay, Calcutta, N.Y.
4. Shukla, R.S. & P.S Chandel (1996) : Cytogenetics, Evolution & Plant Breeding
5. S. Chand & Co., New Delhi.
6. Verma, P.S. & V.K . Agarwal (1999) : Concepts of Evolution S. Chand & Co., New Delhi.

CORE – VIII (Theory) - ECOLOGY AND GEOGRAPHY- UBOT53

Credits :4 **Hours :5**

Objectives

- Have a basic knowledge on components of ecosystem
- Acquire knowledge on development of vegetation
- Exhibit an idea about pollution and its control
- Understands the mega centres of biodiversity

UNIT I

Approaches to the study of ecology (Autecology and Synecology). Plant environment: climatic and edaphic factors.

UNIT II

Ecosystem Concept: Components (Abiotic and Biotic), autotrophic producers and heterotrophic consumers. Biomass. Ecological pyramids. Productivity: primary, secondary and gross, food chain, Food web and energy flow. Pond ecosystem.

UNIT III

Vegetation - Development of vegetation - migration, ecesis, colonization. Plant succession: Hydrosere and Xerosere. Ecological classification of plants and their correllation to the habitat factors.

UNIT IV

Applied Ecology: Pollution and its control, Atmospheric pollution: Air Pollution - Particulate matter, chemicals, acid rain, radiation pollution, noise pollution. Soil pollution: Industrial effluents. Agricultural pollution: plant residues, insecticides, pesticides, fungicides and herbicides. Water pollution: domestic waste and sewage.

UNIT V

Approaches to phytogeography - vegetational types of Tamilnadu: Evergreen, deciduous, scrub and mangrove Approaches to biodiversity, conservation insitu and exsitu methods. Mega centers of bio diversity.

REFERENCE

1. Ambasht R.S., 1978 The Book of Plant Ecology, Students friends Co.,.
2. Kellman, CM, 1980 Plant Geogrpahy, Methuen.
3. Sharma, P.D,1990 Ecology and Environment, Rastogi Publications.
4. Shukla, R.S and Chande I.P.S Plant Ecology and Soli Science, S. Chand & Co Ltd.,
5. Vasishta, P.C, 1979 Plant Ecology, Vishal Publication.
6. Verma, V,A 1981 Text Book of plant Ecology, Emkay Publication.
7. Sharama, J.P.2004 Environmental Studies, Laxmi Publications (P) Ltd. New Delhi.

CORE – IX (Theory)- PLANT PATHOLOGY AND MICROBIOLOGY- UBOT54

Credits :4 **Hours :5**

Objectives

- Understand the structure and reproduction of bacteria, virus and fungi
- Learn to identify the fungal species
- Have a brief and concise idea about food microbiology
- Understand the modern techniques such as fermentation technology and manufacture of ethanol and various enzymes

UNIT I

Bacteria – Morphology, ultra structure and reproduction, culture of *E. coli*, rhizospere-Mycorrhiza and its advantages, viruses – general morphology, ultra structure. Structure and replication of T2 phage, transmission of plant viruses and control. Bacteria: outline of bacterial classification-Bergey‟s manual of determinative bacteriology.Ultrastructure-Gram positive and gram negative bacteria, genetic recombination-Transformation, transduction and conjugation.

UNIT II

Fungi- Classification, life cycle, identification. Microbiology of soil-soil profile, rhizosphere, rhizoplane- bacterial - fungi interaction – VAM fungi and Biofertilizers. Edible and Poisonous Mushroom . Fungal toxins. Bioremediation.

UNIT III

Food microbiology – Milk – physical and chemical composition – pasterurisation. Dairy products – manufacture of cheese, microbial flora of fresh food. Microbial examination of food - Botulism.

UNIT IV

Industrial microbiology – fermentation technology – aerobic and anaerobic, industrial manufacture of ethanol – penicillin, vitamin B12, enzymes – cellulose, protease and lipase, amino acids.

