The New College (Autonomous), Chennai – 600 014.
I B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY
SYLLABUS – CBCS PATTERN
(Effective from the academic year 2017 – 2018)
Batch: 2017 - 2020

Title: Algology & Algal Biotechnology
Core: 01
Credits: 5
Semester: I
Work load: 6 Lecture Hours and 2 Practical Hours per week

Unit I:
General characters, Distribution, Organization of the Thallus, Pigmentation, Flagellation, Food Reserves and Reproduction of Algae.

Unit II:
Classification of Algae (Class level) – F. E. Fritsch, 1945 and Economic importance of Algae - Agar agar, Alginates, Carrageenin, Diatomaceous earth, Medicines and Minerals.

Unit III:
Distribution, Structure, reproduction and life cycle of *Chlorella, Caulerpa, Sargassum* and *Gracilaria* (No developmental studies).

Unit IV:
Biotechnology – Definition, history and scope. Single Cell Proteins (SCP): *Spirulina* and *Scenedesmus* - production harvesting and applications.

Unit V:
Biofertilizer –Blue Green Algae (BGA): *Nostoc*, *Anabaena* and *Oscillatoria* - Isolation, preparation of starter culture, mass culture, application and crop response.

Practical: All the items included in the Theory.

Reference Books:

1.Fritch. F.E. 1945. Structure and reproduction of Algae. Volume. I & II. Cambridge University press.

2.Smith G.M.1955.Cryptogamic Botany. Vol.1 McGraw Hill

3.Chapman ,VJ& Chapman ,D.j. 1981 .The Algae ,Macmillan

4.Vasishta. B.R;1990. Botany for degree students, Algae, S.Chand & Co

5.Singh. V; Pandey,P.C & Jain, D.K,1998.AText book of Botany for under graduate students. Rastogi publications.

6.Bold Hc and Wyne M. J.1978 Introduction to the Algae : Structure and function Practice Hall of India New Delhi.

7.Borowitzka, M. A & Borowitzka, L.J. Microalgal Biotechnology.

8.Sasson, A. Biotechnologies challenges and promises UNESO.

9.Srivatsatava, H. S. An Introduction to Biotechnology Willy eastern

10.Trehan, M. D; Boffey,S; Goulding R.A & Stanbury, P. Bio-technology, The Biological Principles. Tata McGraw Hill.

11.Kumaresan,V. Biotechnology, Saras publication.

THE NEW COLLEGE (AUTONOMOUS), CHENNAI – 14

Year : - I year **ALLIED ZOOLOGY & BIOTECHNOLOGY Semester :** I

(for B.Sc. Plant Biology & Plant Biotechnology, B.Sc. Chemistry Major students)

With effective from the academic year 2017-2018

Title: PAPER I ANIMAL DIVERSITY, ORGANIZATION AND FUNCTIONS

Sub. Code:17BZA101 **Credits: 4**

Teaching Hours: 7

Unit I

Scope of Zoology – Outline classification of Invertebrata upto class level with examples – Type study: Cockroach – External morphology, Digestive and Reproductive system.

Unit II

Outline classification of Chordata upto class level with examples – Type study: Fish – Digestive and Urinogenital system.

Unit III

Human parasites – Biology and life cycle of *Entamoeba histolytica* and *Taenia solium*

Unit IV

Migration in fish, Parental care in Amphibia, Identification of poisonous and non-poisonous snakes, Migration in birds, Aquatic mammals.

Unit V

Economic Zoology

Harmful organisms – Biology of pests of rice and sugarcane; Beneficial insects – Apiculture and Sericulture.

Reference Books

Ghosh and Manna (2004). Fundamentals of Zoology. New Central book Agency (P) Ltd.

Miller and Harley (2002). Zoology, 4th Edn., Tata-McGraw Hill Publ. Co, Ltd, New Delhi.

Sukla, G.S. and Upadhyay, V.B., 2000. Economic Zoology. Rastogi Publications, Meerut, India.

The New College (Autonomous), Chennai – 600 014.

I B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS – CBCS PATTERN

(Effective from the academic year 2017 – 2018)

Batch: 2017 - 2020

Title: Mycology, Lichens & Fungal Biotechnology

Core: 02

Credits: 5

Semester: II

Work load: 6 Lecture Hours and 2 Practical Hours per week

Unit I:
General characters – Occurrence of Fungi, Mycelial structure, Mode of nutrition and Reproduction.

Unit II:
Classification of Fungi – (Sub class level) Alexopoulos & Mims 1979. Economic importance of Fungi - Food, Manures, Medicines and Industrial uses.

Unit III:
Detailed study of structure, reproduction and life cycles of *Albugo, Peziza* and *Puccinia.*

Unit IV:
General account of Lichens – Classification – Occurrence and distribution – Structure and mode of reproduction of crustose, foliose and fruticose lichens. Economic importance of lichens. Detailed study of *Usnea.*

Unit V:
Isolation and cultivation of *Yeast* and *Aspergillus* as SCP. Mushroom cultivation – Paddy Straw mushroom (*Volvariella volvacea*) and Oyster mushroom (*Pleurotus sajor-caju*), Nutritional Value and methods of cultivation. Mycorrhiza - VAM – structure, mass culture, application and importance of VAM fungi.

