Course Name: Bachelor of Science
Discipline: Botany
(For those who join in 2024 and after)
Eligibility for admission

Higher secondary students with Biology as Background

Duration of the course: Three years
Course Scheme:

I year B.Sc. BOTANY

Semester	Part	Subject Name	Hours	Credit	Int + Ext =Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
I	Part I	**Tamil**	6	3	25+75=100												**U24PT11**	**New**
	Part II	English	6	3	25+75=100												U23PE11	No Change
	Core -I	**Algae and Bryophytes**	6	4	25+75=100				✔					✔	✔	✔	**U24BYC11**	**New**
	Allied	General Chemistry - I	4	3	25+75=100												**U24CHAY11**	**Mark Change/ Sem Change**
	Allied Lab	**LAB:** Volumetric Analysis	2	-	-												----	
	Core Practical -I	**LAB : Algae and Bryophytes**	2	1	40+60=100				✔					✔	✔	✔	**U24BYCP11**	**New**
	SBE 1	**LAB: Horticulture**	2	2	40+60=100				✔					✔	✔	✔	**U24BYSP11**	**Revised 20%**
	SBE 2	**Embryology of Angiosperms**	2	2	25+75=100				✔					✔	✔	✔	**U24BYS11**	**New**
	Total		**30**	**18**														
II	Part I	**Tamil**	6	3	25+75=100												**U24PT21**	**New**
	Part II	English	6	3	25+75=100												U23PE21	No Change
	Core -II	**Herbal Technology**	6	4	25+75=100				✔					✔	✔	✔	**U24BYC21**	**Revised 10%**
	Core Practical-II	**LAB: Herbal Technology**	2	1	40+60=100				✔					✔	✔	✔	**U24BYCP21**	**Revised 10%**
	Allied	General Chemistry - II	4	3	25+75=100												**U24CHAY21**	**Mark Change/ Sem Change**

	Allied Lab	**LAB:** Volumetric Analysis	2	2	40+60=100				✔					✔	✔	✔	U22CHAYP21	No Change
	SBE 3	**Plant Ecology and Phytogeography**	2	2	25+75=100				✔					✔	✔	✔	**U24BYS21**	**New**
	SBE 4	**LAB: Techniques in Cell Biology**	2	2	40+60=100				✔					✔	✔	✔	**U24BYSP21**	**Revised 10%**
	Total		**30**	**20**														

Year	Part	Subject	Credit	Int = Total	Code
I & II	Part V	NSS / NCC / Physical Education/ YRC / RRC	3	100 = 100	U22NS4 / U22NC4 / U22PS4 / U22YR4 / U22RR4

Course Title : Core - I -ALGAE AND BRYOPHYTES	**Total Hours : 90**
Course Code : U24BYC11	**Total Credits : 4**

Course Outcomes:

COs	CO Statement
CO1	Provide basic knowledge and expose to the habit of algae
CO2	Know the systematics, morphology and structure of Algae.
CO3	Understand the life cycle pattern and uses of Algae.
CO4	Understand the morphological diversity of Bryophytes.
CO5	Familiarize with the economic importance of the Bryophytes

Unit I **18-Hours**

General characters of Algae; Classification of algae by Fritsch; Economic importance of Algae.

Unit II **18- Hours**

Study of the distribution, structure, reproduction and life history of the following Genera:

i) *Oscillatoria*
ii) *Caulerpa*
iii) *Vaucheria*

Unit III **18- Hours**

Study of the distribution, structure, reproduction and life history of the following Genera:

i) Pennate Diatoms
ii) *Sargassum*
iii) *Polysiphonia*

Unit IV **18- Hours**

General characters of Bryophytes; Classification of Bryophytes by Rothmaler (1951); Morphology, reproduction and structure of Gametophyte and Sporophyte of *Marchantia*

Unit V **18- Hours**

Morphology, reproduction and structure of Gametophyte and Sporophyte of the following Genera

i) *Anthoceros*
ii) *Polytrichum*

Economic importance of Bryophytes.

