

St. Xavier's College (Autonomous),
Mumbai



Syllabus of the courses offered by the
Department of Botany
(2015-16)

Approved
Syllabus

15-16.

SYLLABUS UNDER AUTONOMY

BOTANY

COURSE : S.BOT.1.01

PLANT DIVERSITY

[45 LECTURES]

LEARNING OBJECTIVES

The students will be able to:

1. understand the morphology, structure and importance of the organisms
2. state the meaning of scientific terms
3. differentiate between various groups of Bacteria, Algae, Fungi, Lichens and Bryophyte.

UNIT I: MICROBIOLOGY AND ALGAE

(15)

MICROBIOLOGY

Bacteria:

Size, shape, arrangement, cell structure

- Growth and reproduction
- Significance of bacteria

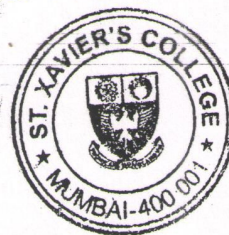
Viruses:

- Size, shape, structure
- Significance

ALGAE

- General characters of Algae
- Pigments in Algae
- Classification of algae into 4 major classes -
Cyanophyta, Chlorophyta, Phaeophyta and Rhodophyta
General characters of these classes
- Economic importance of Algae
- Type studies: Distribution, life cycle and systematic position of
Nostoc, *Zygnema*.

Fraser Mascare
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UNIT II: FUNGI

(15)

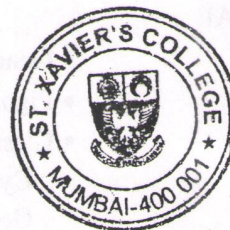
- General characters of Fungi
- Classification:
 - Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes
 - General characters of these classes
- Mode of nutrition in Fungi
- Economic importance of Fungi
- Type studies: Distribution, lifecycle and systematic position of *Rhizopus*, *Agaricus*

UNIT III: BRYOPHYTA

(15)

- General characters
- Classification:
 - Hepataceae, Anthocerotaceae and Musci
 - General characters of these classes
- Type studies: Distribution, life cycle and systematic position of *Riccia*.
- Economic importance of Bryophytes

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SYLLABUS UNDER AUTONOMY

BOTANY

SEMESTER I

COURSE : S.BOT.1.02

ANGIOSPERMS-I

[45 LECTURES]

LEARNING OBJECTIVES

The students will be able to

1. understand the morphology, Structure and functions of various parts of plants.
2. learn the taxonomic terminologies and understand their uses.
3. learn anatomical structure and functions of various tissues.

UNIT I: MORPHOLOGY OF ANGIOSPERMS

(15)

- Root
- Stem
- Leaf
- Inflorescence
- Flower

UNIT II: ANGIOSPERM TAXONOMY

(15)

- Introduction to Systems of Classification – Artificial, Natural and Phylogenetic.
- Bentham and Hooker's system of classification
- Study of following families
- Malvaceae, Leguminosae, Asteraceae, Euphorbiaceae, Amaryllidaceae and Liliaceae.

UNIT III: ANATOMY- PRIMARY STRUCTRES

(15)

- Tissue systems in plants:
- Epidermal tissue system: Epidermal out growths, stomata (dicot and monocot)
- Mechanical tissue system: Collenchyma, Sclerenchyma and Lignified tissues.
- Vascular tissue system: Xylem and Phloem.
- Study of Primary structures: Dicot and monocot root, stem and leaf.

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BOTANY

SEMESTER II

COURSE : S.BOT.2.01

PLANT PHYSIOLOGY AND BIOCHEMISTRY-I

[45 LECTURES]

LEARNING OBJECTIVES

The students will be able to understand

1. transport mechanism in plants
2. and differentiate between the physiological processes and their importance.
3. mechanism of enzyme actions
4. major classes of organic compounds, their synthesis and breakdown in plants.