Practical: All the items included in the Theory.

Reference Books:

1.Alexopoulos, C.J & Mims C.V,1979,Introductory Mycology, John Wiley & sons.

2. Vasishta ,B.R. 1990 Botany for degree students, Fungi, S.Chand& Co

3.Singh,V, Pandey ,P.C and Jain, D.K;1998.A text book of botany for Undergraduate students.Rastogi publications.

4.Dube H.C.1993.An introduction to Fungi .Vikas, New Delhi.

5.Sasson, A. Biotechnologies challenges and promises UNESO.

6.Srivatsatava, H. S. An Introduction to Biotechnology Willy eastern

7.Trehan, M. D; Boffey,S; Goulding R.A & Stanbury, P. Bio-technology, The Biological Principles. Tata McGraw Hill.

8.Kumaresan,V. Biotechnology, Saras publication.

THE NEW COLLEGE (AUTONOMOUS), CHENNAI – 14
Year : - I year **ALLIED ZOOLOGY & BIOTECHNOLOGY Semester :** II
With effective from the academic year 2017-2018
(for B.Sc. Plant Biology & Plant Biotechnology, B.Sc. Chemistry Major students)
Title: PAPER II GENERAL PRINCIPLES AND BIOTECHNOLOGY

Sub. Code:17BZA202 **Credits: 4**

Teaching Hours: 7

Unit I

Organisation of prokaryotic and eukaryotic cell - Structure and functions of plasma membrane, mitochondria, ribosomes, nucleus and lysosomes.

Unit II

Mendelian principles: Monohybrid and Dihybrid crosses; Chromosomes and its types – Giant chromosomes – Structure of DNA and RNA

Unit III

Chromosomal abnormalities: Klinefelter's, Turner's and Down's syndrome;

Genetic disorders: Haemophilia, Sickle Cell Anaemia, Colour blindness.

Unit IV

Ecosystem: Food chain, Food web – Pollution: Air, water and land pollution, causes, effects and preventive measures.

Unit V

Biotechnology – Definition, applications in medicine, agriculture, industry – Biopesticides and Biofertilizers.

Reference Books

Dubey , R.C., (2005). Biotechnology. S. Chand and Co. Ltd.

Verma, P.S. and Agarwal, V.K. (2001). Cell and Molecular Biology, 8th edition.

Arumugam, N. 2014. Cell Biology and Molecular Biology. Saras publication, Nagercoil.

Verma, P.S and V.K. Agarwal 2002. Genetics, S. Chand and Co., New Delhi.

Arumugam, N. 2014. Concepts of Ecology. Saras Publication. Nagercoil.

The New College (Autonomous), Chennai – 600 014.

II B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2018 – 2019)

Batch: 2017 - 2020

Title: Microbes, Bryophytes, Pteridophytes &Gymnosperms

Core: 03

Credits: 5

Semester: III

Work load: 6 Lecture Hours and 2 Practical Hours per week

Unit I:

Bacteria: Occurrence, general characteristics, structure, reproduction and economic importance. Virus: Characteristic features, structure and life - cycle of a plant virus (TMV). Bacteriophages – structure and reproduction.

Unit II:

General characteristics features and classification of Bryophytes (Watson, 1967), Distribution, structure, reproduction and life cycle of *Marchantia* and *Polytrichum*. (No developmental studies).

Unit III:

General characteristics features and classification of Pteridophytes (Reimer, 1954) Stelar evolution, Apospory, Apogamy and Heterospory – Leptosporangiate and Eusporangiate.

Unit IV:

Detailed study of structure, reproduction and life cycle *of Lycopodium* and *Marsilea* (No developmental studies).

Unit V:

General characteristics features and classification of Gymnosperms (K. R. Sporne, 1965) Detailed study of structure, reproduction and life cycle *of Pinus.*

Practical: All the items included in the Theory.

Reference Books:

1.Parihar .N.S; 1967 .An introduction to Bryophyta Vol-I &II . General Book Depot.

2.Prempuri,1973 Bryophytes-Abroad perspective, Atmaram & Sons.

3.Smith. G.M; 1955.Cryptogamic Botany. Vol-II.McGraw Hill

4.Sporne, K.R;1976, Morphology of Pteridophytes, BI Publications.

5.Vasishta, B.R.1978. Bryophytes. S.Chand &Co

6.Vasishta ,P.C, 1976. Botany for degree students VolIV, S.Chand& co

7.Chamberlain. C.J 1957 Gymnosperms.Structure & Evolution.

8.Sporne, K.R: 1967 .Morphology of Gymnosperms.Chand & co

9.Vasishta. P.C;1971. Pteridophytes.S.Chand & Co.

10.Misra ,A. and Agarwal, R.P.1978. Lichens – A preliminary text. Oxford.