Text Books:

1. Vasishta, B.R. Algae - S.Chand & Co. Ltd, New Delhi,
2. Pandey, B.P. College Botany - Algae, Fungi and Bryophyta Vol.1 S.Chand & Co. Ltd, Ram Nagar, New Delhi.
3. Vasishta B.R. et al, Bryophyta - S Chand & Co., Ltd, New Delhi, 2010.

Reference Books:

1. Fritsch, F.E, - The Structure and Reproduction of the Algae Vol.1 & II Vikas Publication, New Delhi, 1956.
2. Bhatia, K.N, Treatise on algae - S.Chand & Co. Ltd, New Delhi, 1975.
3. Chopra, G.L, - A text book of algae, S.Nagin & Co, New Delhi, 1969.

4. Gupta,J.S, - A text book of algae, S.Nagin& Co, New Delhi, 1987.
5. Sharma, O.P., Text book of algae, Tata MvGraw - Hill publishing company Ltd, New Delhi, 2008.
6. Smith, G.M., Cryptogamic Botany Vol.11, Tata MvGraw - Hill publishing company Ltd, New Delhi, 1958.
7. Parihar N.S., An Introduction to Bryophytes Vol.1, Central book Depot, Allahabad, 1985.

e- RESOURCES:

- https://www.biologydiscussion.com/algae/algae-definition-characteristics-and-structure-with-diagram/46727
- https://www.onlinebiologynotes.com/algae-general-characteristics-classification/
- https://www.easybiologyclass.com/characteristics-of-bryophytes-life-cycle-and-reproduction-of-phylum-bryophyta/

SEMESTER I

Part III — **Allied** Subject — **GENERAL CHEMISTRY-I for Biological Science**

Hours per week: 4 Subject Code: U24CHAY11

Credits: 3

(For those who joined from June 2024 onwards)

Course Outcomes

CO1: To study fundamental ideas on organic chemistry.
CO2: To know the basic properties of hydrogen, hydrides & oxides
CO3: To search out an idea on colloids.
CO4: To learn some important petroleum processes and fertilizers
CO5: To acquire a knowledge on polymers.

Unit I: Basic concepts of organic chemistry 12 Hours

Organic compounds — general properties and classification of organic compounds — functional groups — homologous series. Isomerism — structural isomerism and stereoisomerism — examples — Types of organic reactions: substitution, addition and elimination with examples.

Unit II: Hydrogen, Hydrides and Oxides 12 Hours

Hydrogen:

Isotopes of hydrogen — preparation, properties and uses of heavy hydrogen — ortho and para hydrogen.

Hydrides:

Definition — classification of hydrides (Saline hydrides, Metallic hydrides, Molecular hydrides and Polymeric hydrides.) — Nature of hydrides and position of hydrogen in the periodic table.

Oxides:

Definition — classification — examples.

Unit III: Colloids 12 Hours

Colloidal state of matter — various types — classification. Sols — dialysis — electroosmosis- electrophorosis — stability of colloids — protective action — Hardy Schulze law — gold number.

Emulsion: types of emulsion — emulsifier.

Gels: Classification, preparation — application of colloids.

Unit IV: Petroleum and fertilizers **12 Hours**

Refining of petroleum — composition and uses of petroleum fractions — thermal and catalytic cracking — octane number, cetane number — antiknocking agents - unleaded petroleum — petrochemicals — synthetic petrol.

Fertilizers — classification — important manures — manufacture and uses of urea — super phosphate — calcium ammonium nitrate (CAN) fertilizer.

Unit V: Polymers **12 Hours**

Polymers — general characteristics — plastics — elastomers and fibres — thermoplastics and thermosetting plastics - methods of polymerization — bulk — suspension and solution polymerization. Uses of polycarbonates — polyurethanes — epoxy resins and teflons (PTFE).

