MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. Botany

(Choice Based Credit System)

(With effect from the academic year 2017-2018 onwards)

Sem	Pt	Sub No	Subject Status	Subject Title	Con Tact Hrs/wk	L Hrs/ wk	P Hrs/ wk	Credits
I	I	1	Language	Tamil/Other Languages	6	6	0	4
	II	2	Language	English	6	6	0	4
	III	3	Core – Paper I	Plant Anatomy & Microtechniques	4	4	0	4
	III	4	Core – Paper II	Algae & Bryophytes	4	4	0	4
	III	5	Major Practical I	Plant Anatomy, Microtechniques, Algae & Bryophytes	2	0	2	2
	III	6	Allied I Paper – 1	Plant Diversity and Medicinal Botany	4	4	0	3
	III	7	Allied Practical-1		2	0	2	2
	IV	8	Common	Environmental Studies	2	2	0	2
				Subtotal	**30**	**26**	**4**	**25**
II	I	9	Language	Tamil/Other Languages	6	6	0	4
	II	10	Language	English	6	6	0	4
	III	11	Core – Paper III	Fungi, Plant Pathology and Lichenology	4	4	0	4
	III	12	Core – Paper IV	Cell Biology & Embryology of Angiosperms	4	4	0	4
	III	13	Major Practical 2	Fungi, Plant Pathology, Lichenology, Cell Biology & Embryology of Angiosperms	2	0	2	2
	III	14	Allied 1 Paper – II	Embryology, Plant anatomy, Physiology and Biotechnology	4	4	0	3
	III	15	Allied Practical-2		2	0	2	2
	IV	16	Common	Social Value Education	2	2	0	2
				Subtotal	**30**	**26**	**4**	**25**
III	I	17	Language	Tamil/Other Languages	6	6	0	4
	II	18	Language	English	6	6	0	4
	III	19	Core – Paper V	Pteridophytes, Gymnosperms &Paleobotany	4	4	0	4
	III	20	Major Practical 3	Pteridophytes, Gymnosperms &Paleobotany	2	0	2	2
	III	21	Allied - II		4	4	0	3
	III	22	Allied Practical II		2	0	2	2

	III	23	Skilled Based Core	Mushroom Cultivation/Preservation of Fruits and Vegetables	4	4	0	4
	IV	24	Non-Major Elective	Gardening and Garden Management/ Herbal Medicine	2	2	0	2
				Subtotal	**30**	**26**	**4**	**25**
IV	I	25	Language	Tamil/Other Languages	6	6	0	4
	II	26	Language	English	6	6	0	4
	III	27	Core – Paper VI	Microbiology & Techniques in Biology	4	4	0	4
	III	28	Major Practical 4	Microbiology & Techniques in Biology	2	0	2	2
	III	29	Allied - II		4	4	0	3
	III	30	Allied Practical II		2	0	2	2
	IV	31	Skilled Based II	Personality Development and Yoga	4	4	0	4
	IV	32	Non-Major Elective	Food and Nutrition/Botany for Competitive Examination	2	2	0	2
	V	33	Extension Activity	NCC/NSS/YRC/YWF	-	-	-	1
				Subtotal	**30**	**26**	**4**	**26**
V	III	34	Core – Paper VII	Morphology and Taxonomy of Angiosperms & Economic Botany	6	6	0	4
	III	35	Core – Paper VIII	Biochemistry & Bioinformatics	6	6	0	4
	III	36	Major Elective-1	Plant Biotechnology & Genetic Engineering/Environmental Biotechnology	5	5	0	4
	III	37	Major Elective - 2	Horticulture and Plant Breeding/Forestry	5	5	0	4
	III	38	Major Practical V, VI	Morphology and Taxonomy of Angiosperms, Economic Botany Biochemistry, Bioinformatics and Electives I & II	6	0	6	4
	IV	39	Skill Based III Common	Computer	2	2	0	2
				Subtotal	30	22	8	22
VI	III	40	Core Paper IX	Plant Physiology	6	6	0	4
	III	41	Core Paper X	Genetics, Evolution and Biostatistics	6	6	0	4
	III	42	Core Paper XI	Plant Ecology & Phytogeography	5	5	0	4
	III	43	Major Practical VII, VIII and IX	Plant Physiology, Genetics, Evolution, Biostatistics, Plant Ecology & Phytogeography	8	0	8	6
	III		Group Project		5			4
Subtotal					30	17	13	22
Grand Total					180	143	37	145

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester – I / Core – I

PLANT ANATOMY AND MICRO TECHNIQUES
(4 hrs/week)

UNIT –I **12Hrs**

Meristems – Characteristics of meristematic tissues – Types, functions and Theories of meristems. Structure and functions of simple and permanent tissues – parenchyma, collenchyma, sclerenchyma, xylem and phloem.

UNIT – II **12Hrs**

Structure of dicot stem and root, structure of monocot stem and root, structure of dicot and monocot leaves.

UNIT – III **12Hrs**

Normal secondary thickening in dicot stem and root, anomalous secondary growth in the stem of *Boerhaavia*and *Dracaena*.

UNIT – IV **12Hrs**

Nodal anatomy: Types of nodes – unilocular, trilocular and multilocular; leaf traces and leaf gaps; epidermal tissue system: stomatal types, hair, trichomes and glands.

UNIT – V **12Hrs**

Microscopy: Principle and working of simple and compound light microscopes and electron microscope (TEM only). Micro techniques – simple staining, double staining and preparation of permanent slides – Maceration

PRACTICALS:

1. To observe and identify the following slides showing
   a. Meristems – shoot apex and root apex
   b. Simple tissues
   c. Xylem elements
2. Primary structure of stem, root and leaves of dicot and monocot plant.
3. Normal secondary thickening in dicot stem and root.
4. Anomalous secondary growth in *Boerhaavia* and *Dracaena*.
5. Maceration technique (Xylem elements only)
6. Demonstration: Preparation of double stained permanent slides.

ALGAE AND BRYOPHYTES
(4 hrs/week)

UNIT –I **12Hrs**

General characters and classification of Algae based on Fritsch (1945), life cycle patterns of Algae, systematic position, distribution, structure, reproduction and life history of *Volvox* and *Caulerpa* .

UNIT – II **12Hrs**

Systematic position, distribution, structure, reproduction and life history of *Chara, Sargassum* and *Gracilaria*.

UNIT – III **12Hrs**

Seaweed cultivation – *Gracilaria*; Methods of extraction and uses of agar-agar and carrageenin; Economic importance of Algae.

UNIT – IV **12Hrs**

Morphology, mass culture and nutritive importance of *Spirulina*; Morphology, mass culture and economic importance of *Nostoc.*

UNIT – V **12Hrs**

General characters and classification of Bryophytes by Rothmaler (1951); systematic position, distribution, structure, reproduction and life history of *Marchantia.*

PRACTICALS

1. Study of morphology of the Algae and Bryophytes prescribed in the syllabus.
2. Make suitable micro preparations of the following:
   a. *Caulerpa*– Rhizomeb. *Sargassum* - Stipe, leaf
   c. *Gracilaria*–Thallus with cystocarpd. *Marchantia* – Thallus.
3. Observe and identify the microslides
   a. *Volvox* - Vegetative colony, colony with daughter colonies and sexorgans.
   b. *Chara* - Sex organs
   c. *Sargassum* - Male and female conceptacles
   d. *Gracilaria* - Thallus with cystocarp.
   e. *Marchantia* – V.S of Gemma cup, V.S of Antheridiophore, V.S of Archegoniophore, V.S of Sporophyte
   f. Algal Slides/ Tablet - *Spirulina, Nostoc*; BGA – fertilizer (packet);.
4. Field trip of minimum one day.

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester – I / Allied – I

Semester I / III

PLANT DIVERSITY AND MEDICINAL BOTANY

4hrs/week

UNIT – I

General characters and economic importance of Algae – Distribution, Structure and Life History of Volvox; General characters and economic importance of Fungi – Distribution, Structure and Life History of Polyporus

UNIT – II

General characters and classification of Lichens; Structure and Reproduction of Usnea. General characters of Bryophytes; Structure, Reproduction and Life History of Funaria.

UNIT – III

General characters of Pteridophytes; Structure, Reproduction and Life History of Lycopodium. General characteristics of Gymnosperms ; Structure, Reproduction and Life History of Pinus.

UNIT – IV

Bentham and Hooker's system of classification; Critical study of the following families: Rutaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.

UNIT – V

Study of the following plants with reference to the morphology of the useful parts and their medicinal importance: *Aloe vera, Piper nigrum, Phyllanthusamarus, Coleus amboinicus*and *Catharanthusroseus,*.

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester – I / Allied Practical – I

Practical's

1. Assign the given plant to its family, giving reasons.
2. Dissect out and draw the floral parts of the plants belong to the families prescribed in the syllabus.
3. Make suitable micropreparations of Lycopodium stem, Pinus needle.
4. Identify and record the medicinal values and morphology of the useful parts of the plants prescribed in the syllabus.
5. Observe and identify the following specimens: Polyporus, Funaria, Lycopodium and Pinus –male and female cone.
6. Identify the slides showing mature anther, ovule, dicot embryo, Volvox, Nostoc, Yeast, Lycopodium - cone L.S and Funaria -capsule L.S.