THE NEW COLLEGE (AUTONOMOUS), CHENNAI 600014

B.Sc. DEGREE BRANCH – IV CHEMISTRY

CBCS Pattern SYLLABUS (Effective from 2017-2018)

ALLIED CHEMISTRY – I:

FOR PLANT BIOLOGY AND ZOOLOGY MAJOR STUDENTS

SEMESTER III: **TEACHING HOURS: 90**

Code: 17BEA301 **CREDITS: 3**

UNIT – I **(15 hours)**

1.1 **Basic Chemistry:** Aufbau principle – Pauli's exclusion principle - Hund's rule – Electronic configurations of the elements.

1.2 Modern periodic law- long form of periodic table – definition and periodicity in properties -atomic radii - ionic radii -ionization potential -electron affinity- electronegativity.

1.3 Types of bonds- ionic, covalent, coordinate and metallic bonds.

UNIT–II **(15 hours)**

2.1 **Vitamins**-fat soluble vitamins- A, D, E and K-water soluble vitamins. Vitamins B_1, B_2, B_3, B_5, B_{12} and Vitamin C-source, function and deficiency.

2.2 Enzymes-Nomenclature and classification, Mechanisms of enzyme and co-enzyme reactions.

2.3 **Hormones:** Introduction-properties and chemical nature of hormones-structure and physiological functions of adrenaline, thyroxin and insulin.

UNIT–III **(15 hours)**

3.1 **Sugar Chemistry** - Sugar Industry in India- Sugarcane and Sugar Bett - Manufacture of Cane Sugar. Extraction of Juice- Concentration - Separation of crystals - Recovery of glucose from molasses defection. Sulphitation and carbonation- Testing and Estimation of Sugar. Double Sulphitation process.

3.2 **Preparation of Bagasse** - Use of Bagasse for manufacture of paper and electricity Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol Manufacture of Rectified spirit, Methylated spirit - Power Alcohol.

UNIT–IV Food Chemistry **(15 hours)**

4.1 **Food additive**- artificial sweeteners -saccharin cyclamate and aspartame- food flavors Esters and aldehydes (any two) antioxidants- emulsifying agents (any two) food preservatives - vinegar and citric acid- leavening agents- baking powder- yeast . Taste enhancers- Monosodium glutamate (MSG) and Ajinomoto.

4.2 **Beverages**-soft drinks-composition of soft drinks-Adverse effect of beverages.

4.3 **Adulterants in food**-definition, classification, injurious adulterants/contaminants in foods and their health effects, simple method of detection and prevention of food adulterants.

UNIT – V **(30 Hours)**

5.1 **Insecticides and Pesticide** - Definition - classification Inorganic pesticides; lead arsenate, Paris green, lime, sulphur, hydrocyanic acid- organic pesticides, (DDT and Gammexane) Fungicides - repellants.

5.2 **Fertilizer** - Definition - nutrients for plant - role of various elements in plants growth natural and chemical fertilizers - classification of chemical fertilizers –NPK fertilizer, urea, super phosphate and potassium nitrate - mixed fertilizer industry in India.

5.3 **Petrochemicals** - Elementary study - definition - origin - octane number, classification, Fuels, calorific value of fuels-, Fuel gases- natural gas, water gas, producer gas, LPG and biogas (composition and uses only).

ALLIED: PAPER - III

Subject	Code
Statistical Methods & their Applications – I *(for B.Sc. Computer Science, Zoology, Plant Biology & Plant Biotechnology)*	

YEAR	SEMESTER	CREDITS	LECTURE HOURS
II	III	4	135

Objective: To introduce basic Statistical tools for collection interpretation of data.

Unit - I:

Nature and scope of statistical methods and their limitations – classification, tabulation and diagrammatic representation of various types of statistical data.

Unit - II:

Frequency curves and Ogives – graphical determination of percentile, quartiles and their uses Lorenz curve.

Unit - III:

Measures of location: Arithmetic mean, median, mode, geometric mean harmonic mean and their properties merits and demerits.

Unit - IV:

Measures of dispersion: Range – mean deviation – quartile deviation – standard deviation – coefficient of variation – skewness and kurtosis and their properties.

Unit – V:

Fundamentals of Probability – Addition and multiplication theorems and simple problems

Text Book:

Elements of Mathematical Statistics

-by S.C. Gupta & V.K. Kapoor

Unit I: *Chapter 9 (Page 281 to 299)*
Unit II: *Chapter 9 (Page 299 to 321)*
Unit III: *Chapter 10 (Page 321 to 347)*
Unit IV: *Chapter 11 (Page 390 to 111,* ***Omit Sections 11.14 to 11.18)***
Unit V: *Chapter 13 (Page 468 to 483)*

Question pattern:

- Section-A: 10 x 2 = 20 marks. (2 questions from each unit ant the final 2 questions from any unit)
- Section-B: 5 x 5 = 25 marks . Answer any FIVE out of EIGHT questions. (2 questions from each unit)
- Section-C: 3 x 10 = 30 marks. Answer any THREE out of FIVE questions. (Each question from first 4 units and the final question from any unit)

The New College (Autonomous), Chennai – 600 014.

II B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2018 – 2019)

Batch: 2017 - 2020

Title: Plant Anatomy & Embryology of Angiosperms

Core: 04

Credits: 5

Semester: IV

Work load: 6 Lecture Hours and 2 Practical Hours per week

Unit I:

Meristem – Characteristics, Classification; Theories of Shoot apex and Root apex Organization, Apical Cell Theory, Histogen Theory, Tunica Corpus Theory, Zonation Theory and Quiescent Center Concept.