Text Books

Unit I

1. B.S.Bah1 and Arun Bah1, Advanced Organic Chemistry, S.Chand & Co., Ltd., 2008.

Unit II & III

1. B.R.Puri, L.R.Sharma and K.C.Kalia, Principles of Inorganic Chemistry, Villabh Publishing , 2003.

Unit-IV & V

1. M.K. Jain and S.C.Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2011.

Reference Books:

Unit I

1. M.K. Jain and S.C.Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2011.

Unit II

1. R.D.Madan, Satya Prakash's Modern Inorganic Chemistry, S.Chand & Co., Ltd., 2008.
2. P.L.Soni and Mohan Katiyal, Textbook of Inorganic Chemistry, Sultan Chand & Sons, 2008.

Unit III

1. P.L.Soni, Textbook of Physical Chemistry, Sultan Chand & Sons, 2008.

Unit IV

1. K.S.Tewari, N.K.Vishnoi and S.N.Mehrota, A Text book of Organic Chemistry, 2nd revised edition, Vikas publishing house PVT LTD, New Delhi, 2005.

Unit V

1. P.L.Soni, Textbook of Physical Chemistry, Sultan Chand & Sons, 2008.

e-Resources:

1. https://www.priyamstudycentre.com/chemistry/organic-compound
2. https://youtu.be/XklMKuEAWdU
3. https://www.adichemistry.com/inorganic/hydrogen/H2/hydrogen.html
4. https://en.m.wikipedia.org/wiki/Isotopes_of_hydrogen
5. https://byjus.com/jee/colloids/
6. https://youtu.be/QAH-cCK1bS8

7. https://en.m.wikipedia.org/wiki/Petroleum_refining_processes
8. https://youtu.be/Dmn1X_z985A
9. https://www.britannica.com/science/polymer/Synthetic-polymers
10. https://youtu.be/t9UtS70GR44

Course Title : Core - I – LAB - ALGAE AND BRYOPHYTES	**Total Hours :30**
Course Code : U24BYCP11	**Total Credits : 1**

Course Outcomes:

COs	CO Statement
CO1	Develop skill in the micro preparations of the thallus of Algae and Bryophytes and make sketches of it
CO2	Understand the thallus variations among Algae
CO3	Identify the reproductive structures among algae
CO4	Acquires knowledge on the morphological diversity of Bryophytes.
CO5	Compare and contrast the reproductive structures among Bryophytes

Algae: To study the external and internal structure of the thallus and the reproductive structure of the following groups:

Cyanophyceae – *Oscillatoria*.
Chlorophyceae – *Caulerpa*
Xanthophyceae – *Vaucheria*
Bacillariophyceae – Pennate diatom
Phaeophyceae – *Sargassum*
Rhodophyceae -*Polysiphonia.*

Bryophytes: Study of the external and internal structure of the Gametophyte and the structure of Sporophyte of the following groups:

Hepaticopsida - *Marchantia*
Anthocerotopsida – *Anthoceros*
Bryopsida–*Polytrichum*

Duration: 3 hours **Total marks: 60**

1. To make suitable temporary micro preparation of 'A' and 'B' Mount it in glycerin and submit the slides for valuation. Draw diagrams, identify and give reasons (2 X 15 = 30 Marks)
2. Write critical notes on C.D.E & F (4 X 5 = 20 Marks)
3. Submission of record note books (10 Marks)

Course Title : LAB - HORTICULTURE	**Total Hours :30**
Course Code : U24BYSP11	**Total Credits : 2**

Course Outcomes:

COs	CO Statement
CO1	Understand the usefulness of garden tools and implements in various horticultural operations.
CO2	Acquire sufficient knowledge in raising the nursery beds and horticultural operations of seeds raised in pots.
CO3	Expertise in vegetative propagation methods of important horticultural plants.
CO4	Self-reliant in the preparation of Farm yard Manure.
CO5	Development of skills in raising Indoor Garden plants.

List of Practical

1. Identification and description of various plants grown in ornamental/Garden Plants in our campus.
2. Study of garden tools and implements and containers used in ornamental gardening.
3. Preparation of seed bed /nursery bed
4. Study of pots, potting, depotting and repotting
5. Study on propagation of horticultural plants by cutting
6. Study on propagation by horticultural plants by layering
7. Study on propagation horticultural plants by grafting
8. Study on propagation horticultural plants by budding
9. Preparation of farm-yard manure preparation
10. Study of Planning, designing and establishment of water garden, carpet bedding, shade garden, roof garden.
11. Raising the kitchen garden
12. Demonstration of bonsai making
13. Study and creation of terrariums, vertical garden.