UNIT V

Bacterial diseases: (Bacterial leaf blight- X. oryzae), Fungal diseases (Tickka diseases – Cercospora), Viral diseases (Bunchy top of Banana), Plant disesases control methods (Physical, Chemical and Biological)

REFERENCES

1. Microbiology (2005), Sixth edition by L.M. Prescott, J.P. Harley and D.A. Klein, McGraw Hill, Boston.
2. Environmental Microbiology, (2006), R.M. Maier, I.L. Pepper and C.P. Gerba, Elseiver Publication, New Delhi, India.
3. Microbiology – Diversity, Disease and the Environment, (2001), A.A. Salyers and B.D. Whitt. Fitzerald Scientific Press, Maryland.
4. Bilgrami, K. S. and Dube, H. C. (1990). A Textbook of Modern Plant Pathology. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Cooper, J. I. (1995). Viruses and the Environment. 2nd ed. Chapman & Hall, London.
6. Pandey, B. P. (1982). A Textbook of Plant Pathology, Pathogen and Plant Diseases. S. Chand and Co. Ltd., New Delhi.
7. Rangaswamy, G. (1972). Diseases of Crop Plants in India. Prentice Hall of India Pvt.Ltd.

CORE – X (Theory)- HORTICULTURE AND PLANT BREEDING- UBOT55

Credits :4 **Hours :5**

Objectives

- Understand the importance and scope of horticulture and plant breeding
- Know about plant propagation methods such as cutting, layering, grafting and budding
- Learn about lawn making and its maintenance
- Acquire a skill on floriculture

UNIT I

Horticulture: Importance and scope of Horticulture, Classification of horticultural crops – fruits, vegetables crops, climate, soil, water, nutrition needs of horticultural crops. Cultivation of important fruit trees – Mangoes and Banana.

UNIT II

Plant propagation methods, cutting, layering, grafting, budding, stock-seion relationship. Use of plant regulators in Horticulture. Garden designs, types of gardens – formal, informal and kitchen garden, units of garden.

UNIT III

Aftercare of plants : weeding, top dressing methods of pruning and topinary. hedge, border, popiary arches,.Lawn making: types of lawn grasses and maintenance. Plants suitable for hedges.

UNIT IV

Floriculture: cultivation of commercial flowers – rose and jasmines, Chrysanthemum. Nursery maintenance, Cut flowers – flower arrangement, Ikebane.

UNIT V

Principles and objectives of plant breeding, Plant introduction and acclimatization. Selection methods, plant breeding (pure line, clonal, mass) Hybridization: Types and procedure of hybridization. Somatic hybridization: Heterosis, hybrid vigor and exploitation in plant breeding. Anther culture and its role in plant breeding. Role of mutation and polyploidy in plant breeding. Artificial seed production.

REFERENCES

1. Kunte, Y.N. Introduction to principles of fruit growing – Agri – Horticultural Publishing House Dharmapath, Nagpur.
2. Hand Book of Horticulture, Dr. Chadha – ICAR Publications. 2001.
3. Fundamentals of Horticulture – Edment Senn Andrews 1994 Tata McGraw Hill Publishing Co., Ltd., Delhi.
4. A Hand Book of Trophical Plants & Gardening MacMillan 1989. Scientific Publishers Jodpur.
5. Chauduri, H.K. Elementary Principles of Plant Breeding, 1971- Oxford and IBH Co., New Delhi.
6. Singh, S.P. Lakhi Ram Singh, Srivastava, J.P. 1999 – Plant Breeding, Aman Publishing House, Meerut.
7. Singh, B.D. 2002-Plant Breeding, Kalyani Publishers, Ludhiana.

ELECTIVE III- CHOICE I-BIOREMEDIATION- UBOE53

Credits: 3 **Hours:3**

Objectives

- Understands the concepts of bioremediation
- Know about the phytoremediation
- Understand the modern techniques such as microbial leaching, bio-sensor, bio-leaching
- Have an basic idea on Hazardous waste management

UNIT I

Bioremediation- Introduction, constraints and priorities, Biostimulation of Naturally occurring microbial activities, Bioaugmentation, in situ, ex situ, intrinsic & engineered bioremediation.