Unit II:

Normal secondary thickening in Dicot stem (*Tridax*) and Dicot root (Bean).
Anomalous secondary growth in Dicot stems (*Nyctanthes* and *Boerhaavia).*
Monocot stem – Normal (*Chloris*) Anomalous (*Dracaena).*

Unit III:

Nodal anatomy – Unilacunar, Trilacunar and Multilacunar. Anatomy of Monocot and Dicot leaves. Stomata – structure and types.

Unit IV:

Microsporangium and Microsporogenesis; Development of Male gametophyte Ovule –types; Development of Female gametophytes – Monosporic (*Polygonoum*) Bisporic (*Allium*) and Tetrasporic (*Peperomia*).

Unit V:

Fertilization – Double fertilization and Post fertilization changes. Development of Endosperm – Nuclear, Cellular and Helobial). Dicot (*Capsella bursapastoris*) and Monocot (*Luzula forsteri*) Embryo development; Apomixis.

Practical: All the items included in the Theory.

Reference Books:

1. Pandey, B. P.1997. Plant Anatomy. Chand & Company (V. edition).
2. Esau, K. 1985. Anatomy of seed plants John Willey.
3. Cutter, E. G. 1989. Plant Anatomy Part -1; Addison – Wesely Publishing Company.
4. Fahn, 1985. Plant Anatomy. Hakkibutz Hameuhad Publishing House Ltd.
5. Vashista, P. C. 1991. A Text book of Plant Anatomy. S. Nagin & Company.
6. Maheswari, P. 1991. An Introduction to Embryology of Angiosperms. Tata – Mc Graw Hill Pub. Co.Ltd.
7. Swamy, B. G. L & Krishnamoorthy, K. V. 1990. From flower to fruits, Tata – Mc Graw Hill Pub. Co.Ltd.
8. Bhojwani, S. S & Bhatnagar, S. P. 1987. Embryology of Angiosperms, Vikas Publishing Houses, Pvt. Ltd.

THE NEW COLLEGE (AUTONOMOUS), CHENNAI 600014

B.Sc. DEGREE BRANCH – IV CHEMISTRY

CBCS Pattern SYLLABUS (Effective from 2017-2018)

ALLIED CHEMISTRY – II:
FOR PLANT BIOLOGY AND ZOOLOGY MAJOR STUDENTS

SEMESTER IV: **TEACHING HOURS: 90**

Code: 17BEA402 **CREDITS: 3**

UNIT – I **(15 hours)**

1.1 **Carbohydrates:** Classification-mono, oligo and polysaccharides. Reducing and non-reducing sugars. Structures of Glucose and Fructose.

1.2 **Amino acids:** Classification-acidic, basic and neutral; essential and non-essential amino acids-Prepartion of alpha amino acids (glycine)-isoelectric point and zwitter ion.

UNIT – II **(15 hours)**

2.1 **Paper Technology:** Introduction, Manufacture of Pulp, various raw materials used for the preparation of Pulp. Preparation of Sulphite Pulp, Soda Pulp, Rag Pulp. Various Processes: Beating Refining, Filling sizing and colouring. Manufacture of paper, calendaring, uses.

2.2 **Milk Chemistry:** Composition of milk-physical properties of milk-effect of heat on milk-pasteurisation and homogenization- milk product (cream and butter).

UNIT – III **(15 hours)**

3.1 **Medicinal Chemistry**: Classification of drugs-**Sulpha drugs**: synthesis of sulphanilimide, structure and uses of **sulphadiazine** and **sulphamethoxazole**-**Antibiotic**s: Broad spectrum antibiotics and their uses (structural elucidation is not required)-**Antipyretics**: synthesis and uses of **aspirin**.

UNIT – IV **(30 hours)**

4.1 **Water Quality Analysis** - Chemical and physical analysis of water quality parameters - Standards prescribed for water quality by WHO and other Indian Standards. Sea water as a source of drinking water - Electrodialysis method and reserve osmosis method for purifications of water.

4.2 **Sewage Treatment** - Municipal waste water - sewage treatment - Aerobic and anaerobic processes - miscellaneous method of sewage treatment.

4.3 Method of rainwater harvesting and its advantages.

UNIT – V **(15 hours)**

5.1 **Common diseases and their treatments-** Definition-Insect born diseases-malaria and filariasis-Air born diseases-diphtheria and tuberculosis, water born diseases - cholera, typhoid-treatment and prevention.

5.2 **Micronutrients and their biological role**- Biological function of some micro minerals Iron, Copper, Iodine, Fluorine, Zinc.

ALLIED PAPER - IV

Subject	Code
Statistical Methods & their Applications – II *(for Computer science, Zoology, Plant Biology & Plant Bio-technology)*	

YEAR	SEMESTER	CREDITS	LECTURE HOURS
II	IV	4	135

Objective: To introduce basic Statistical tools to computer & Life sciences oriented problems.