Text books:

- Kumar.N, 1990 - Introduction to Horticulture, Rohini Agency, Nagercoil
- S.K. Pandey and C.S. Pandey 2018. Practical Manual on Fundamentals of Horticulture, Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, MP

Reference Books:

1. Edmond et al., 1977- Fundamentals of Horticulture, Tata Mc Grew Hill Publishing Co., Mumbai.
2. GopalaSwami Iyyengar K.S, 1970 - Complete Gardening.
3. Percy Lancaster, 1977 - Gardening in India, Rakha Printers, New Delhi.
4. Hidson T. Hartmann & Dale E.Kester, 1976 Plant Propagation, Principles and Practices Prentice Hall of India., Delhi.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1.	https://agritech.tnau.ac.in/horticulture/horti_TNAU_techvideos.html

2	https://swayam.gov.in/nd2_cec20_ag11/preview
3	https://swayam.gov.in/nd2_cec20_bt13/preview
4	https://swayam.gov.in/nd1_noc20_ce11/preview
5	https://swayam.gov.in/nd1_noc19_ag04/preview
6	http://ugcmoocs.inflibnet.ac.in/ugcmoocs/view_module_ug.php/50
7	https://nptel.ac.in/courses/126/105/126105009/

Course Title : **SKILL BASED II: EMBRYOLOGY OF ANGIOSPERMS**	Total Hours :30
Course Code : **U24BYS11**	Total Credits : 2

Course Outcomes:

COs	CO Statement
CO1	Appreciate the Structure and development of microsporangium.
CO2	Understand the differences between monosporic, bisporic and tetrasporic embryo sac development.
CO3	Gain knowledge about double fertilization and endosperm types.
CO4	Get an insight about the Structure and development of dicot and monocot embryos.
CO5	Acquire basic knowledge about tissue culture and their significance.

Unit I **6- Hours**

Microsporangium structure; Tapetum- Types and functions; Microsporogenesis; Male gametophyte development (a brief account).

Unit II **6- Hours**

Megasporangium structure; Types of ovules; Megasporogenesis; Megagametogenesis– *Polygonum* type (Monosporic) and *Allium* type (Bisporic).

Unit III **6- Hours**

Fertilization; Path of pollen tube – types; Double fertilization; Endosperm types -Nuclear, cellular and helobial (a brief account).

Unit IV **6- Hours**

Structure and Development of Dicot embryo (*Capsella*) and Monocot embryo (Luzula); Apomixis.

Unit V **6- Hours**

Experimental Embryology: *In vitro* culture of embryo and anther; Polyembryony - causes, types and significance.

Text Books:

1. Bhojwani S and S.P. Bhatnagar, The Embryology of Angiosperms, Vikas Publishing House (P) Ltd, 1998.
2. Maheswari P., Introduction to Embryology of Angiosperms, Mac Graw Hill, New York, 1985.

Reference Books:

1. Davis C.L., Systematic Embryology of Angiosperms, John Wiley, New York, 1965.
2. Eames M.S., Morphology of Angiosperms, Mc Graw Hill New York, 1960.
3. Johri B.D., Embryology of Angiosperms, Springer - Verlag, Berlin, 1984.

e- Resources:

1. https://en.wikipedia.org/wiki/Microsporangia
2.https://www.britannica.com/science/microsporangium
3. https://www.youtube.com/watch?v=xBoxtvCJ1_o
4.https://www.youtube.com/watch?v=GSYClHTgcIA
5.https://pubmed.ncbi.nlm.nih.gov/11337398/

SEMESTER II

Course Title : Core - II - HERBAL TECHNOLOGY	**Total Hours : 90**
Course Code : U24BYC21	**Total Credits : 4**

Course Outcomes:

Cos	CO Statement
CO1	Impart knowledge on herbal medicine
CO2	Develop a scientific attitude towards the study of herbal medicines.
CO3	Expose the students to different pharmaceutical industries and research institutes.
CO4	Develop skill in experiments and usage of equipments in herbal products preparation and their utilization.
CO5	Understand the ethical principles in herbal medicine research.