FUNGI, PLANT PATHOLOGY AND LICHENOLOGY
(4 hrs/week)

UNIT I **12Hrs**

General characters and classification of fungi based on Alexopoulous (1962). occurrence, systematic position, structure, reproduction and life cycle of *Albugo* and *Mucor*.

UNIT II **12Hrs**

Occurrence, systematic position, structure, reproduction and life cycle of *Peziza* and *Puccinia*. Economic importance of fungi: Role of fungi in medicine, industry, agriculture, food and food products.

UNIT III **12Hrs**

Study of the following plant diseases with special reference to the symptoms, etiology, dissemination and control measures: Tikka disease of groundnut, Red rot of sugarcane; Paddy blast.

UNIT IV **12Hrs**

Study of the following plant diseases with special reference to the symptoms, etiology, dissemination and control measures: Citrus canker, Bunchy top disease of Banana and Tobacco Mosaic viral disease.

UNIT V **12Hrs**

Lichens: General account, types and economic importance of Lichens. Structure and reproduction with special reference to *Usnea*.

PRACTICALS

1. Micro preparation and identification of *Peziza*, *Puccinia* and Lichen thallus.
2. Spotters:
   i. Slides - *Albugo*, *Mucor*, *Usnea*- VS of apothecium, Puccinia – Uredosorus andTeleutosorus
   ii. Disease infected leaves showing Albugo and Puccinia; *Usnea* habit
   iii. Observe and identify thefollowing Plant diseases.
      a. Tikka disease of Groundnut
      b. Red Rot of Sugarcane
      c. Paddy Blast
      d. Citrus Canker
      e. Bunchy Top of Banana
      f. Tobacco Mosaic Viral disease
5. Maintain a record note book.

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester – II / Core - 4

CELL BIOLOGY & EMBRYOLOGY OF ANGIOSPERMS
(4 hrs/week)

UNIT I
Cell Biology: Structure ofa Plant cell – prokaryotic and eukaryotic cell, structure and functions of cell wall, plasma membrane, endoplasmic reticulum and ribosome.

UNIT II
Structure and functionsof Mitochondria, Chloroplast, Nucleus, Chromosome.

UNIT III
Non-living inclusions - cystolith, raphides, starch grains.
Cell Division: Mitosis and Meiosis.

UNIT IV
Embryology : Structure of Microsporoangium, microsporogenesis, development of male gametophyte. Types and structure of megasporangium, Megasporogenesis, development of female gametophyte, Types of embryo sac:Monosporic – Polygonum type; Bisporic – Allium type; Tetra sporic - Peperomia type

UNIT V
Double fertilization, types of endosperm – nuclear, cellular and helobial; Ruminate endosperm.Structure and Development of dicot embryo (Capsella) and Polyembryony.

PRACTICALS

Cell Biology

1. Mitosis using Onion roots.
2. Electro micrographs of cell organelles – Chloroplast, Mitochondria and Nucleus.
3. Non-living inclusions – Starch grains, Cystolith and Raphides.

Embryology of Angiosperms

1. Dissect out any one stage of embryo.
2. Identification of slides/specimen/photographs showing the C.S of mature anther, Ovules-orthotropous and anatropous; dicot embryo and Polyembryony
3. Specimen – Ruminate endosperm

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester-II / Allied –II

Semester II/IV
EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY
4hrs/week

UNIT – I
Structure and development of microsporangium; Structure, types and development of megasporangium; Development of male and female gametophyte; Double fertilization, Endosperm – types, Structure of dicot embryo.

UNIT – II
Meristem - Structure and classification. Simple tissues, complex tissues; Primary structure of **Dicot** and Monocot stem and root;Structure of leaf; Normal secondary thickening in dicot stem.

UNIT – III
Absorption of water – diffusion, osmosis, imbibition, mechanism of absorption of water; Ascent of sap – (cohesion theory only); Transpiration – Types, Mechanism of stomatal transpiration (Starch – sugar hypothesis); Photosynthesis importance of photosynthesis, Mechanism of Photosynthesis – Light and dark reaction (Calvin cycle).

UNIT – IV
Nostoc - Morphology, Use as Biofertilizerand Mass cultivation; Structure,multiplication (budding and fission) and Mass culture of Yeast.

UNIT – V
Tissue Culture – Scope and importance - totipotency, Nutrient media(M.S medium) Callus and Meristem Culture; Applications of plant tissue culture.

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc.Botany) / Semester – II /
Allied Practical –II

PRACTICAL – 2

EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY

1) Dissect out young embryo from *Tridax* flower bud.

2) Make suitable micro-preparations of dicot and monocot stem, root and leaf.

3) Demonstrate the physiology experimental set up –Potato osmoscope, Ganong's light screen, Bell jar experiment

4)) Identify the Photograph/ Slide/ Specimen/setup - (i) *Nostoc* (ii) (ii) Yeast (iii) Callus culture, (iv) Meristem culture.

6) Maintain a record note book for external and internal evaluation.

MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES
B.Sc. Botany
(Choice Based Credit System)
(With effect from the academic year 2017 -2018)

III	I	17	Language	Tamil/Other Languages	6	6	0	4
	II	18	Language	English	6	6	0	4
	III	19	Core Paper V	Pteridophytes, Gymnosperms &Paleobotany	4	4	0	4
	III	20	Major Practical 3	Pteridophytes, Gymnosperms &Paleobotany	2	0	2	1
	III	21	Allied – II PaperI		4	4	0	3
	III	22	Allied Practical II		2	0	2	1
	III	23	Skill Based Core I	Mushroom Cultivation/ Organic Farming	4	4	0	4
	IV		Common	Yoga	2	2	0	2
	IV	24	Non-Major Elective I		2	2	0	2
				Subtotal	**32***	**28**	**4**	**25**
IV	I	25	Language	Tamil/Other Languages	6	6	0	4
	II	26	Language	English	6	6	0	4
	III	27	Core Paper VI	Microbiology & Techniques in Biology	4	4	0	4
	III	28	Major Practical 4	Microbiology & Techniques in Biology	2	0	2	1
	III	29	Allied – II Paper II		4	4	0	3
	III	30	Allied Practical II		2	0	2	1
	IV	31	Skill Based Core II	Floriculture/ Preservation of Fruits and Vegetables	4	4	0	4
	IV	32	Non-Major Elective II		2	2	0	2
	IV		Part IV	Common-Computers for Digital Era	2	2	0	2
	V	33	Extension Activity	NCC/NSS/YRC/YWF	-	-	-	1
				Subtotal	**32***	**28**	**4**	**26**

V	III	34	Core Paper VII	Morphology & Taxonomy of Angiosperms	5	5	0	4
	III	35	Core Paper VIII	Biochemistry & Biophysics	5	5	0	4
	III	36	Major Elective-1	Plant Biotechnology & Genetic Engineering/Environmental Biotechnology	5	5	0	4
	III	37	Major Elective - 2	Horticulture and Plant Breeding/Forestry	5	5	0	4
	III	38	Major Practical V	Morphology and Taxonomy of Angiosperms & Elective II	3+1	0	3+1	2
			Major Practical VI	Biochemistry, Biophysics and Elective I	3+1	0	3+1	2
	IV	39	Skill Based Common	Personality Development/Effective Communication/Youth Leadership	2	2	0	2
				Subtotal	30	22	**8**	22
VI	III	40	Core Paper IX	Plant Physiology	5	5	0	4
	III	41	Core Paper X	Genetics, Evolution and Biostatistics	5	5	0	4
	III	42	Major Elective 3	Plant Ecology & Phytogeography / Marine Biotechnology	5	5	0	4
	III	43	Major Practical VII	Plant Physiology& Elective III	3+1	0	3+1	2
			Major Practical VIII	Genetics, Evolution, Biostatistics	2	0	2	1
	III		Group Project		9		9	6
Subtotal					30	15	**15**	21
Grand Total					**184***	**145**	**39**	**140**

* Extra hour classes can be arranged for Common Yoga / Computers for Digital Era

MSU/2017-2018/B.Sc. Botany/Semester-III/Core Paper – 5
PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY
(4hrs/week)

Preamble: **LTPC**

4 0 0 4

Knowledge on cryptogams and phanerogams and primary information about fossil record is a prerequisite. It provides a thorough knowledge about the diversity, structural organization and reproduction of Pteridophytes and Gymnosperms. It also makes the students aware ofthe preserved vestiges of plant life of the geological past.

UNIIT I **(12L)**

Pteridophytes:

General Characteristics and Classification of Pteridophytes (Sporne 1966), *Psilotum*and *Lycopodium*: Distribution, Systematic Position, Structure, Reproduction and Life History (need not study the development of gametophyte, sex organs and sporophyte).