Unit - I:

Concept of Correlation coefficient- Scatter diagram -Karl-Pearson's correlation and rank correlation coefficient - regression lines

Unit - II:

Curve fitting by method of least squares $y = ax + b$; $y = ax^2 + bx + c$
$y = ae^{bx}$; $y = ab^x$

Unit - III:

Standard Probability distributions – Binomial, Poisson and Normal distribution – fitting of distribution.

Unit - IV:

Concept of sampling distribution – standard error – Test of significance based on large sample, t, chi-square and F distributions with respect to mean and variance.

Unit – V:

Principles of scientific experiments randomization, replication and control. Analysis of variance: one way and two way classification – analysis of CRD and RBD – Latin square designs.

Text Book:

Elements of Mathematical Statistics

-by S.C. Gupta & V.K. Kapoor

Unit I: *Chapter 9 (Page 281 to 299)*
Unit II: *Chapter 9 (Page 299 to 321)*
Unit III: *Chapter 10 (Page 321 to 347)*
Unit IV: *Chapter 11 (Page 390 to 111,* ***Omit Sections 11.14 to 11.18)***
Unit V: *Chapter 13 (Page 468 to 483*

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III B. Sc PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Morphology &Taxonomy of Angiosperms

Core: 05

Credits: 5

Semester: V

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Morphology

Inflorescence - Definition and types – Racemose, cymose , Mixed and special types.

Flower - Parts, Symmtery, Floral diagram and Foral formula

Fruits and Seed - Classification & Types.

Unit II:

Taxonomy and its importance, Concept of a taxon – genus and species. Binomial nomenclature, I.C.B.N, Taxonomic Hierarchy and Herbarium techniques.

Unit III:

Type of classifications – 1.Artificial (Linnaeus) 2.Natural (Bentham & Hooker) only outline classification needed – merits and demerits.

Unit IV:

A detailed study of the range of characters of the following families and their economic importance – Dicotyledons – Annonaceae, Capparidaceae, Sterculiaceae, Cucurbitaceae, Verbenaceae, Rubiaceae and Acanthaceae.

Unit V:

A detailed study of the range of characters of the following families and their economic importance – Monochlamydae – Amaranthaceae and Moraceae.

Monocotylendons – Cannaceae, Orchidaceae, Commelinaceae and Poaceae.

Practical: All the items included in the Theory.

Conduct Flied trip/ Botanical study tour and prepare Herbarium submit at the time of Practical Examination.

Reference Books:

1.Lawrence, G.H.M. 1985. An introduction to plant Taxonomy, Central book depot, Allahabad.

2.Porter CL. 1982. Taxonomy of flowering plants .Eurasia Publication House , New Delhi

3.Rendle .A. B. 1980. The Classification of flowering plants (Vol.1&2) Vikas students Edn.

4.Pandey B.P. 1987. Taxonomy of Angiosperms.

5.Kaushik,M.P. 1997. Mordern Botany ,Prakash publications, Muzaffarnagar(UP)

6. Mitra, J.N Mitra, D & Chowdhuri, S.K 1990. Studies in Botany, Vol.1 Moulik Library, Calcutta.

7.Hutchinson,J; 1969. Evolution & Phylogeny of flowering plants. Academic Press: London.

The New College (Autonomous), Chennai – 600 014.

III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Cytogenetics & Genetic Engineering

Core: 06

Credits: 5

Semester: V

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

The Cell – cell types – Prokaryotic and Eukaryotic; Structure and functions of Cell Wall, Cell membrane, Mitochondria, Chloroplast, Endoplasmic Reticulum, Golgi bodies & Ribosome.

Unit II:

Nucleus &Chromosomes - Structure and functions. Cell division – Cell cycle, Mitosis and Meiosis.

Unit III:

Mendelism; Monohybrid, Dihybrid cross – Gene interactions. Linkage and crossing over, chromosome map and sex determination in plants.

Unit IV:

Extra nuclear inheritance, inheritance of Mitochondrial and Chloroplast genes. Mutation and Polyploidy.

Unit V:

Genetic engineering – Procedure - Restriction enzymes – pBR 322 plasmid as vector – methods of r DNA formation –Multiplication of host cell and cloning of genes – Genetic engineering in plants – applications of Genetic engineering.

Practical: All the items included in the Theory.

Reference Books:

1.Brown W.V and Bertke , E.M.1974. A text book of cytology C.V Mosley Co . St.Louis.
2.Cohn, NS 1979. Elements of cytology , Freeman book co
3.De Robertis E.M.P and De RobertisE.M.F. Jr. 1987. Cell and Molecular Biology Lea and Febiger.
4.Verma P.S and Agarwal V.K. 1995. Cell Biology and Evolution.
5.Freifelder D.Essentials of Molecular Biology,jorner and Bartlette pub inc.Boston.
6. Freifelder D. 1990. Molecular Biology ,Narosa Publishers
7.Watson J.D. et al. Molecular biology of the gene .The Benjamin/Cummings.
8. Freifelder D. Microbial genetics. Jones & Bartlette Publications
9. Brown, TA; Gene cloning.
10.Stanfield, W.D. Genetics 2nd Ed, McGraw Hill.
11.Goodenough, V. Genetics 3rd Ed, Saunders College publishing.
12.Freifelder D. Microbial genetics. Jones & Bartlette pub.Inc.Boston
13.Verma & Agarwal ,Genetics ,Chand & Co
14.Lewin . B Gene IV Oxford University press
15. Shukla, R.S & Chandel, P.S. Cytogentics.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 – 2020

Title: Plant Ecology & Environmental Biotechnology

Core: 07

Credits: 5

Semester: V

Work load: 4Lecture Hours and 2 Practical Hours per week

Unit I:

Ecosystem – concept; structure and functional components. Food chain; Food web; Energy flow; Agro ecosystem.