Unit I

Introduction and scope of Ethnobotany and Ethnomedicine; Identification and authentication of herbs; Different dosage forms of herbal drugs; Evaluation of different dosage forms; Stability studies of herbal formulations; Adulteration of Raw Drugs & Detection; Basics of Herbal Drug Standardization.

Unit-II

Herbal Care Products: Hair care - Formulation of Shampoos, Conditioners, Setting lotion, Hair creams, Hair dyes; Skin Care - Formulation of skin cleansers, moisturizers, acne products; Dental products - Oral rinses, Tooth powder, Tooth paste.

Unit-III

Preparation of Herbal medicine/ Products - Herbal Tea, Herbal Infusion, Herbal Tincture and Ointments, Eucalyptus oil, *Aloe vera* gel and Triphala Churna.

Unit IV

Organoleptic properties of crude drugs; Endomorphological characters of crude drugs: Trichomes, Various types of Stomata and their frequency, stomatal index, Vein islet and Vein termination number; Simple permanent tissues and Complex tissues.

Unit V

Pharmacognostical standardization of the following plants with special reference to anatomical features.

Stem- *Boerhaavia diffusa* and *Achyranthes aspera*
Root –*Gloriosa superba,*
Leaf – *Piper betle*

Reference Books:

1. G.E.Treese and W.C.Evans, Text book of Pharmacognosy, 15thedn, W.B. Saunders Edenburg, NewYork.
2. C.K.Kokate, Purohit, Ghokhale, Text book of Pharmacognosy, 5thednNiraliPrakassan. 1996.
3. Pharmacognosy, Phytochemistry, Medicinal Plants by Jean Bruneton, 2nd Revised edition
4. Varro E. Tyler, Lynn R. Brady, James E. Robbers, Pharmacognosy,Intercept Ltd; Edward Praegner Claus.
5. Pulok K. Mukherjee, Quality Control and Evaluation of Herbal Drugs: Evaluating Natural Products and Traditional Medicine, Elsevier Science, United States, 2019.
6. Anil K. Sharma, Raj K. Keservani, Surya Prakash Gautam, Herbal Product Development: Formulation and Applications, Apple Academic Press, United States, 2020.

Course Title : LAB- HERBAL TECHNOLOGY	**Total Hours : 30**
Course Code : U24BYCP21	**Total Credits : 1**

Hours/week: 2

Course Outcomes:

COs	CO Statement
CO1	Acquire knowledge on identification of. crude drug.
CO2	Understands the anatomical traits of the crude drugs.
CO3	Get trained in the preparations of herbal formulations
CO4	Develop skill in experiments and usage of equipments in herbal products preparation and their utilization.
CO5	Gain hands on training in pharmacognostic standardization of herbal drugs.

Practical Syllabus

1. Preliminary phytochemical screening of secondary metabolites.
2. Determination of ash values of drugs.
3. Study of stomatal frequency and index
4. Study of Vein termination number and vein islet number
5. Organoleptic properties of crude drugs
6. Preparation of selected herbal based formulations
   i) Shampoos
   ii) Tooth powder
   iii)Hair oil

iv) Bath powder
vii) Decoction (Kasayam)
viii) Churnam

7. Pharmacognostical standardization of the following plants with special reference to anatomical features.
Stem- *Boerhaavia diffusa* and *Achyranthes aspera*
Root –*Gloriosa superba,*
Leaf – *Piper betle*

A field study / trip or research institute / universities / industrial visit should be carried out for atleast Three days.