UNIT II **(11L)**

Adiantum*, *Marsilea: Occurrence, Systematic Position, Structure, Reproduction and Life Cycle (need not study the development of gametophytes, sex organ and sporophyte), Stelar Evolution in Pteridophytes.

UNIT III **(13L)**

Gymnosperms:

General Characteristics and Classification of Gymnosperms (David Bierhorst, 1971), ***Pinus*:**Distribution, Systematic Position, Structure, Reproduction and Life History

UNIT IV **(14L)**

Gnetum: Occurrence, Systematic Position, Structure, Reproduction and Life Cycle of (need not study the Development of Sex Organs and Sporophyte). Economic Importance of Gymnosperms.

UNIT V **(10L)**

Paleobotany:

Geological Time Scale, Methods of Fossilization; Brief Study of *Rhynia*, *Lepidodendron* and *Lyginopteris*.

REFERENCES

Arnold, C.A. 1947. An introduction to Palaeobotany. McGraw Hill Co. Ltd., New Delhi.

Chamberlain, C.A. 1986. Gymnosperms-Structure and Evolution, Publishers & Distributors.

Pandey, S.N. 1995. A Textbook of Pteridophyta.Vikas Publishing House, Ghasiabad.

Smith, G.M. 1955.Cryptogamic Botany. Vol. III. McGraw Hill Co.

Sporne, K.R. 1976. Morphology of Pteridophytes.B.I.Publishers, New Delhi.

Vashista, P.C. 1971. Botany for Degree students: Pteridophyta. S. Chand& Co., New Delhi.

Vashista, P.C. 1978. Botany for degree students: Gymnosperms. S. Chand & Co., New Delhi

PRACTICALS

1. To make suitable micro preparations of the following:
   *Lycopodium*Stem,*Adiantum*Stipe,*Marsilea*Petiole, Rhizome andSporocarp.
   *Pinus*Stem and Needle, *Gnetum* Stem andLeaf.

2. To observe and identify Specimens and Microslides.
   *Psilotum*Habit, Stem T.S, Synangium L.S;*Lycopodium*cone L.S, *Adiantum*habit,
   Pinus -Male and Female Cone (Specimen),L.S of Male and Female Cone (Slide)
   Gnetum – Male and Female Cone (Specimen); L.S. of Male cone, Female Cone & Ovule.

   Paleobotany (Slide):
   Rhynia stem
   *Lepidodendron*stem
   Lyginopteris stem.
3. To maintain a Record Notebook.

MSU/2017-18/ B. Sc Botany / Semester –III
Skill Based Subject - I (A)
MUSHROOM CULTIVATION
(4hrs/week)

Preamble: **LTPC**

4 0 0 4

Keeping the employment entrepreneurship in mind, this paper has been included.The subject enables the students to identify the edible mushrooms, to know the cultivation of Paddy Straw Mushroom and preparation of recipes. The course content also has the new practical exercises so that the students get a hands-on experience of the latest techniques that are currently in use.

UNIT I **(11hr)**

Mushrooms:

Introduction, Identification of Edible and Poisonous Mushrooms,Medicinal Mushrooms, Structure and Life cycle of Edible Mushroom-Oyster (*Pleurotus* species), Prospects of Mushroom Cultivation in Small Scale Industry.

Unit II **(13hr)**

Mushrooms Culture:

Pure culture - Preparation of Medium (PDA and Oat meal Agar Medium,) Sterilization methods, Preparation of Test Tube Slants to Store Mother Culture, Culturing of *Pleurotus*mycelium on Petri Plates, Preparation of Mother Spawn in Saline Bottle and Polypropylene Bag and their Multiplication.

Unit III **(12hr)**

Mushroom Culture Technique:

Cultivation of Mushrooms-Infrastructure, substrates (locally available), Polythene bag, Mushroom bed preparation - Factors affecting the Mushroom Bed Preparation, Spawn Running and Harvesting of Mushrooms - Button mushroom (*Agaricusbisporus*), Oyster Mushroom(*Pleurotus sp*.) and Paddy Straw Mushroom(*Volvariella*sp.)

Unit IV- **(13hr)**

Post Harvesting Technology of Mushrooms:

Farm Design and Protection of Mushrooms from Pests and Diseases.Nutritional Value – Proteins, Amino Acids, Mineral Elements, Carbohydrates, Fibre content and Vitamins, Significance of Mushrooms.

Unit V

(11hr)

Storage&Value Added Food Preparation

Short-Term Storage (Refrigeration – upto 24 hours) Long Term Storage (Canning, Pickles, Papads), Drying, Storage in Salt Solutions, Value Added Food Preparation : Types of Food Prepared from Mushroom; Soup, Cutlet, Omelette, Samosa, Pickles, Curry.

REFERENCES

Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

Swaminathan, M. (1990) Food and Nutrition.Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

Tewari, PankajKapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II

PRACTICALS

Demonstration:

1. Identification of edible mushrooms.
2. Cultivation of Paddy Straw Mushroom.
3. Preparation of recipes.

MSU/2017-18/ B. Sc Botany / Semester –III
Skill Based Subject - I (B)
ORGANIC FARMING
(4hrs/week)

Preamble: **LTPC**

4 0 0 4

The contents have been drawn-up to accommodate the role of manures in the improvement soil fertility,soilprofile,different kinds of soil, biofertilizerproduction technology,vermicomposting etc. in organic farming. It makes the students aware about sustainable use of biofertilizers

Unit -I **(11hr)**

Soil Science:

Brief Account of Soil Profile, Fertility of Soil – Importance of Organic Matter – Water Retentivityand Aeration of Soil.

Unit – II: **(12hr)**

Manure and Manuring:

Organic Manure, Types, Animal Wastes – Cattle Dung, Urine, Poultry Wastes, Slaughter Wastes, Piggery and Fishery Wastes.

Unit – III **(10 hr)**

Green Manure:

Plant wastes – Fallen leaves and Twigs, Humus Formation, Green Manuring, Mulching - Leaves of Trees like *Pongamia, Gliricidia ,Azadirachta,andCalotropis*, Compost making.

Unit-IV **(13hr)**

Biofertilizers:

Rhizobium-Importance, Mass Production and Application, VAM Fungi – Importance, Mass production and Applications.

Unit–V **(14hr)**

Vermicomposting:

Importance, Application and Production of Vermicompost, Preparation and importance of Panchagavyaas foliar spray.

PRACTICALS:

1. Soil Profile
2. Capillarity of Different kinds of Soil.
3. Vermicomposting
4. Preparation of Organic Manure
5. Identification of the following plants:
    a. Pongamia,
    b. Gliricidia
    c. Azadirachta and
    d. Calotropis.
2. Maintain an Observation Notebook.

REFERENCES:

Dubey, R.C. 2006, A Text Book of Biotechnology, S. Chand and Company Ltd. New Delhi.

ICAR, 1980. Hand Book of Agriculture, Indian Council of Agricultural Research, New Delhi.

John JothiPrakash, E. 2006. Outlines of Biotechnology.Emkay Publications, New Delhi.

Mark Coyne, 2004. Soil Microbiology- An Exploratory Approach.Delmar Publishers, Singapore.

Miller, C.E. and Turk, L.M. 2002.Fundamentals of Soil Science. Biotech Books, New

MSU/2017-18/ B. Sc Botany/ Semester –IV /Core paper-6
MICROBIOLOGY AND TECHNIQUES IN BIOLOGY
(4hrs/week)

Preamble: **LTPC**

4 0 04

The scientific discipline of Microbiology is one of the most critical components of modern science.The main focus of this paper is to give an idea of the world of microbesand to evaluate their role in the environmental segments to the learners. The contents have been drawn to accommodate the techniques in biology and to highlight their role in the human welfare.

UNIIT I **(13L)**

Microbiology:

Brief History and Development, Classification of Microorganisms (Whittaker's Five Kingdom Concept), **Bacteria** - Outline of Classification (Bergey'smanual), Ultra Structure, Nutritional Types and Reproduction of Bacteria, Media Preparation and Pure Culture techniques of Bacteria, Staining Technique - Gram Staining.

UNIT II **(12L)**

Viruses:

General Characteristics, Structure and Reproduction of HIV, T_4 Bacteriophages, Viroids, Virions and Mycoplasma, Transmission of Viruses and Purification of Viruses.

UNIT III **(12L)**

Microbes:

Microbes in Food Production, Spoilage, Poisoning and Preservation. Bacteria Flora in Milk, Pasteurization of Milk and Milk Products, Bacterial Pathogens and Water Pollution, Drinking Water as a Vehicle of Diseases, Purification of water.

UNIT IV **(11L)**

Instruments:

Principles, Working Mechanism and Applications ofUV Spectrometer, Centrifuge, ECG, MRI and Positron emission tomography

UNIT V **(12L)**

Electrophoresis:

Basic principles, electrophoretic mobility, factors, isoelectric focusing. Types- vertical and horizontal agarose and poly acrylamide gel electrophoresis, detection and recovery of electrophorogram. Gel documentation system. X-ray crystallography.