UNIT II

Solid phase bioremediation - land farming, prepared beds, soil piles, Composting, Bioventing & Biosparging; Liquid phase bioremediation- suspended bioreactors, fixed biofilm reactors.

UNIT III

Hazardous Waste Management biotechnology application to hazardous waste management - examples– cyanide detoxification - detoxification of oxalate, urea etc. - toxic organics -phenols.

UNIT IV

Concept of bioremediation (in-situ & ex-situ), Bioremediation of toxic metal ions biosorption and bioaccumulation principles. Concepts of phytoremediation. Biosensors and Bioindicators.

UNIT V

Microbial leaching of ore-direct and indirect mechanisms. Mining and metal. Use of microorganisms in augmentation of petroleum recovery. Biotechnology-with special reference to Copper and Iron.

REFERENCES

1. Environmental Biotechnology by S. K. Agarwal
2. Biodegradation & Bioremediation (1999), Martin Alexander, Academic press.
3. Foster C.F., John Ware D.A., Environmental Biotechnology, Ellis Horwood Ltd.,
    a. 1987.
4. Environmental Biotechnology by A.K. Chatterjee
5. Environmental Biotechnology by S.N.Jogdand Himalaya Publishing

ELECTIVE III- CHOICE 2: HERBAL TECHNOLOGY - UBOE53

Credits: 3 **Hours:3**

Objectives

- Understands the concepts of Pharmacognosy
- To be able to identify, classify, collect and process medicinal plants
- Acquire knowledge about the uses of various medicinal plants in the treatment of illness.
- To learn the methods of processing and packaging of medicinal plants for commercial use.

Unit – I

Pharmacognosy – Definition and history, Indian systems of medicine – Siddha, ayurvedha, and Unani systems. Taxmony of locally available medicinal plants, their chemical constituents and medicinal uses – Classification of Crude drugs – Chemistry of Drugs – Future of pharmacognosy.

Unit – II

Classification of medicinal plants – Vernacular name and family – Geographical source, cultivation, collection, and processing for market and commerce in crude drugs. Morphological and histological studies, chemical constituents – Therapeutic and other pharmaceutical uses. Underground stem – ginger, Alpinia – Roots – Rauolfia – Belladona – Aerial parts – Bark – Cinchona.

Unit – III

Leaves – Adathoda, Eucalyptus – Flower – Clove fruits seeds – Nux vomica Nutmegs, Gooseberry – unorganized drugs – Gum – Acacia – Resin – Turpentine, fixed oil – castor oil.

Unit – IV

Herbal medicines for Human ailments – Drugs acting on cardiac diseases, cerebral diseases, Nasal, diseases – Blood pressure Drugs acting on Nervous system – Depressants. – stimulants – Respiration and Drugs – Urogenital system and drugs –Psychoactive plants.

Unit – V

Propagation of medicinal plants – Micro and macro propagation conservation of rare medicinal and aromatic plants – Drug adulteration- methods of Drug evaluation, Herbal food – Food processing – packaging – Herbal sale and Export of medicinal plants – marketing – Intellectual property rights – Export laws.

References

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan

Publishers, New Delhi.
3. Jain, S.K (1980) Indian Medicinal plants.
4. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition – Nirali Prakasham Publishers, Pune.
5. Kumar N.C. (1993) An Introduction to Medical Botany and Pharmacognory.
6. Nadkarni (1981) Indian Materia Medica.
7. Shah, S.C. and Qudary (1990) A text book of Pharmacognosy.
8. Wallis, T.E, Text book of phamacognosy by 5th edition. CBS publishers and distributors, New Delhi.