SEMESTER II

Part III — Allied subject II — GENERAL CHEMISTRY —II for Biological science

Hours per week: 4 **Credits: 3** **Subject Code:** U24CHAY21

Course Outcome:

CO1: To study the separation of chemicals by chromatography techniques.
CO2: To know the classification of proteins, structure and function of nucleic acids and Hormones, and the basics of vitamins
CO3: To learn the basics of chemical calculation
CO4: To acquire a knowledge on detection and estimation of elements
CO5: To gain adequate knowledge on dyes

Unit I: Chromatography **12 Hours**

Basic principles of common types of chromatography — Paper chromatography — thin layer chromatography — column chromatography — Ion exchange chromatography. Applications of each technique.

Unit II: Protein, Nucleic acids, Hormones and vitamins **12 Hours**

Definition — classification of proteins — colour reaction of proteins — Nucleic acids — nucleoside — nucleotides and general structure of DNA. Hormones — classification — structure of some sex hormones — oestrone and testosterone. Vitamins — classification of vitamins — sources and deficiencies of Vitamins A, B1, C, D, E and K (structural elucidation not required).

Unit III: Basic chemical calculation **12 Hours**

Significant numbers — SI Units— calculation of formula weight–understanding Avogadro number — mole concept — mole fraction of the solvent and solute — conversion of grams into moles and moles into grams — stoichiometric equations.

Methods of expressing concentration of the solution: normality, molarity and molality — calculations based on principle of volumetric analysis.

Unit IV: Detection and estimation of elements **12 hours**

Detection of nitrogen, halogens and sulphur (Lassaigne's test) — estimation of carbon and hydrogen (Liebig's method), sulphur and halogens (Carius method) — Determination of empirical and molecular formula — structural formula.

Unit V: Dyes **12 Hours**

Dyes - colour and constitutions — chromophore - auxochrome theory - classification of dyes by structure and methods of applications - preparation of methyl red, Bismarck brown, Malachite green, Indigo and Congo red.

Text Books:

Unit – I

1. B.R.Puri, L.R.Sharma and S.Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2004.

Unit – II

1. M.K. Jain and S.C.Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2011.

Unit – III

1. P.L.Soni and Mohan Katiyal, Textbook of Inorganic Chemistry, Sultan Chand &Sons, 2008.

Unit – IV

1. P.L.Soni, Textbook of Organic Chemistry, Sultan Chand & Sons, 2008.

Unit – V

1. M.K. Jain and S.C.Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2011
2. B.S.Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand & Co., Ltd., 2008.

Reference Books:

Unit - I

1. B.R.Puri, L.R.Sharma and S.Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2004.

Unit - II

1. P.L.Soni, Textbook of Organic Chemistry, Sultan Chand & Sons, 2008.

Unit - III

1. K.S.Tewari, N.K.Vishnoi and S.N.Mehrotra, textbook of organic Chemistry, Vikas house PVT Ltd, New Delhi, 1998.

Unit - IV

1. B.S.Bah1 and Arun Bah1, Advanced Organic Chemistry, S.Chand & Co., Ltd., 2008.

Unit - V

1. R.D.Madan, Satya Prakash's Modern Inorganic Chemistry, S.Chand & Co., Ltd., 2008.

e-Resoursces:

1. https://microbenotes.com/chromatography-principle-types-and-applications/
2. https://youtu.be/8m7CeObsTIk
3. https://youtu.be/AUMJwjLXh1M
4. https://simple.m.wikipedia.org/wiki/Vitamin
5. https://en.m.wikipedia.org/wiki/Significant_figures
6. https://chemistryonline.guru/normality-molarity-molality-3/
7. https://youtu.be/aH-Cjyn8V_Y
8. https://www.adichemistry.com/organic/basics/analysis/lassaignes/lassaignes- test.html
9. https://youtu.be/MhBEj32wZqE
10. https://www.britannica.com/technology/dye

Part III — Allied Chemistry Lab I — LAB: VOLUMETRIC ANALYSIS
Hours per week: 2 Subject Code: U22CHAYP21 **Credits: 2**

Course Outcome:
CO1: To acquire the basic principles of volumetric titration,
CO2: To understand the basic knowledge on standard solution, molar and the indicator
CO3: To get the knowledge on the titration between acidimetry and alkalimetry
CO4: To develop the basic knowledge on permanganometry
CO5: To know the fundamental knowledge on iodometry.