PRACTICALS

1. Preparation of Culture Media for Bacteria.
2. Preparation of Serial Dilution.
3. Isolation of Bacteria – Streak Plate Method
4. Identify the type of Bacteria using Gram Staining.
5. Analysis of Milk – Methylene Blue Dye Reduction Test.
6. **Spotters:**

   Ultra Structure of Bacterial Cell, T_4 Phage, HIV Virus,Autoclave, Laminar Air Flow Chamber,Hot Air Oven,Inoculation Needle, Agar slant, Spoiled Food,UV Spectrophotometer, Clinical Centrifuge, ECG, MRI, Positron emission tomography, Electrophoresis.

7. To maintain a Record Notebook.

MSU/2017-18/ B. Sc Botany / Semester –III

Skill Based Subject - I (A)

PRESERVATION OF FRUITS AND VEGETABLES

(4hrs/week)

Preamble: **LTPC**

4 0 04

The well-organized curricula shall inspire the students regardingthe principles of preservation of fruits and vegetables.The learners are expected to know the nutritive values, importance, factors affecting storage and methods of preservation of fruits and vegetables and preservation recipes.

Unit-I **(11L)**

Fruits and Vegetables:

Nutritive values, factors affecting storage, spoilage - microbial, enzymatic and insects.

Unit-II **(13L)**

Principles of Preservation:

Importance and Methods of Preservation - Refrigeration, Freezing, Canning, Drying and Dehydration, Chemical preservatives.

Unit-III **(13L)**

Preparation of Products:

Methods of preparation of Fruit Juice- Orange, Squashes- grape and Pine apple; Jam - Tomato and Mixed Fruit , Jellies- Guava.

Unit- IV **(11 L)**

Preparation of Chutney, Sauce, Pickles & Ketchup:

Preparation of Chutney- Mango, Sauce –Tomato,Pickles- Lime, Mango and Garlic, Ketchup- Tomato. **Drying of fruits**: Banana, Mango, Grapes and Fig.

Unit- V **(12 L)**

Canning of Fruits& Vegetables:

Mango and Banana; Tomato, Carrot, Bean and Mushrooms.

REFERENCES:

Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.

C.K. Usha Rani and R. Mary Christi. 2010. Preservation of Fruits and Vegetables,SheenGrafix, Nagercoil.

GirdhariLal, G.S. Siddappa and G.L.Tandon, 1986, Preservation of Fruits and Vegetables,Indian Council of Aricultural Research, New Delhi.

Cruess W.V.1948. Commercial Fruits and Vegetables Products, McGraw Hill Book Company Inc, New York.

Alex.V and Ramani.2009. Food Chemistry, MPJ Publishers, Chennai.

V.Kumaresan. 2009.Horticulture, Saras Publication, Nagercoil.

MSU/2017-18/ B. Sc Botany / Semester –III
Skill Based Subject - I (B)
FLORICULTURE

(4hrs/week)

Preamble: **LTPC**

4 0 04

The course provides thorough knowledge about the commercial cultivation of flowers and different value added products prepared from it. It highlight the potential of these studies to become an entrepreneur.

UNIT- I : **(11L)**

Floriculture:

Importance, Cut flower production – Chrysanthemum, Tulips, Lavendula, Gerbera, Gladiolus andHelichrysum.

UNIT-II : **(13 L)**

Commercial Floriculture:

Definition, Cultivation of Calendula, Polyanthus and Marigold.

UNIT- III: **(14 L)**

Cultivation Techniques:

Cultivation of Anthurium, Orchids, Cut flower production, Package and export

UNIT–IV: **(12 L)**

Value Added Products of flowers:

Importance of flowers in Perfumery - Extraction of Rose and Jasmine oil and their products.

UNIT – V **(10 L)**

Flower arrangement:

Introduction, General Principles of Flower Arrangement, Western and Japanese, Dry flower Decorations.

REFERENCES

Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.

Kumaresan,V. 2009. Horticulture, Saras Publication, Nagercoil.

Randhawa., G.S. 1973. Ornamental Horticulture in India.Today and Tomorrow Printers andPublishers, New Delhi.

Vishnu Swarap. 1997. Garden flowers. National Book Trust, India.

MSU/2017-2018/B.Sc. Botany/Semester-V/Core Paper – 7
MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS
(5hrs/week)

Preamble: **LTPC**
5 0 0 4

This enrichthe students to have a broad knowledge about various families, local floraand classification plants based on natural system. It will equip the learners with skills to identify angiospermsand economical use of local plants.

UNIT I **(13L)**

ModificationsPhyllotaxy& Inflorescence:

Modifications:Root, stem and leaf; Phyllotaxy: Types; Inflorescence: Types; Description of floral parts;Herbarium preparation and its importance.

UNIT II **(14L)**

Principles of taxonomic hierarchy,**classification**&**Key**:

Species, Genus and Family concept; Systems of classification- (with merits and demerits) Natural- Benthem and Hooker system, Phylogenetic- Engler and PrantlSystem.Binomial nomenclature, Dichotomous key preparation.

UNIT III **(15L)**

Detailed study of the following families and their economic importance:

Annonaceae, Sterculiaceae, Rutaceae, Caesalpiniaceae, Cucurbitaceae, Apiaceae.

UNIT IV **(17L)**

Rubiaceae, Sapotaceae, Convolvulaceae, Asclepiadaceae, Oleaceae, Lamiaceae.

UNIT V **(16L)**

Euphorbiaceae, Amaranthaceae, Liliaceae, Cannaceae, Arecaceae and Poaceae.

REFERENCES:

Lawrence, G. H. M (1953) – Taxonomy of Vascular Plants, Oxford & IBH Publishes, New Delhi.

Narayanaswamy, R.V &Rao, K. N (1976) – Outlines of Botany, S. Viswanathan Printers & Publishers, Madras.

Ashok Bendre and Ashok Kumar (1984) – A Text Book of Practical Botany – Vol. II, Rastogi Publications, Shivaji Road, Meerut.

Mathews, K.M, (1987 – 90) – Flora of Tamil Nadu and Carnatic (1 – 4 Vols.)Rapinat Herbarium, Trichy – 1.

Davis P. H. and Heywood V.H. (1993) – Principles of Angiosperms Taxonomy

Vashista, P.C (1997) – Taxonomy of Angiosperms, S. Chand & Co., (P) Ltd., New Delhi.

Singh, V & Singh, D.K (1983) – Taxonomy of Angiosperms, Rastogi Publications, Meerut.

Naik, V. N. 2000. Taxonomy of Angiosperms. Tata McGraw – Hill Publishing Company Limited. New Delhi.

Singh, G. 2005. Plant Systematics – Theory and Practice.Oxford & IBH, New Delhi.

Verma, V (1974) – A Text Book of Economic Botany, Emkay Publications, New Delhi. 28

PRACTICALS:

1. Morphological identification of plant parts and their modifications.
2. Technical description of plant parts and dissection of floral parts of plants with reference to the families prescribed in the syllabus.
3. Field trips (minimum 2 days) to places under the guidance of teachers to study plants in their natural habitat and submit a report.
4. Preparation of dichotomous key.
5. Identify and comment on the useful plant parts or plants prescribed in the syllabus.
6. Preparation and submission of 10 herbarium sheets.
   To maintain a record book.

MSU/2017-2018/B.Sc. Botany/Semester-V/Core Paper – 8
BIOCHEMISTRY AND BIOPHYSICS
(5hrs/week)

Preamble: **LTPC**

5 0 0 4

This enable the studentsregarding the basic knowledge on atom, bonds, bio-molecules, enzymes and proteins; to understand the fundamentals of biochemistry and biophysics, and the structure of various bio-molecules.Know the working principle of instruments like pH meter, colorimeter and centrifuge.

UNIT 1 **(15L)**

Basic concepts of Biochemistry:

Brief account of atom, bonds – ionic, covalent and hydrogen bonds; pH meter, Colorimeter, Centrifuge, Chromatography – Principles, techniques and their application in Biological studies.

UNIT 11 **(16L)**

Biomolecules:

Carbohydrates- structure and Properties of monosaccharides – Glucose and fructose; disaccharides – Sucrose, Maltose and Lactose; polysaccharides – Starch, Cellulose, Lignin and Chitin.

UNIT 111 **(14L)**

Aminoacids:

Basic Structure, Classification, Essential and Non-essential amino acids; Proteins- Primary, Secondary, Tertiary and Quaternary structure and properties; Monomeric and oligomeric proteins (Myoglobin and Hemoglobin)

UNIT IV **(16L)**

Lipids&Enzymes:

Lipids:General characters, Types, Basic structure and properties**;**Enzymes: General classification, Nomenclature, Mechanism of enzyme action, Enzyme kinetics, Enzyme inhibition, Enzyme immobilization, Application of enzymes in industry and medicine.

UNIT V **(14L)**

Bioenergetics:

Bioenergetics of Chloroplast and Mitochondria, Structure and role of ATP in biological systems, ATP as energy rich compound.Biological energy conversion, Electromagnetic spectrum, Absorption spectrum - chlorophylls, Emission spectrum - Phosphorescence, Fluorescence.