SKILL BASED STUDIES III –BIOFERTILISER AND BIODEGRADABLE WASTE MANAGEMENT- UBOS53

Credits:2 **Hours:2**

Objectives

- Acquire a skill on production of biofertillizers
- Understand the Processing techniques and recovery of energy
- Have a concise idea on municipal solid waste
- Learn to prepare Farm Yard Manure and Green Leaf Manure

UNIT I

Mass production of Cyanobacterial Biofertilizers -- Nostoc, Anabaena Azolla. Blue green algae. Bacterial Biofertilizers -Azotobacter, Azospirillum ,Rhizobium ,Pseudomonas

UNIT II

Manures: leaf moulds, composts Form Yard Manure , Oil seed cakes (Castor and neem) Green leaf manures, Vermi-Compost, Agro-industrial wastes, Seed and leaf sprays.

UNIT III

Municipal solid waste -Sources and types of solid waste- composition and its determinants of Solid waste-factors influencing its generation.

UNIT IV

Processing Techniques and Recovery of Energy. Recovery of Resources, energy conversion products and energy recovery.

UNIT V

Disposal of Solid Wastes- Refuse disposal – various methods , sanitary landfill- methods of operation – advantages and disadvantages of sanitary land fill .

REFERENCE

1. N.S. Subba Rao – Soil Microorganisms and Plant growth.
2. N.S. Subba Rao – Biofertilizers.
3. Alexander 1977. Introduction to soil microorganisms and plant growth
4. George Techobanoglous et al, Integrated Solid Waste Management, McGraw- Hill, 1993.
5. Principles of Ecology- P.S.Verma, V.K.Agarwal.S.Chand & Company (Pvt) LTD 1989.
6. Richard, Tom; Nancy Trautmann. Cornell composting: composting in schools 2007.

SEMESTER VI

CORE XI (Theory)- PLANT EMBRYOLOGY- UBOT61

Credits :4 **Hours :5**

Objectives

- Have knowledge on physiological and genetic aspects of ecological adaptations of plants.
- To understand the basis of development of gametes.
- Able to identify the reproductive parts of a plant.
- Describe the function of each part of the plant.

UNIT I

Embryology: Microsporangium,Microsporogensis, structure and function of wall layers,ultra functional changes in tapetum and meiocytes, role of callose, role of tapetum in pollen development, microgametogenesis development of male gametophyte. Anther culture and haploid plants.

UNIT II

Megasporangium (ovule) – types and evolution, megasporogenesis, embroyosac types, structure of egg,synergids, antipodal cells.

UNIT III

Pollination: structure and histochemical details of style and stigma. Agents for pollination, Self and interspecific incompatibility. Barriers to fertilization, methods of overcoming incompatibilities. In-vitro pollination and its uses.

UNIT IV

Fertilization: discharge and movement of sperms, syngamy and triple fusion, post fertilization changes in embyosac. Endosperm: Development types, haustoria, cytology and function of endosperm. Basic concepts of apomixis, apospory, Polyembryony and Parthenogenesis

UNIT V

Embryo : embryogenic types and embryo culture. Polyembryony: types, natural, induced, importance.Apomixis : Type and importance.Role of embryology in plant breeding. Embryogenesis in Dicot and Monocot; Polyembryony, Structure of Dicot and Monocot seed, Fruit types; Dispersal mechanisms in fruits and seeds.

REFERENCES

1 Diversity and classification of Flowering Plants- Takhtajan, Columbia Univ. Press, New York.
2 An introduction to Embryology of Angiosperm - P. Maheshwari, New Delhi.
3 Recent Advances in the Embryology of Angiosperms-P. Maheshwari, New Delhi.
4 The embryology of Angrosperms - Bhajwani and Bhatnagar, Vikas Pub. House, New Delhi.Syllabus/Botony / 11
5 Taxonomy of Angiosperms - V.N. Nair, TMH Publishing Comp. Ltd., New Delhi.
6 Taxonomy of Angiosperms - Kshetrapal and Tyagi, RBD Pub., Jaipur.
7 Introduction to Principles of Plant Taxonomy-Sivarajan, Oxford & IBH Publishing Co., New Delhi.
8 Plant Systematics - Gurcharan Singh, Oxford & IBH Publishing Co. New Delhi.
9 Morphology of Vascular Plants - A.J. Eames, Tata McGraw Hill Publ. Co. Ltd., New Delhi.
10 An introduction to Taxonomy of Angiosperms - Shukla and Mishra, Vikas Publ. House Pvt. Ltd., New Delhi.