Unit II:

Plant succession; Hydrosere and Xerosere; Adaptations – Hydrophytes, Xerophytes and Halophytes .

Unit III:

Biodiversity and its conservation – In –situ and Ex- situ. Phytogeographic regions of India – Ever green forests, Deciduous forests and Scrub Jungles

Unit IV:

Biological waste treatment – Sewage treatment, primary, secondary and tertiary treatments – compost making – solid waste management.

Unit V:

Bioremediation – Insitu bioremediation, composting, land farming and digestion in above ground reactors.

Biodegradation – Xenobiotics, Biomining leaching, methodology and advantages of biomining and removal of metals from water.

Practical: All the items included in the Theory.

Reference Books:

1.Allen,H.Benton William,E.Werner .1976. Field Biology & Ecology . McGraw HillPub.Ltd.

2.Smith, W.H.1981. Air pollution and forest: interactions between air contaminants and forest ecosystems.

3.Odum, E.P.1983.Basic Ecology. Holt-Sanders international editions.

4.Mabberly. O.J; 1983 .Tropical rain forest ecology .Blackie& Sons Ltd

5.Singh. D.V.1985. The peoples representations and Global environment

6.Shukla . R.S &Chand P.S. 1990. Plant Ecology . S.Chand co.Pvt. Ltd

7.Kumar, H.D.1990 Mordern Concept of Ecology Vikas Pub. House Pvt.Ltd

8.Gupta, P. K. Elements of Biotechnology, Rastogi and company.

9.Kumaresan,V. Biotechnology, Saras publication.

10. Dubey, R. C. Text book of Biotechnology .S.Chand co. New Delhi.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Plant Pathology

Core: 08

Credits: 5

Semester: V

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:
A brief history of Plant Pathology; Principles of Plant Pathology; Symptomatology - Study of infection – Entry of Fungal, Bacterial and Viral Pathogens.

Unit II:
Dissemination of Pathogens – spore dispersal, role of vector in viral transmission, influence of Weather – Wind, Temperature and Humidity.

Unit III:
Disease resistance – Morphological, cytological, biochemical and genetical basis. Role of toxins and enzymes in plant pathogenesis.

Unit IV:
Modern methods of disease forecast – Epiphytotics – causes, course, decline and prophylaxis; cultural, breeding and chemical control - Protectant and systemic Fungicides.

Unit V:
Study of causal organisms, symptoms and control of (a) Little Leaf of Brinjal; (b) Red Rot of Sugarcane; (c) Bacterial Blight of Rice; (d) Citrus Canker; (e) Tikka disease of Groundnut and (f) Leaf Curl of Papaya.

Practical: All the items included in the Theory.

References:

1. Wheeler, B. E. J. 1992.An introduction to plant diseases. Oxford & IBH.
2. Rengasamy, G. Diseases of crop plants of India. Prentice Hall.
3. Singh, R. S. Plant diseases. Oxford & IBH.
4. Pandey, B. P. Plant Pathology.
5. Vasishta ,B.R. 1990 Botany for degree students, Fungi, S.Chand& Co
6. Singh,V, Pandey ,P.C and Jain, D.K;1998.A text book of botany for Undergraduate students. Rastogi publications.
7. Mehrotra, R. S and Ashok Aggarwal. 2010. Plant Pathology. Tata McGraw – Hill.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Herbal Medicine

Core: 09

Credits: 5

Semester: V

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Importance and relevance of Herbal Medicine – Pharmacognosy – Aim and Scope: Indigenous systems of Medicine, Phytochemicals – reserve materials carbohydrates, proteins and lipids; Secretory materials – Latex. Secondary metabolites - Alkaloids, Glycosides, Tannins, Resins and Gums.

Unit II:

Botanical description and active principles of leaves (*Digitalis* and *Coca*), Flowers (Rose and Saffron), Fruits (Pepper and Fennel), Seeds (Castor and Black seeds) and whole plants (*Vinca* and *Phyllanthus*).

Unit III:

Pharmacognosy of some selected herbs; Root (*Rauwolfia*), Rhizome (*Zingiber*), Bark (*Cinnamomum*) and Leaf (*Senna*).

Unit IV:

Adulteration of crude drugs and its detection, Spoilage, Contamination and Storage. Medicinal uses of non flowering plants.

Unit V:

Standardization of Crude Drugs by Anatomical and Phytochemical methods.

Practical: All the items included in the Theory.