REFERENCES:

Jain, J.L. (1998). Fundamentals of Biochemistry. S. Chand & Co., New Delhi.

Jayaraman, J. (1981). Laboratory Manual of Biochemistry. Wiley Eastern Ltd., New Delhi.

John Webster , (2004). Bioinstrumentation.Johnweily& sons.

Lehninger, A.L. (1984). Biochemistry (2nd Edition).Kalyani Publishers, Ludhiana, New Delhi.

Plummer, D.T. (1988). An Introduction to Practical Biochemistry (3rd Edn.,). Tata McGraw Hill Publishing Co., Ltd., New Delhi.

Srivastava, H.S. (1990). Elements of Biochemistry.Rastogi Publications, Meerut, India.

Arora.(2004) Biophysics.First edn.Himalaya Publishers, New Delhi.

Salil Bose, S. (1982). Elementary Biophysics.Vijaya Printers, Madura

PRACTICALS

1. Colorimetric estimation of starch in plant tissues
2. Colorimetric estimation of sugar in plant tissues
3. Colorimetric estimation of proteins
4. Verification of Beer's Law
5. Preparation of acetate buffer
6. Separation of dyes by paper chromatography
7. Determination of complimentary color

Spotters:

a. Instruments: Electrodes of pH meter, pH meter, Colorimeter, Centrifuge and Chromatogram
b. Structure of monosaccharides, disaccharides and polysaccharides prescribed in the syllabus
c. Models and charts: Absorption spectrum of chlorophyll a and chlorophyll b, Fluorescence, Phosphorescence, Lock and key model & induced fit model of enzyme action To maintain a record book.

MSU/2017-2018/B.Sc. Botany/Semester-V/Elective Paper – 1A

BIOTECHNOLOGY AND GENETIC ENGINEERING

(5hrs/week)

Preamble: **LTPC**

5 0 0 4

The syllabus helps to understand the totipotency of the cells and the tissue culture techniques, tolearn the fundamental principles in gene cloning, various methods of gene transfer, screening and the use of vectors in gene transfer technology for the desired characteristics.

UNIT1 **(15L)**

Tissue Culture:

Introduction, definition, history, scope and importance of plant tissue culture, Totipotency of cells, Tissue culture laboratory- organization and requirements, Sterilization techniques, Nutrient media- composition and preparation.

UNIT 11 **(14L)**

Types of tissue culture:

Callus culture and apical meristem culture. **Protoplast culture:** Protoplast isolation, fusion, selection of hybrids and regeneration.**Cybrids**– production and applications, **Artificial seed**: production, advantages and disadvantages.

UNIT 111 **(16L)**

Techniques of genetic engineering:

Isolation of specific genes, enzymes used in gene cloning, **Cloning Vectors** - Plasmids,Cosmids and Phagemids,cDNALibraries,*Agrobacterium* mediated gene transfer in plants,**GM plants** – *Bt*Brinjal, *Bt* Cotton, Golden rice. Bioethical issues.

UNIT 1V **(16L)**

Identification of Recombinants:

Insertional inactivation, Immunochemical Method and Colony Hybridization Technique.Selection of Recombinant using Selective Medium and reporter genes, **Blotting Techniques** – Southern, Northern and Western Blotting.

UNIT V **(14L)**

Mutagenesis& DNA transfer techniques:

Site directed mutagenesis and random mutagenesis;DNA transfer techniques: Physical method-Microinjection, Chemical method-Calcium phosphate method, Electrical method-Electroporation,Natural-Conjugation and bacterial transformation.

REFERENCES:

Bhojwani, S.S and M.K.razdan. 2004. Tissue Culture Theory and Practice.

Davis J.A. and W.S.Roznikolf (1992) Milestones in Biotechnology.Classic papers on genetic Engineering, Butterworth-Helnemann, Boston.

Glick, B Pasternak, J.J.(2007) Molecular Biotechnology ASM Press, Washington Benjamin Lewin. Genes-VIII.Oxford university press.

Glover, D.M and B.D Hames.DNA Cloning 1-4.(2006). Oxford University Press.

Guptha, P.K. 1996. Elements of Biotechnology.Rastogi and Co. Meerut,.

Hammond, J., P.McGarvey and V.Yusibov(Eds.) 2000.Plant Biotechnology. Springer verlag, 2000.

James D. Watson. Recombinant DNA (2001).Scientific American Books. USA

Kingsman S.M. and A.J.Kingsman, (1998) Genetic Engineering.An Introduction to gene analysis and exploitation in eukaryotes.Blackwell Scientific Publications, Oxford.

Satyanarayanan, U. 2005. Biotechnology, Books and allied (p) Ltd.,

PRACTICALS:

Spotters/Photographs

i. Callus culture from Carrot Explant.
ii. Protoplast Isolation.
iii. Plasmids – Ti plasmids
iv. Gene cloning in E. Coli.
v. Agrobacterium mediated gene transfer.
vi. Blotting Techniques.
vii. Colony Hybridization technique.
viii. Transgenic Plants prescribed in the syllabus.To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-V/Elective Paper – 1B

ENVIRONMENTAL BIOTECHNOLOGY
(5hrs/week)

Preamble: **LTPC**

5 0 0 4

The paper presents an objective view of the application of biotechnological know-hows in tackling environmental problems. It starts with basic knowledge about molecular biology and later links to application based processes and techniques which also address the socio-economical challenges.

UNIT I **(15L)**

Environmental Spheres :

Hydrosphere, Geosphere, Biosphere and Anthrosphere. Aims and Scope of Environmental Biotechnology, **Pollution Measurement** : Biotechnological Methods, Criteria for Biomonitoringof Pollution, Molecular biology in Environmental Monitoring and Role of Biosensors in Pollution monitoring, Biotechnological methods for management of Metal Pollution.

UNIT II **(15L)**

Biofuels:

Biogas – Production of Biogas, stages of Methanogenesis, Methane production from Hydrocarbons, Uses of Biogas, Hydrogen production – Importance of Biological Production of Hydrogen, Microbial production of Hydrogen, Uses of Hydrogen Production Technology. **Petroleum Plants** – *Calotropis, Euphorbiatirucalli, Jatrophacurcas*

UNIT III **(15L)**

Sewage Treatment:

Biotechnological Methods for Sewage and Waste Water Treatment -Primary, Secondary (Aerobic – Trickling filterand Activated Sludge Process, Anaerobic – Anaerobic digestion and Anaerobic Filter) and Tertiary Treatment (Ion Exchange Method), Water Recycling, Soil Conservation and Restoration, Sustainable Agricultural Management.

UNIT IV **(15L)**

Biodegradation:

Solid Waste Treatment and Disposal, Biodegradation of Hydrocarbons, Pesticides and Herbicides. **Bioremediation:**Types of Bioremediation: *in situ* and *ex situ*, Phytoremediation, Biosensors and Bioindicators,Bioleaching,Types of Reactions in Bioremediation, Genetically Engineered Microorganisms in Bioremediation.

UNIT V **(15L)**

Global Environmental Problems:

Green House Effect and Global Warming; measures to Control Green House Effect;Ozone Depletion -Effects and Control Measures; Acid rains -– Causes, Effects and Control Measures; Remote Sensing and its applications in ecology.

References:

Chatterji, A.K. (2011). *Introduction to Environmental Biotechnology*. Prentice Hall India Pvt., Ltd., New Delhi.

Dubey, R.C. (2013). A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi.

Gupta, P.K. (1994). *Elements of Biotechnology*.Restogi Publications, Meerut.

Ignacimuthu, S. (1997).*Plant Biotechnology*.Oxford & IBM Publishing Co., New Delhi.

Kumar, H.D. (1991). *A Textbook on Biotechnology.*East west press, New Delhi.

Parihar, P. (2014). A Textbook of Biotechnology.Argobios Publications, Jodhpur

Purohit, S.S. (2003). *Agricultural Biotechnology*.Agrobios Publications, Joshpur.

Sharma, P.D. (1994). *Environmental Biology*.Rastogi Publications.

PRACTICALS:

Photographs/Model

1. Biosensor
2. Biogas Plant
3. Sewage Treatment
4. Acid Rain
5. Green House Effect

Spotters

Petro Plants

i. *Calotropis*
ii. *Euphorbia tirucalli*
iii. *Jatrophacurcas*

To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-V/Elective Paper – 2A
HORTICULTURE & PLANT BREEDING
(5hrs/week)

Preamble: **LTPC**

5 0 0 4

The students will learn the methods of crop improvement and the importance of horticulture in human welfare.It enables the students to acquire knowledge on the application of induced mutations, induced polyploidy and wide hybridization for crop improvement. This fundamental course will help the students to undertake the breeding of horticultural crops.

UNIT - I **(14L)**

Horticulture:

Scope, importance and divisions, Vegetative propagation methods- cutting, layering, budding, grafting and vegetative propagules (bulb, sucker, corm).Advantages and disadvantages of vegetative propagation.

UNIT - II **(16L)**

Gardening:

Types of gardens – Formal, informal, Design and Establishment of Garden,Garden components, garden implements, lawn making, glass house, rockery, hanging baskets, water garden, terrarium, topiary and Bonsai.