CORE XII (Theory)- BIOSTATISTICS, BIOINSTRUMENTATION AND BIOPHYSICS-UBOT62

Credits :4 **Hours :5**

Objectives

- Have a basic idea on data collection, Sampling, classification, tabulation and graphical representation.
- Know about the technique "Correlation and Regression"
- Understands the Principle and application of various types of microscope
- Know the principles and application of chromatography and electrophoresis.
- Acquire a basic knowledge on biological physics

UNIT I

Data collection, Sampling, classification, tabulation and graphical representation, rounding off and significance of figures, frequency distribution. Measures of central tendency, mean, median and mode, deviation, average deviation, variance, standard deviation and standard error.

UNIT II

Correlation and regression – Explanation – Types of correlation – Positive and negative correlation – Methods of studying Correlation using Karl Pearsons Coefficient of correlation. chi square test and student‟s T- test. Analysis of Variance.

UNIT III

Electrochemistry: pH and buffers, potentiometric and conductometric titration. Principle and application of light, phase contrast, fluorescence, scanning and transmission electron microscopy, cytophotometry and flow cytometry. Centrifugation: Basic principle and application; Differential, density and Ultracentrifugation.

UNIT IV

Colorimetry – parts and their functions – Beer Lambert‟s Law – Spectroscopy – , UV, visible, spectroscopy. Principle, methodology and applications of Thin layer chromatography; HPLC. Electrophoresis: Principle and applications of Native, SDS and Agarose.

UNIT III

Photobiology - Electromagnetic Spectrum – Light emission- Fluorescence – Phosphorescence – delayed light emission –Bioluminescence. Bioenergetics - Energy and work. Laws of thermodynamics –High energy compounds – ATP bioenergetics.

REFERENCES

1. Analytical Biochemistry & Separation Techniques – Palanivelu.P, 2001, 2nd edition.

2. Fundamental Laboratory & Approach for Biochemistry & Biotechnology – Alexander.J Ninfa, 2nd edition.
3. Casey, E. J. (1962). Biophysics: Concepts and Mechanics. Van Nostrand Reinhold Co. and East-West Press, New Delhi.
4. Salil Bose, S. (1982). Elementary Biophysics. Vijaya Printers, Madurai.

CORE XIII (Theory)- PLANT BIOTECHNOLOGY- UBOT63

Credits :4 **Hours :5**

Objectives

- Understand the plant genome organization
- Learn about the genetically engineered plants
- Acquire a basic knowledge on Plant tissue culture and biogas production
- Learn about the advance techniques in plant biotechnology

UNIT I

Plant genome organization – structure of representative plant genes and gene families in plant – organization of chloroplast genome – organization of mitochondrial genome .

UNIT II

Molecular biology and gene rearrangement – Agrobacterium and crown gall tumors – mechanism of T-DNA transfer to plant – Ti plasmid vectors and its utility – plant viral vectors – symbiotic nitrogen fixation in Rhizobia.

UNIT III

Genetic engineering of plants – construction of genome libraries and cDNA libraries Molecular breeding – probe construction – recombinant DNA – Transgenic plant and applications.

UNIT IV

Plant hormones-Auxin, IAA, GA, Cytokinins and Absicisic acid (ABA) - molecular basis of action – phytochrome – role in photo – morphogenesis – regulation of gene expression - stress induced promoter switches in the control of gene expression – ethylene and fruit ripening.

UNIT V

Plant tissue culture – cells suspension cultures– haploid plants – cloning of hosts – micro propagation – somatic embryogenesis – protoplast isolation and applications.