Reference books

1. Agarwal, O.P. 1985. Chemistry of Organic – Natural products Vol-II
2. Gamble, J.S and Fisher, 1921. CEC. Flora of the Presidency of Madras I, II, and III Volumes.
3. Mathew K.M. 1988. Flora of the Tamil Nadu and Carnatic
4. Nair N.C and Henry, A.N. 1983. Flora of Tamil Nadu, Botanical survey of India.
5. Chopra R.N Nagar S.L and Chopra I.C., 1956. Glossary of Indian Medicinal Plants.
6. Chopra R.N., Chopra I.C. Handa K.L and Kanpur L.D., 1994. Indigenous drugs of India.
7. Chopra R.N., Badhuvar R.L & Gosh G., 1965.Poisonous Plants of India.
8. Wallis, T.E.1967. Text book of Pharmacognosy.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Plant Tissue culture

Core: 10

Credits: 5

Semester: VI

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction-History of plant tissue culture-Laboratory organization-tools and techniques of plant tissue culture.

Unit II:

Sterilization-methods of sterilization-medium and its preparation-Plant Growth Regulators (PGR), Macro & Micro nutrients, Vitamins and its roles in tissue culture.

Unit III:

Culture initiation-Explant-Totipotency-Dedifferentiation-Redifferentiation-Various types of culture-Callus culture, Cell culture, Anther culture, Meristem culture. Organogenesis-Direct & Indirect.

Unit IV:

Micropropagation-Methods of micro propagation, somatic embryogenesis- Plant protoplast-Isolation, Culture and Somatic hybridization- Somaclonal variation, Secondary plant products-Secondary metabolites of plants, origin, factors affecting the production in culture.

Unit V:

Bio-transformation-Bio reactor- Cell immobilization-Synthetic seeds technology and applications of plant tissue culture-impacts on industry, forestry, agriculture and horticulture.

Practical: All the items included in the Theory.

Reference Books:

1. Kumaresan,V. Biotechnology, Saras publication.
2. Dubey, R. C. Text book of Biotechnology .S.Chand co. New Delhi.
3. Timir Baransha, Biswajit Ghash. Plant tissue culture.
4. Narayanaswamy, S. Plant cell and Tissue culture.
5. Kavi Kishor - Plant tissue culture and Biotechnology (Emerging Trends)
6. Dwivedi, P. 2004. Plant tissue culture. Scientific Publishers (India).
7. Mahipal Singh Shekawat, Plant Cell and Tissue Culture, Saras Publication.
8. Kalyan Kumar De, Plant Tissue Culture, New Central Book Agency.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Plant Physiology & Biochemistry

Core: 11

Credits: 5

Semester: VI

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Transpiration – types – cuticular, lenticular and stomatal. Mechanism of transpiration – stomatal movement – starch – sugar hypothesis, Steward's hypothesis and theory of potassium transport. Factors affecting transpiration and importance of transpiration.

Unit II:

Photosynthesis –Radiant energy, Absorption spectrum, Action spectrum, Hill reaction, Red drop and Emerson Enhancement effect; Pigment systems – I and II. Light reactions – cyclic & Non cyclic – Carbon Assimilation – C3 and C4 cycles. Factors affecting photosynthesis and significance of photosynthesis.

Unit III:

Respiration –Types - Anaerobic , Aerobic – Glycolysis, Kreb's cycle. Electron Transport system, Oxidative Phosphorylation & Respiratory Quotient. Factors affecting respiration. Photorespiration (C2 cycle)

Unit IV:

Carbohydrates – classification of carbohydrates – chemistry of monosaccharides, disaccharides, trisaccharides and polysaccharides. Significance of Carbohydrates.

Unit V:

Proteins and lipids – classification of proteins, structure of proteins – primary, secondary, tertiary and quarternary; Denaturation and re-naturation of proteins.

Classification of lipids – single lipids, triglycerides. Compound lipids – phospholipids, glycolipids, lipoproteins and derived lipids (steroids). Importance of lipids.

Practical: All the items included in the Theory.

References:

1.Arditti,J &Dunn, A. 1969. Experimental plant physiology. Holt, Rinehart and Wintston.
2.Devlin , R.M.1966. Plant physiology. Affiliated East West Press.
3. Devlin, R. M &Witham, F.H. 1985. Plant Physiology.
4. Noggle, G.R & Fritz, G. J. 1982. Introductory Plant Physiology. Prentice private Limited.
5. Pandey, S. N & Sinha, B. K. 1985. Plant Physiology. Vani Eductional Books.
6. Roa, K. N; Sudhakara Roa, G & Bharathan. S. 1987. The functioning plant S. Viswanathan Pvt. Ltd.
7. Salisbury, F. B & Ross, C.W. 1986. Plant Physiology. CBS Publisher and distributors.
8. Bajracharya, D. 1999. Experiments in Plant Physiology. A Laboratory Manual.
9. Rasool, S. k & Sekar, T. 2004. Allied Botany. Popular Book Depo, Chennai.
10. Verma, S. K- A text book of plant physiology and biochemistry. S.Chand & compamy Ltd.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Industrial Biotechnology

Core: 12

Credits: 5

Semester: VI

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction to fermentation technology. Stages of fermentation – design of fermentor – formulation of medium – sterilization – isolation, selection and culture of microorganism-Fermentation products.