(Exam to be conducted at the end of even Semester)
A double titration involving making up of the solution to be estimated or single titration involving making up of the solution to be estimated and the preparation of standard solution.

(a) Acidimetry and alkalimetry
1. Titration between a strong acid and strong base.
2. Titration between a strong acid and weak base.
3. Titration between a weak acid and strong base.

(b) Permanganometry
1. Titrations between potassium permanganate and oxalic acid, ferrous sulphate and ferrous ammonium sulphate.

(c) Iodometry
1. Titrations between sodium thiosulphate with potassium permanganate and potassium dichromate (demonstration only)

Course Title : SKILL BASED III - PLANT ECOLOGY AND PHYTOGEOGRAPHY	**Total Hours :30 Hours**
Course Code : U24BYS21	**Total Credits : 2**

Course Outcomes:

COs	CO Statement
CO1	Know about the biotic and abiotic components of ecosystems.
CO2	Understand the importance of biogeochemical cycles and flow of energy among various trophic levels.
CO3	Learn about the adaptations exhibited by the flora of various geographical areas
CO4	Know about the Ecological succession and its types.
CO5	Understand the phytogeographical regions of India.

Unit I **6-Hours**
Ecosystem: - Biotic and Abiotic components; Types of ecosystem – Pond, forest and grassland.

Unit II **6-Hours**
Biogeochemical cycles – Nitrogen and Phosphorus cycle; Food chain and food web; Ecological Pyramids - Pyramid of number and biomass.

Unit III **6- Hours**

Study of the following groups with special reference to their morphological and anatomical adaptations – Hydrophytes and Xerophytes.

Unit IV **6- Hours**

Ecological succession – Primary and Secondary Succession; Types of Seres - Hydrosere and Xerosere.

Unit V **6- Hours**

Phytogeographic regions of India, Principles of Phytogeography. Alfred Wegener theory of Continental drift; Endemism.

Text Book:

1. Shukla, R.S. and P.S. Chandel, Plant Ecology and soil science, S.Chand & Co. Ltd. 1991.

Reference Books:

1. Stanly, A. Claim, F. Fundamentals of Plant Geography. Harper and Brother, New York. 1859.
2. Odum, E.P. Fundamental of Ecology, W.B. Saunder Co London. 1959.
3. Ambast, R.S. A text book of Plant Ecology, Students Friends & C.Varanashi. 1969.
4. Bhatia and Sharma, Atreaties on Plant Ecology, Pradeep Publication, Jalendhur. 2005.

e- Resources:

1.https://www.canr.msu.edu/resources/biotic-abiotic
2.https://www.britannica.com/science/biogeochemical-cycle
3.https://www.biologydiscussion.com/plants/morphological-and-physiological-adaptations-of-hydrophytes/4583
4. https://biologydictionary.net/ecological-succession/
5.https://ccelms.ap.gov.in/adminassets/docs/26062020030446-phytogeographical_zones_in_india_notes.pdf

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Course Title : SBE LAB: TECHNIQUES IN CELL BIOLOGY	**Total Hours :30 Hours**
Course Code : U24BYSP21	**Total Credits : 2**

Course Outcomes:

COs	**CO Statement**
CO1	Know about the principles and working of microscopes
CO2	Develop skills to measure the objects and count the cells viewed under microscope.
CO3	Know the various structures present in the plants
CO4	Develop skills to preserve the plant material sections
CO5	Understand the various stages of Mitosis

List of Practicals:

1. Study of Structure and working principles of Dissection microscope and Compound microscope.
2. Study of the cell organelles through photomicrographs.
3. Study of Principles and calibrations of Ocular micrometer, Stage micrometer and Haemocytometer.
4. Study of epidermal appendages – Glands and trichomes
5. Study of stomatal types.
6. Study of simple and complex tissues through Maceration technique.
7. Study of ergastic substances – starch grains, raphides, druses and cystolith.
8. Histochemical localization of starch and lipid.
9. Double Staining method
10. Observation of stages in Mitosis (onion root tip).

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