REFERENCES

1. Kojima, Lee, H. and Kun, Y.2001 Photosynthetic microorganisms in Environmental Biotechnology. Springer – Verlag.

2. Trivedi, P.C.2000 Applied Biotechnology and plant genetics, Dominant publishers and distribution.
3. Ignacimuthu , 1996. Applied plant Biotechnology. Tata McGraw – Hill.
4. Grierson and Convey, S.N. 1988. Plant molecular Biology., Backie.
5. Narayanaswamy. S. 1994. Plant cell and tissue culture . Tata McGraw Hill publishing company limited, New Delhi.

CORE PRACTICALS III – LAB IN PLANT ANATOMY AND PHYSIOLOGY - UBOP63

Credits :4 **Hours :5**

Objectives

- Learn about the sectioning of Dicot stem, Dicot root, Monocot Stem and Monocot root.
- Understand the basic knowledge on measurement of rate of photosynthesis and respiration
- Understand the determination of water absorption and transpiration
- Explore the basic knowledge on techniques on plant physiology

1. Study of primary structure and sectioning of Dicot stem, Dicot root, Monocot Stem and Monocot root.
2. Normal secondary thickening in Dicot stem and root.
3. Anomalous secondary structures – Bignonia Boerhaavia, Nyctanthes
4. T.S of Anther and ovule
5. Determination of water absorbtion and transpiration ratio of twigs.
6. Effect of light intensity on transpiration using Ganong‟s Potometer.
7. Rate of photosynthesis under varying concentration of CO2 water plants-Wilmott‟s bubbler.
8. Effect of intensity of light on O2 evolution during photosynthesis using Wilmott‟s bubbler.
9. Measurement of rate of respiration in germinating seeds, flower buds using simple Respiroscope.

REFERENCES

1. Pandey, S.N.1991 – Plant Physiology,Tata McGraw Hill Publishers, New Delhi.
2. Verma,V.,1991-A Text Book of Plant Physiology, Emkay Publications,NewDelhi.
3. Malik, C.P. 1999 – Plant Physiology, Kalyani Publishers, Ludhiyana.
4. Gill, D.S.2000 –Plant Physiology, S.Chand and co., New Delhi.
5. Salisbury, F.B. and Ross, C.W. 1986- Plant Physiology, CBS Publishers and Printers, New Delhi.
6. Jayaraman, J. 1992 – Techniques in Biology. A College level Study, Higginbotham‟s (Private) Ltd, Chennai.
7. Winchester, A.M. (1958) : Genetics(3rd Edition) Oxford & IBH Publishing House, Calcutta, Bombay, New Delhi.

CORE PRACTICALS IV– LAB IN PLANT PATHOLOGY AND MICROBIOLOGY-UBOP64

Credits :4 **Hours :5**

Objectives

- Understands the disease symptoms, causal organism, and transmission and control measures of various plant diseases.
- Able to identify morphological characteristics of mould fungi
- Acquire knowledge about staining techniques
- Through knowledge on basic techniques of Microbiology

1. Study of the disease symptoms, causal organism, and transmission and control measures of the following plant diseases.
   - Viral Diseases – Bunchy top of Banana
   - Bacterial Disease – Citrus canker
   - Fungal Disease – Red rot of Sugar cane
2. Preparation of non-selective and selective media; enumeration of bacteria and fungi from soil and water.
3. Isolation of pathogenic microorganisms from infected tissue
4. Observation of morphological characteristics of mould fungi
5. Staining methods: Preparation of smears for stains, simple staining , negative staining, gram staining;