UNIT I: WATER RELATIONS

(15)

Water as a plant constituent

- Functions of water in plants
- Water molecule
- Physical and chemical properties of water
- Imbibition and osmosis
- Water potential and its components
- Role of turgor pressure in plant cells
- Changes in Ψ_p and Ψ_w during reversible changes in cell volume

Transpiration and absorption

- Water loss by transpiration
- Measurements of transpiration rates
- Movement of water vapor through stomatal pores
- Plant antitranspirants
- Stomatal movements
- Absorption of water by absorbing plants
- Movement of water across roots and through leaves

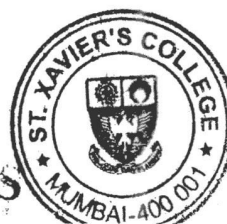
UNIT II: TRANSPORT PROCESSES AND ENZYMES

(15)

Transport processes

- Movement of solutes in plants
- Passive transport
- Protoplasmic membrane
- Active transport across protoplasmic membranes
- Mechanism of active transport

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- Shuttle systems
- Electroosmosis and pinocytosis
- Transcellular transport
- Translocation in sieve tubes
- Anatomy of sieve tubes
- Mechanism of sieve tube translocation

Enzymes

- Nomenclature
- Properties
- Classification
- Specificity
- Apoenzyme, prosthetic group
- Mode of action
- Kinetics
- Inhibition
- Isozymes

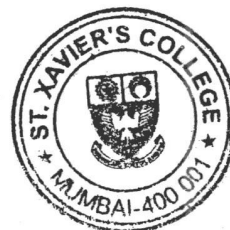
UNIT III: PLANT BIOCHEMISTRY

(15)

Major Cellular compounds, their classification and functions in plants and *biosynthesis and degradation of selective compounds*.

- Carbohydrates - *Starch, *Cellulose
- Proteins
- Lipids - *Triglycerides

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SYLLABUS UNDER AUTONOMY

BOTANY

SEMESTER II

COURSE : S.BOT.2.02

CYTOLOGY, GENETICS AND ECOLOGY [45 LECTURES]

LEARNING OBJECTIVES

The students will be able to understand

1. the structure and functions of various cell organelles.
2. the phenomenon of inheritance.
3. the interactions taking place in the ecosystem and flow of Energy.

UNIT I: CYTOLOGY

(15)

Ultra-structure and functions of the following:

- Cell wall, Plasma membrane (unit membrane and fluid mosaic model)
- Mitochondrion and Chloroplast
- Nucleus: Chromosomes
- Cell division – Mitosis

UNIT II: GENETICS

(15)

- Mendel's Laws
- Allelic and non-allelic interaction
- Epistatic interactions
- Sex determination in plants

UNIT III: ECOLOGY

(15)

- Concept of Ecosystem: Components and their interactions, Food Chains and food web Ecological pyramids
- Ecological adaptations of plants belonging to following ecological groups: Hydrophytes, Xerophytes and Halophytes

Evaluation:

CIA – MCQ

End of semester examination – Long and short answer questions.

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PRACTICALS

SEMESTER I

COURSE : S.BOT.1.PR

1. Gram staining of Bacteria
2. Study of Economically important Algae and Fungi.
3. Study of stages in the life cycle of *Nostoc*, *Zygnema*
4. Study of stages in the life cycle of *Rhizopus* and *Agaricus*
5. Study of life cycle of *Riccia*.

Course: S.BOT PR1.02

1. Study of morphological characters of root, stem, leaf, inflorescence and flower
2. Study of different tissue systems in *Cucurbita* stem
3. Primary structure of typical dicot and monocot root, stem and leaf
4. Study of epidermal outgrowths and stomata
5. Study of families prescribed in the theory using any one plant species from the respective family available in the field.