UNIT - III **(15L)**

Kitchen garden:

Establishment, Organic manures and growth regulators in horticulture, Plant protection measures for horticulture, Seed Propagation methods, Preparation of Nursery beds, Transplantation – steps and Methods.

UNIT - IV **(16L)**

Plant Breeding-

Nature, Scope and Objectives, Plant introduction, selection methods (pure line and mass), Hybridization techniques, Heterosis breeding, Interspecific and intergeneric hybridization.

UNIT – V **(14L)**

Mutation breeding:

Procedure and practices, Mutagens, Polyploidy breeding and its applications.Breeding for disease resistance.

REFERENCES:

Allard, R.W. (1960). *Principles of Plant Breeding*. John Wiley & Sons, NewYork.

Bose, T.K., Maiti, R.G., Dhua, R.S. and Das, P. (1999).*Floriculture and Landscaping*.NayaPrakash, Calcutta.

Chopra, V.L. (1989). *Plant Breeding.*Oxford IBH, New Delhi.

Kumar, N. (1997). *Introduction to Horticulture*.Rajalakshmi Publication, India.

ManibhushanRao, K. (1991). *Text Book of Horticulture*.Macmillan Publications, New Delhi.

Mukherjee, D. (1972). *Gardening in India*. Oxford & IBH Publishing Co., Kolkatta, Mumbai, New Delhi.

Roy Choudhry, N. and Mishra, H.P. (2001).*Text book on Floriculture and Landscaping*.Raja Infotech Enterprise, India.

Sharma, J.R. (1994). *Principles and Practice of Plant Breeding*.Tata McGraw Hill, New Delhi.

PRACTICALS :

Demonstration

i. Vegetative methods of propagation.
    a. Cutting-Stem and Leaf cutting
    b. Layering-Simple and air layering.
    c. Grafting – Tongue grafting.
    d. Budding – T-budding.
ii. Garden components -Rockery, hanging baskets, terrarium and topiary.
iii. Garden implements-spade, water can, pruning scissors, digging fork
iv. Designing Kitchen Garden.
v. Plant Breeding: Emasculation and Bagging methods.

To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-V/Elective Paper – 2B
FORESTRY
(5hrs/week)

Preamble: **LTPC**
5 0 0 4

To know about the types of forest, its degradation, agroforestry and its economic utilization. It make the students aware about conservation and sustainable use of plants for future generation.

UNIT-1 **(13L)**

Forest:

Definition, Scope and Classification ,Importance/Functions of forest, Forest as a Balanced Eco system, Types andDistribution of Forest withreference to India (Champion and Seth - Classification)

UNIT II **(17L)**

Forest Degradation:

Damage caused by Fire, Climatic Factors and Injuries by Insects, Plants, Animals and Diseases, activities of Man including Encroachment and Shifting Cultivation, Measures to Protect the Forest Damage caused by various Factors.

UNIT III **(16L)**

Forest Management and Conservation:

Regeneration,Tending Operations, Sustainable Utilization ofForest Resources, Forest Organization, Role of Remote Sensing in Forest Management.

UNIT IV **(15L)**

Agroforestry:

Objectives, Advantages and Disadvantages. Energy Plantation, Recreational Forestry, Roleof Biosphere reserves, National Parks, Sanctuaries and Botanical Gardens in Conservation of Wild life.

UNIT V **(14L)**

Forest Utilization:

Conservation, Storage and Disposal of Wood in Forest, Major and Minor Forest Products, Forest based Industries- Paper and Pulp Industry, Resin tapping and Turpentine manufacture.

REFERENCES:

Agrawal, K.C. (1987). *Environmental Biology*. Agro Botanical Publisher, India.

Arumugam, N. (1994). *Concepts of Ecology* (Environmental Biology).Saras Publications, Nagercoil, Tamilnadu.

Kumar, H.D. (1992). *Modern Concepts of Ecology* (7th Edn.).Vikas Publishing Co., New Delhi.

Odum, E.P. (1971). *Fundamentals of Ecology* (2nd Edn.). Saunders & Co., Philadelphia &Natraj Publishers, Dehradun.

Sharma, P.D. (2000). *Ecology & Environment*.Rastogi Publications, Meerut, India.

Vashishta, P.C. (1990). *Plant Ecology*. Vishal Publications, Delhi, Jalandhar.

Verma, P.S. and Agarwal, V.K. (1999).*Concept of Ecology* (Enviromental Biology). S. Chand & Co., New Delhi.

DEMONSTRATION

1. Identify and find out the uses of wood samples of common timbers.
2. Prepare maps showing forest types in India and Tamil Nadu.
3. Prepare photographs of different forest types and nature of forest degradation.
4. Study of commonly used forest products.

To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-VI/Core Paper – 9

PLANT PHYSIOLOGY

(5hrs/week)

Preamble: **LTPC**

5 0 0 4

To acquaint the students to understand the various functions of the plants, mechanisms of the various activities; anabolic and catabolic The course will enable the learners to gain more information in recent findings in the field of physiology.

UNIT I **(17L)**

WaterRelationsof Plants&Transpiration:

Water Relations: Imbibition, Diffusion and Osmosis; Water Potential- Definition, Components, Absorption of Water – Mechanism and Factors affecting Water Absorption; Transpiration- Definition, Types, Significance and Mechanism of Stomatal Transpiration- steps and theories, Guttation

UNIT II **(15L)**

Ascent of Sap&Mineral nutrition:

Ascent of Sap –Definition, Path of Ascent of Sap, Mechanism- Transpiration Pull and Cohesion Theory.Mineral nutrition - Macro and Micro Nutrients-Absorption of Mineral Salts – Mechanism, Translocation of Organic Solutes - Mechanism of Phloem Transport (Munch's Mass flow hypothesis).

UNIT III **(16L)**

Photosynthesis&.Respiration:

Photosynthesis:Light and Dark Reactions - Photosynthetic Electron Transport Chain and Photophosphorylation (Cylic and Non cyclic); Carbon Assimilation - C3, C4 and CAM Pathways andits Significance**;**Respiration: Glycolysis, TCA cycle and Oxidative Phosphorylation.

UNIT IV **(13L)**

Growth and Development:

Growth Curve and phases of growth;Phytohormones**:**Physiological Effect and Practical Applications - Auxin, Gibberellic acid, Cytokinin, Ethylene and Abscisicacid;Photoperiodism and Vernalization.

UNIT V **(14L)**

Seed Dormancy:

Causes and Methods ofBreaking Dormancy; Stress Physiology - Classification– Bioticand Abiotic, Stress Factors- Response of Plants to Salt, Drought, Frost and Heat.

REFERENCES:

Devlin, R.M. (1969). Plant Physiology. Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi.

Dulsy Fatima, R.P. et. al., (1994).*Elements of Biochemistry*.Saras Publications, Nagercoil, Tamilnadu.

Jain, V.K. (1990). *Fundamentals of Plant Physiology*. S. Chand & Co., New Delhi.

Noggle, R. and Fritz (1989).Introductory Plant Physiology.Prentice Hall of India.

Pandey, S.N. (1991). *Plant Physiology*.Vikas Publishing House (P) Ltd., New Delhi.

Periyasamy, K. (1978). *Cell IyakkaViyal*(Cell Physiology). Tamilnadu text Book Society, Chennai.

Salisbury, F.B. and Ross, C.W. (1999).*Plant Physiology*.CBS Publishers and Printers, New Delhi.

PRACTICALS

1. Water Potential by Gravimetric Method.
2. Water Potential by Falling Drop Method.
3. Osmotic Potential by Plasmolytic Method.
4. Rate of Photosynthesis in Different Concentrations of Bi-Carbonate – Bubble Method.
5. Measurement of Stomatal Index.
6. Effect of Temperature on Permeability of Plasma Membrane.
7. Separation of Chlorophyll Pigments by Ascending Paper Chromatography.

DEMONSTRATION:

1. Tissue Tension
2. Suction due to Transpiration
3. Ganong'sPhotometer
4. Fermentation
5. Arc Auxanometer
6. Clinostat
7. Phototropism

Spotters

1. Absorption Spectrum of Chlorophylls
2. Growth curve.

To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-VI/Core Paper – 10

GENETICS, EVOLUTION AND BIOSTATISTICS

(5hrs/week)

Preamble: **LTPC**

5 0 0 4

To learn the pattern of inheritance, to understand the mechanism of gene action, to learn the concept of biometrics and to become aware of the importance of statistical tools and computer applications in life sciences.The students will also learn about use of Statistics in the plant sciences which will be helpful to them during research.

UNIT-I **(18L)**

Monohybrid and dihybrid cross &Polygenic inheritance:

Monohybrid and dihybridcross,testcross,back cross, Mendel's laws, Deviation from Mendelian ratio–incomplete dominance,lethalfactor,complementaryfactor,supplementaryfactor,duplicate and inhibitory. Polygenic inheritance- Inheritance of Wheat Kernel and Ear length in Maize.