Unit II:

Designing of bioreactors –Bioreactor – salient features – types of bioreactors; stirred tank bioreactor, Air – lift bioreactor, Cylindro – conical bioreactor, Hollow – fibre bioreactor and Cyclone column bioreactor; Strain development.

Unit III:

Microbial production of enzymes – Advantages – selection process and improvement of organisms –culture of microbes – extraction of enzymes – separation – purification – storage of enzymes. Application of microbial enzymes.

Unit IV:

Bio-fuels: Ethanol – industrial production and applications. Biogas – Production of Biogas – Biogas plants - stages of methanogenesis. – uses of Biogas.

Unit V:

Microbial production of Amino acids – L-Glutamic Acid, L- Lysine, L- Threonine, L- Serine, L-Leucine, L- Histidine, L- Alanine, Aspartic acid, Proline, Cystine, Methionine, Tryptophan, Phenylalanine and Tyrosine.

Practical: All the items included in the Theory.

Reference Books:

1. Borowitzka, M. A & Borowitzka, L.J. Microalgal Biotechnology.
2. Doods, J.H & Roberts, L.W. Experimentals in plant tissue culture. Cambridge University Press
3. Sasson, A. Biotechnologies challenges and promises UNESO.
4. Srivatsatava, H. S. An Introduction to Biotechnology Willy eastern
5. Trehan, M. D; Boffey,S; Goulding R.A & Stanbury, P. Bio-technology, The Biological Principles. Tata McGraw Hill.
6. Wiseman, A. Principles of Biotechnology – 2nd edition, Surrey University Press UK.
7. Kumaresan,V. Biotechnology, Saras publication.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Plant Microtechnique

Core: 13

Credits: 5

Semester: VI

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Light Microsocopy – History and Optical principles use and care of microscopes – Types: Bright field, Dark field, Polarizing and Fluorescence. A brief study of Electron Microscopes –T.E.M and S.E.M.

Unit II:

Principles and techniques – Fixation, Dehydration, Clearing, Infiltration and Staining – Types.

Unit III:

Semi- permanent and permanent microscopic preparation.

Unit IV:

Special techniques – Squash – Smear and Maceration.

Unit V:

Microtomy – Types of microtomes – Rotary and Sledge and their uses.

Practical: All the items included in the Theory.

References:

1. Johansen, D. A. 1940. Plant Microtechnique. Tata McGraw Hill.
2. Sasse John, E. 1964. Botanical Microtechnique.Oxford & IBH.
3. Grav, P. 1964. Hand Book of Basic Microtechniques. McGraw Hill.
4. Alan Peacock, H. 1966. Elementary Microtechnique.Edward Arnoid (Publishers) Ltd.
5. Duddington, C. L. 1960. Practical Microscopy. Pitman.
6. Mc Cluney, C.L. 1961. Hand book of Microscopical Technique. Wafner.

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III B. Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

SYLLABUS –CBCS PATTERN

(Effective from the academic year 2019 – 2020)

Batch: 2017 - 2020

Title: Horticulture

Core: 14

Credits: 5

Semester: VI

Work load: 4 Lecture Hours and 2 Practical Hours per week

Unit I:

Introduction – scope and division of Horticulture. Gardening – formal and informal style, garden components – living and non – living, garden implements and accessories.

Unit II:

Preparation of soil mixture, Organic farming – Composting and Vermiculite
Nursery structures – nursery beds, propagating frames, hot beds and green house.
Nursery Management – Seedage, Cuttage, Layerage and Graftage.

Unit III:

Types of Garden – Indoor garden -Terrarium, hanging baskets and Bonsai. Public garden, Kitchen garden, Terrace garden. Preparation of Lawn and Hydroponics.

Unit IV:

Garden Techniques - Potting, Repotting, Staking, Mulching, Planting and Transplantation; Pruning and special pruning techniques.

Unit V:

Commercial floriculture: production of cut flowers.Types of flower arrangements.
Cultural practices of Rose and Jasmine.

Practical: All the items included in the Theory.

References:

1. Kumar, N 1990. Introduction to Horticulture. Rohini agencies Nagarcoil.
2. Prasad. 2005 Principles of Horticulture. International book dist, Dehradun.
3. Chauhan,D.V.S. 1968. Vegetable production in India .Ram Prasad . SMS Agra.
4. Edmund, J.B; Senn, T.L Andrews F.S and Halforce R.G 1990. Fundamentals of Horticulture 14th edn. Tata McGraw Hill Pvt .Co. London.
5. Gopalaswami Iyengar, K.S. 1970. Complete gardening in India. Kalyan press. Bangalore.
6. Jules, J. Janick, J. 1982. Horticulture science, 3rd Edition Surjeet publication. New Delhi.
7. Nayak, K.1963. South Indian fruits and their culture.
8. Randhawa, G.S. 1973. Ornamental Horticulture in India. Today and Tomorrow printers and publishers, New Delhi.
9. Percy Lancaste. 1979. Gardening in India. Mohan Makhijani and Rekha printers. New Delhi.