REFERENCES

1. Microbiology (2005), Sixth edition by L.M. Prescott, J.P. Harley and D.A. Klein, McGraw Hill, Boston.
2. Environmental Microbiology, (2006), R.M. Maier, I.L. Pepper and C.P. Gerba, Elseiver Publication, New Delhi, India.
3. Microbiology – Diversity, Disease and the Environment, (2001), A.A. Salyers and B.D. Whitt. Fitzerald Scientific Press, Maryland.
4. Bilgrami, K. S. and Dube, H. C. (1990). A Textbook of Modern Plant Pathology. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Cooper, J. I. (1995). Viruses and the Environment. 2nd ed. Chapman & Hall, London.
6. Pandey, B. P. (1982). A Textbook of Plant Pathology, Pathogen and Plant Diseases. S. Chand and Co. Ltd., New Delhi.
7. •Rangaswamy, G. (1972). Diseases of Crop Plants in India. Prentice Hall of India Pvt.Ltd.

ELECTIVE IV-CHOICE 1 :SIVICULTURE- UBOE64

Credits: 3 **Hours:3**

Objectives

- Acquire knowledge on composition and structure of forest.
- To know the techniques in establishment, growth and quality of forest vegetation.
- Understand the role of forests in environmental sustenance.
- Learn about the manipulations in management and establishment of forest vegetation.

UNIT I

Definition, objectives and scope of Silviculture. Status of forests in India and their role. General Silvicultural Principles : methods of propagation, grafting techniques; site factors; nursery and planting techniques-nursery beds, polybags and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending.

UNIT II

Introduction to trees and their general classification under different forest types. Important tree families and their peculiar characters. Types of trees and canopy structure. Coniferous and broad leaved tree species. Trees in tropical, sub-tropica, temperate and alpine regions.

UNIT III

Forests Soils, classification, factors affecting soil formation; physical, chemical and biological properties. Soil conservation - definition, causes for erosion; types - wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; Role of forests in conserving soils.

UNIT IV

Forest Management and Management Systems : Objective and principles; techniques; stand structure and dynamics, sustained yield relation; rotation, normal forest, growing stock; regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches viz., (i) site-specific planning, (ii) strategic planning, (iii) Approval, sanction and expenditure, (iv) Monitoring (v) Reporting and governance.

UNIT V

Injuries to forest - abiotic and biotic, destructive agencies, insect-pests and disease.

Role of afforestation and forest regeneration in absorption of CO2. effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, live fencing, shifting cultivation and control.

REFERENCES

1. Dwivedi, A. P. 1992. Principles and Practice of Indian Silviculture, Surya Publication, 420p.
2. Shiva, M.P. A Handbook of Systematic Botany, 1986.IBD Publisher, Dehradun.
3. Sagreiya, K.P. Forests and Forestry, 1997. National Book Trust India.
4. Khanna, L. S. 1984.Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun. P. 476.
5. Ram Prakash and L.S. Khanna. 1991. Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun. 298p.
6. Dwivedi, A.P. 1993. A Text Book of Silviculture, International Book Distributors, Dehradun.

ELECTIVE IV- BIODIVERSITY AND CONSERVATION - UBOE64

Credits: 3 **Hours:3**

Objectives

- To know the basics concepts of Biodiversity and its conservation.
- To understand the principle and approaches of conservation.
- Learn about the Insitu and Exsitu conservation methods.
- Acquire knowledge on Environment assessment and monitoring.

Unit 1

Biodiversity and Conservation: Catergories of biodiversity – species concepts: keystone, flagship, dominant and co-dominant species – Biogeography: Major terrestrial biomes – theory of island biogeography – Biogeographical zones of India – Principles and approaches of conservation – In-situ conservation: National parks, Wildlife Sanctuaries, Biosphere reserves – Ex-situ conservation: Botanical and herbal gardens, zoological parks, seed orchards and gene banks.

Unit II

Values of biodiversity-ecosystem services- screening plants for medicines- New agricultural and industrial products from the tropics- identifying and protecting the origin of food crops.

Speciation- species area relationship: productivity- diversity relationship - Biodiversity hot spot.

Unit III

The effect of global climatic change on natural communities- IUCN categories of extinction- red data book – causes for species extinction – impact of exotic species on native species – GMOs and biosafety – Intellectual property rights- GATT,WTO, farmers and breeders rights- Bodiversity act -2002.