UNIT-II **(18L)**

Linkage& Sex determination:

Linkage, crossing over and recombination; Sex determinationin plants;Extra nuclear inheritance - male sterility in corn; Population genetics - Hardy – Weinberg's principle.

UNIT-III **(18L)**

DNA Model:

Watson and Crick, DNA as genetic material, DNA replication, Genetic code, Gene regulation in prokaryotes, Operon Concept*, Lac* Operon.

UNIT-IV **(18L)**

Origin of life& Evolution:

Chemosynthetic theory–evidences (any five); Evolution: Evolutionary theories of Lamarck, Darwin, De Vries, Modern synthetic theory of evolution; Speciation – concept of species-Allopatric and Sympatric, Isolation mechanisms.

UNIT-V **(18L)**

Measures of central tendencies &dispersion

Collection and interpretation of data. Measures of central tendencies **-** Mean, Mode and Median. Measures of dispersion - Standard Deviation, Chi-square test.

REFERENCES:

Agarwal, V.K. (2000). *Simplified course in Genetics* (B.Sc., Zoology). S. Chand & Company Ltd., New Delhi.

Ahluwalia, K.B. (1990). *Genetics*. Wiley Eastern Ltd., Madras.

Chandrasekaran, S.N. and Parathasarathy, S.V. (1965).*Cytogenetics and Plant Breeding*. P. Varadhachari& Co., Madras.

Gupta, P.K. (2000). *Genetics*.Rastogi Publishers, Meerut.

Jain, H.K. (1999). *Genetics-Principles, Concepts & Implications*.Oxford & IBH Publishing Co., (P) Ltd., New Delhi.

Lewin, B. (1990). *Genes IV*. Oxford University Press, Oxford.

Palaniyappan, S. (1987).*Marabiyal*(Genetics - In Tamil). V.K. Publishing House, Madras.

Pandey, B.P. (2012). *Cytology, Genetics and Molecular Genetics*. Tata McGraw-Hill Education Private Ltd., New Delhi.

Genetics. D. Van Nostrand Co., Ltd. Inc., New York.

NageswaraRao, G. (1983). *Statistics for Agricultural Science*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Olive, J.D. (1995). *Basic Statistics - A Primer for the Biomedical Sciences*. John Wiley and Sons, New Delhi.

Gottlieb, LD. and Jain, S.K. (1988).*Plant Evolutionary Biology*. Chapman & Hall, London.

Shukla, R.S. and Chandel, P.S. (1996).*Cytogenetics, Evolution & Plant Breeding*. S. Chand & Company Ltd., New Delhi.

Sproule, A. (1998). *Charles Darwin Scientists who have changed the world*. Orient Longmans, Hyderabad.

Verma, P.S. and Agarwal, V.K. (1999).*Concepts of Evolution*. S. Chand & Company Ltd., New Delhi.

PRACTICALS :

1. Simple genetic problems in monohybrid crosses, incomplete dominance and lethal genes.
2. Simple problems on dihybrid ratio and interaction of factors.
3. Using available data, calculate the Mean and Standard deviation.
4. Spotters:

Linkage and Crossinz over

DNA model/ Photograph

Evolution (Origin of life, Speciation).

5. To maintain a record note book.

MSU/2017-2018/B.Sc. Botany/Semester-VI/Core Paper – 11
PLANT ECOLOGY AND PHYTOGEOGRAPHY
(5hrs/week)

Preamble: **LTPC**
5 0 0 4

To enable the students to understand biotic and abiotic factors in our ecosystem, to study the need of various ecosystems and vegetation.This course will enable the students to understand how environment influence the life of different organisms and vice versa.

UNIT – I **(14L)**

Vegetation:

Biotic and abiotic factors and their influence on vegetation, a brief account of microbes, plants, animals, soil,wind, light, temperature, rainfall and fire. **Biogeochemical cycles** - Nitrogen and Carbon.

UNIT – II **(16L)**

Ecosystem:

Concept, processes and component;Types of ecosystems–Aquatic and Forest;Ecological Classification of Plants; Morphological, anatomical and physiological adaptations of plants with special reference to Hydrophytes and Xerophytes

UNIT – III **(17L)**

Autecology and Synecology:

Autecology and Synecology - Definition (Species, Population, Community);**Vegetation** – Units of vegetation- Formation, Association, Consociation; Society-development of vegetation; Migration- ecesis, colonization; Methods of study of vegetation- Quadrat and transect.

UNIT – IV **(15L)**

Biomonitoring:

Biomonitoring - Biodegradation of Xenobiotics using microbe, Types of Bioremediation-*in situ* and *ex situ*, Phytoremediation, Biosensors and Bioindicators , Bioleaching.

UNIT – V **(13L)**

Phytogeography:

Principles, continental drift and endemism. Centre of origin- paddy and tomato. Vegetationsin Tamil Nadu, Remote Sensing.

PRACTICALS:

1. Analysis of herbaceous vegetation - by using quadrate and line transect method to find out frequency, density, abundance and interpret the vegetations in terms of Raunkaier's frequency formula.
2. Morphological and anatomical adaptations of hydrophytes and xerophytes (each 2).

    Hydrophytes: *Hydrilla,Nymphaea*
    Xerophytes: *Nerium, Casuarina*

3. Maintain a Recordnote book.

REFERENCES:

Singh, J.S., Singh, S.P. and Gupta, S. (2006) Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi

Wilkinson, D.M. (2007). Fundamental Processes in Ecology. An Earth System Approach. Oxford.

Daubenmier, R.F. (1970). Plants and Environment: A text book of PlantAutoecology, Wiley Eastern Private Limited

Daubenmier, R.F. (1970), Plant Communities, Wiley Eastern Private Limited

Odum, E. (2008) Ecology. Oxford and IBH Publisher.

Sharma, P.D. (2010) Ecology and Environment, (8th Ed.)Rastogi Publications, Meerut.

Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A.4th edition.

ALLIED BOTANY
MSU/2017-2018/B.Sc. Allied Botany/Semester I/111 Allied Paper – 1
PLANT DIVERSITY AND MEDICINAL BOTANY
(4hrs/week)

Preamble: **LTPC**

4 0 04

The course facilitates an understanding of the salient features of various plant groups. Without the study of structural and functional aspects of Green plants, fungi, bacteria, viruses and their interrelationships, the "modern biology" is not possible. In fact, applied sciences, cannot replace basic sciences. The learners are expected to know the medicinal values of few plants.

UNIT – I (12L)

Algae& Fungi:

Algae:General characters and economic importance, Distribution, Structure and Life History of *Volvox*; Fungi**:**General characters and economic importance, Distribution, Structure and Life History of *Polyporus.*

UNIT – II (12L)

Lichens& Bryophytes:

Lichens:General characters and classification. Structure and Reproduction of *Usnea*; Bryophytes: General characters, Structure, Reproduction and Life History of *Funaria*.

UNIT – III (14L)

Pteridophytes& Gymnosperms:

General characters, Structure, Reproduction and Life History of *Lycopodium*;Gymnosperm**s:**General characteristics, Structure, Reproduction and Life History of *Pinus*

UNIT – IV (12L)

Taxonomy:

Bentham and Hooker's system of classification, Critical study of the following families: Rutaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.

UNIT – V (10L)

Medicinal Botany:

Study of the following plants with reference to the morphology of the useful parts and their medicinal importance -*Aloe vera, Piper nigrum, Phyllanthusamarus, Coleus amboinicus*and *Catharanthusroseus*.

REFERENCES:

Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.

Smith, G..

Smith, G.M. (1955): Cryptogamic Botany Vol. II. (2nd Edition) (Bryophytes &Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.

Dutta A.C. 2016. Botany for Degree Students.Oxford University Press.

Pandey, B. P. 2007. Botany for Degree Students: Diversity of Seed Plants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd, New Delhi.

Rastogi, R. R. and B. N. Mehrotra. 1993. Compendium of Indian Medicinal Plants. Vol.I & Vol. II. CSIR, Publication and Information Directorate, New Delhi.

PRACTICALS :

1. Assign the given plant to its family giving reasons.
2. Dissect out and draw the floral parts of a plant belong to the families prescribed in the syllabus .
3. Make suitable micropreparations of Lycopodium stem, Pinus needle.
4. Identify and record the medicinal values and morphology of the useful parts of the plants prescribed in the syllabus.
5. Observe and identify the following specimens: Polyporus, Funaria, Lycopodium and Pinus –male and female cone.
6. Identify the slides showing mature anther, ovule, dicot embryo, Volvox, Nostoc, Yeast, Lycopodium - cone L.S and Funaria -capsule L.S.
7. To maintain a Record Note book

MSU/2017-2018/B.Sc. Allied Botany/ Semester II/IV Allied Paper – I1
EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY
(4hrs/week)

Preamble: **LTPC**

4 0 04

The course facilitates the student to know the mechanism underlining the shift from vegetative to reproductive phase and to trace the development of male and female gametophyte.It enable the students to study the structural and functional aspects of various tissue systems and organs of dicots and monocots and to understand the concepts involved in the function of plants and study the recent aspects of various physiological processes in plants, which also focuses on the use of recombinant DNA technology for crop improvement and to identify the molecular markers for selection of superior genotypes.

UNIT – I (13L)

Microsporangium&Mega sporangium:

Microsporangium:Structure and development; Megasporangium:Structure, types and development, Development of male and female gametophyte; Double fertilization;**Endosperm** – types, dicot embryo- Structure.

UNIT – II (12L)

Meristem & Tissues

Meristem: Structure and classification; Tissues**:** Simple and complex tissues, Primary structure of Dicot and Monocot stem and root, Normal secondary thickening in dicot stem.

UNIT – III (12L)

Absorption of water:

Absorption of water - diffusion, osmosis, imbibition; mechanism of absorption of water; Ascentof sap – (cohesion theory only); Transpiration – Types, Mechanism of stomatal transpiration (Starch – sugar hypothesis); Photosynthesis - Mechanism of Light and dark reaction (Calvin cycle).

UNIT – IV (11L)

Biofertilizer*:*

Biofertilizer:*Nostoc* - Morphology, Mass cultivation and use.**Yeast:**Structure, multiplication (budding and fission) and Mass culture.

UNIT – V (11L)

Tissue Culture:

Scope and importance,totipotency, Nutrient media (MS medium). Callus and Meristem Culture, Applications of plant tissue culture

1) Dissect out young embryo from *Tridax* flower bud.
2) Make suitable micro-preparations of dicot and monocot stem and root
3) Demonstrate the physiology experimental set up –Potato osmoscope, Ganong's lightscreen, Tissue tension.
4)Identify the Photograph/ Slide/ Specimen/setup - (i) *Nostoc* (ii) (ii) Yeast (iii) Callus culture, (iv) Meristem culture.
5) Maintain a record note book for external and internal evaluation.

NON-MAJOR ELECTIVES
MSU/2017-18/ B. Sc Botany / Semester –III
Non-Major Electives 1-(A)
GARDENING AND GARDEN MANAGEMENT
(2hrs/week)

Preamble: **LTPC**
2 0 02

Enables the student to gain knowledge about crop production, plant propagation, plant breeding, genetic engineering, preparation of soil biochemistry and simultaneously can work in various fields including floral design, garden centers, teaching, fruit and vegetable production, arboriculture and landscape construction.

UNIT I **(6L)**

Gardens:

Gardens: Types – Formal & informal Gardens – English Gardens, Mogul Gardens, Japanese Gardens. Principles of Ornamental Gardening.

UNIT II **(6L)**

Propagation Techniques:

Soft Wood Cutting, Simple and Air Layering, 'T' Budding, Approach Grafting, Pruning. Garden Implements – Digger, Pruning Shears, Garden Rake.

UNIT III **(6L)**

Components of Ornamental Gardens:

Hedges, Edges, Flower Beds, Arches, Rockery, Lawn and Topiary.

UNIT IV **(6L)**

Vegetable Garden & Kitchen Garden Vegetable Gardening: Types;Kitchen Garden: Establishment, Components– Perennials, Pandals, Fence, Seasonal vegetable crops in bunds, Compost Pits.

UNIT V **(6L)**

Indoor Gardening :

Indoor Gardening :Principles and Maintenance. Hanging baskets, Terrarium, Bottle Garden and Bonsai.

MSU/2017-18/ B. Sc Botany / Semester –III

Non-Major Elective1-(B)

HERBAL MEDICINE

(2hrs/week; Total 30hrs)

Preamble: **LTPC**

2 0 02

Facilitates the role, importance and contributions of ethnomedicine, ethnoecology, ethno pharmacology, etc. in our modern civilization and create an awareness of link between biodiversity and cultural diversity. It will make the students realize the importance of People-Plant relations focusing upon impact of plant conservation and opportunities for sustainable use.

UNIT: I

(6L)Systems of medicine:

Indian systems of medicine –Ayurveda, Siddha, Unani and Homeopathy. TBK (Tribal Botanical knowledge): Folk medicines, includingHome remedies. Ethno medicines of Tamil Nadu.

UNIT: II **(6L) Herbal remedies**:

Herbal remedies for common ailments like cold, fever, diabetes, cuts, diahorrea.

UNIT: III **(6L)**

Economic importance:

Study on the morphology, useful parts, uses and method of use for specific ailments of the following: rhizome (*Acorus*, Ginger), Bulb (Garlic, Onion), Root (*Hemidesmus*, *Vinca*), Bark (*Saracaindica*, *Cinnamomum*), Leaf (*Adhatoda*, *Vitex*), Flower (*Cassia*, *Clove*),Whole plant (*Phyllanthus*, *Azadirachta*).

UNIT: IV **(6L)**

Herbals:

Skin and hair care using herbals. Herbal preparation: decoction, extract, infusions, oils, shampoos, powders.

UNIT: V **(6L)**

Cultivation, harvest and post-harvest technology:

Cultivation, harvest and post-harvest technology of some medicinal plants –*Catharanthusroseus*, *Adhatodavasica*, *Acoruscalamus*

REFERENCES:

ArunaDevaraj, 2002.Herbal cosmetology.

Gala, D.R. Dhiren Gala & Sanjay Gala. 2000. Nature cure for common diseases, Navneet Publications Ltd., Mumbai.

Kirtikar K.R. and Basu, B.D. 1991.Indian Medicinal Plants Vol.1-4, Periodical Experts, New Delhi.

Saha, M.N. 1997. Fruit and Vegetable juice therapy, Jain Publishers-New Delhi.

VaidyaBhagwanDush, B. 1999. Herbal cure, Jain Publishers-New Delhi.

MSU/2017-18/ B. Sc Botany / Semester –IV
Non-Major Electives 1-(A)
FOOD AND NUTRITION
(2hrs/week)

Preamble: **LTPC**

2 0 02

Facilitates understanding of the principles of food and nutrition.It provides the student to **u**nderstand the nutritive values, importance, factors affecting storage and methods of preservation of food which make the students aware of application of different plants in various industries.

UNIT-I **(6L)**

Food:

Energy Value of Food, Major Classes of Food- Carbohydrates, Proteins, Fats and Oils, Vitamins, Minerals – Sources and Requirements. Balanced Diet - Functions and Deficiency Symptoms – Causes and Prevention.

UNIT-II **(6L)**

Plants as Source of Food:

Nutritive Value of Cereals and Millets (Rice, Wheat, Maize, Sorghum, and Ragi); Pulses (Bengal gram, Black gram, Green gram, Red gram and Peas); Nuts and Oil seeds (Ground nuts, Sesame, Coconut, Soyabeans, Sunflower); Fruits and Vegetables (Mango, Banana, Guava, Pomegranate, Grapes, Cucumber, Brinjal, Ladies finger, Tomato, Carrot).

UNIT: III **(6L)**

Food Preservation:

Importance of Preservation.Methods of Preservation. Low and High Temperatures, Uses of Oil and Spices, Use of Salt and Sugar. Preparation of Jam, Jelly, Pickles and Squashes.

UNIT: IV **(6L)**

Food Additives:

Food Additives - Definition and Types; Food Poisoning- Salmonellosis, Botulism; Food Adulteration- Harmful Effects, Simple Physical Tests for Detection of Food Adulterants.

UNIT: V **(6L)**

Food borne Infection and their Prevention:

Food borne Infection and their Prevention - Cholera, Typhoid.

MSU/2017-18/ B. Sc Botany / Semester –IV
Non-Major Electives 1-(B)
BOTANY FOR COMPETITIVE EXAMINATION
(2hrs/week)

Preamble: **LTPC**
2 0 02

Facilitates the basic principles of botany to the students which are vital for facing any competitive examinations.

UNIT I **(6L)**

Basics of the Plant Kingdom :

Basics of the Plant Kingdom – Brief Classification of Plant Kingdom ; Diagnostic features of Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms, Bacteria, Viruses; Economic importance of these Groups.

UNIT II **(6L)**

Basics of Angiosperm Taxonomy:

A brief account of Natural System of Classification (Bentham and Hooker's System) and Phylogenetic System of Classification (Engler and Prantl's System).Binomial Nomenclature. A Brief account of the following Families and their Economic importance: Fabaceae, Cucurbitaceae, Poaceae.

UNIT III **(6L)**

Medicinal Importance:

Medicinal Importance of the following Plants:*Zingiberofficinale*, *Vetiveriazizanioides*, *Ocimum sanctum*, *Azadirachtaindica*, *Solanumtrilobatum*, *Phyllanthusemblica*, *Andrographispaniculata*, *Acalyphaindica*.

UNIT IV **(6L)**

Basics in Physiology:

Basics of Absorption of Water, Transpiration, Photosynthesis, Respiration, Protein Synthesis.

UNIT V **(6L)**

Cell Organelles Genetics and Genetic Engineering:

Cell Organelles; Tissues and Tissue systems; An introduction to Genetics -Mendelism, Monohybrid cross and Dihybrid Cross; Genetic Engineering - Enzymes used in Gene Cloning experiments. An Introduction to Plant Tissue Culture;Biofertilizers.