Unit IV

Remote sensing : Introduction-Analysis techniques-Digital image processing Role of remote sensing in biodiversity management-GIS and biodiversity, landscape elements Oceans colour and fishery, water security. Environment assessment and monitoring.

Unit V

Conservation: In situ and Ex situ conservation methods- conservation of biological diversity in Botaniocal gardens- Information management for the conservation of biodiversity. Cryobiology-

Agro ecology and in situ conservation of native crop diversity- International development and the protection of biodiversity

References:

1. Stiling, P. 2002. Ecology – Theory and applications. Prentice-Hall of India Pvt. Ltd., New Delhi.

2. Gurevitch,J.,Scheiner S.M and Fox G.A. 2002. The Ecology of Plants. Sinauer Associates Inc Publishers, Massachusetts.

3. Cunningham, W.P. and Cunningham, M.A.2002. Principals of environmental science. Tata McGraw-Hill Publishing Company Ltd., New Delhi.

4. Agarwal, K.C. 2000 Biodiversity. Agrobios (India). Jodhpur.

5. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Company, London.

6. Colinvaux, P.1986. Ecology John Wiley and sons, Singapore.

7. Krishnamoorthy, K.V. 2004 An advanced Text Book of Biodiversity. Oxford & IBH Publishing Co, Pvt. Ltd., New Delhi.

8. Meffe, G.K. and Carrol, R.C. 1994. Principles of Conservation of Biology, Sinauer Associates, Inc., Publishers, Saund

9. Jeffries, M.J. and M.J. Jeffries. 2005. Biodiversity and Conservation, Routledge Taylor & Francis Group, UK.

SKILL BASED STUDIES IV-MEDICINAL & AROMATIC PLANTS- UBOS64

Credits:2 **Hours:2**

Objectives

- Know about the Indian systems of medicine
- Learn about the therapeutic and other Pharmaceutical uses of various plants
- Acquire knowledge about nursery techniques.
- Can understand the effects of plant drugs to our system

UNIT I

Pharmacognosy - Definition and History. A general account of different survey of Different systems of Medicines - Indian systems of medicine - Siddha Ayurveda and Unani systems. Classification of drugs (elementary). Chemistry of Drugs(Basics).

UNIT II

Morphological and Histological studies - Chemical constituents. Therapeutic and other Pharmaceutical uses of Bark - Cinchona, Leaves - Adathoda and Eucalyptus, Flower - Clove. ,Root-vetivera zizonoids

UNIT III

Fruits and seed - Wood apple, Goosberry and Poppy seed, Underground stem - Ginger, Unorganized drugs. Gum - Acacia, Resin - Turpentine, Fixed oil - Castor oil.

UNIT IV

A brief account of the following : a) Drugs acting on the Central Nervous system b)Drugs used in the disorders of the Gastro Intestinal tract and c) Cardio Vascular drugs. Methods of preparing poultices, decoctions, powders, tinctures, active content rich extracts, etc.

UNIT V

Climatic and soil requirements for cultivation, propagation and nursery techniques, transplanting and after care, nutritional and water requirements, Harvesting, drying, grading and storage of medicinal plants. Different methods of essential oil extraction and their drying and storage.

REFERENCES

1. Chadha, K.L. 2001. Hand Book of Horticulture. ICAR Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi.
2. Farooqi, A.A. and B.S. Sreeramu. 2001. Cultivation of Medicinal and Aromatic Crops.Universities Press (India) Ltd. 3-5-819, Hyderguda, Hyderabad – 29.
3. Kumar, N., J.B. Md. Abdul Khadar, P. Rangaswamy and I. Irulappan. 1982. Introduction to spices, plantation crops, medicinal and aromatic plants. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Shanmugavelu, K.G., N. Kumar and K.V. Peter. 2002. Production Technology of Spices and Plantation Crops. Agrobios Publications, Bikenar, Rajasthan.