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PRACTICALS

SEMESTER II

COURSE : S.BOT.2.PR

Course: S.BOT PR2.01

1. Determination of solute potential by plasmolytic method
2. Demonstration of transpirational water loss by Ganong's potometer (demonstration only)
3. Determination of stomatal frequency
4. Determination of stomatal size
5. Tests for detection of Carbohydrates - Reducing sugars, non - reducing sugars, monosachharides, non - reducing disaccharides, starch
6. Tests for detection of proteins and amino acids
7. Tests for detection of fats and oil
8. Study of activity of amylase

Course: S.BOT PR2.02

1. Examining various stages of mitosis in root tip cells
2. Study of external and internal structures of *Hydrilla*, *Eichhornia* / *Nymphaea*, *Nerium*, *Opuntia* and *Avicennia*
3. Study of pond ecosystem
4. Study of terrestrial ecosystem
5. Study of estuarine ecosystem
6. Problems on mendelian genetics
 - Mono hybrid and dihybrid ratios
 - Allelic and non-allelic interactions
 - Epistatic interactions

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Reference Books:

Course 1.01

1. Pelzer and Reid, Microbiology
2. Smith, G.M., Cryptogamic Botany Vol. 1
3. Vashishtha B.R – Botany for Degree Students Part I - Algae and Part II – Fungi.
4. Alexopoulos C.J. & Mims, Introductory Mycology
5. Parihar, N.S. Bryophyta
6. Sharma, O.P. Plant Taxonomy
7. Gangulee and Kar, College Botany Vol. II.

Course 1.02

1. Sharma, O.P. Plant Taxonomy
2. Dutta, A.C., Class Book of Botany
3. Lawrence G.M. , Vascular Taxonomy
4. Gangulee, Das, and Dutta – College Botany Vol I.
5. Fahn A., Plant Anatomy
6. Subramanian N., Plant Taxonomy
7. Eames A.J., McDaniels – An introduction to plant Anatomy.
8. Esau K. – Plant Anatomy

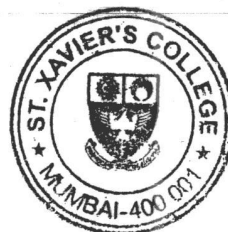
Course 2.01

1. Noggle and Fritz, Introductory plant physiology
2. Devlin, R., Plant Physiology
3. Verma S. K. Plant physiology and Biochemistry

Course 2.02

1. Gupta, P.K., Cell Biology
2. Gardner, Principles of Genetics
3. Odum E.P., Fundamentals of Ecology
4. Sharma P.D., Ecology and Environment
5. Subramanian and Sambamurthy – Principles of Ecology
6. De Robertis and De Robertis., Cell Biology.

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**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-III

COURSE: S.BOT.3.01

PLANT DIVERSITY- II

(45 LECTURES)

LEARNING OBJECTIVES

The students will be able to:

1. understand the importance of bacteria and methods of their cultivation
2. learn about the causal organisms of plant diseases
3. learn the life cycles of the individuals belonging to Algae, Fungi and Lichens.

Unit I

MICROBIOLOGY

(15)

- 1 Basics principles of staining; culture media preparation; pure culture methods:
- 2 Classification of bacteria based on mode of nutrition; Biofertilizers and methods of application; Bacteria in sulphur cycle; Bacteria in Phosphate solubilization.

Unit II

ALGAE AND LICHENS

(15)

- 1 Algae- Structure life cycle and systematic position of *Vaucheria* (Xanthophyta), *Sargassum* (Phaeophyta), *Batrachospermum* (Rhodophyta),
- 2 Lichens- Classification, structure, method of reproduction and ecological significance.

Unit III

FUNGI AND PLANT PATHOLOGY

(15)

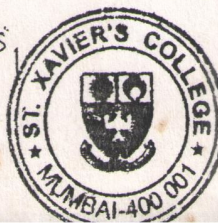
- 1 Fungi- Structure life cycle and systematic position of *Erysiphe*, *Alternaria* / *Fusarium*
- 2 Plant pathology- diseases, symptoms, causative organism, disease cycle and control measures of rust of wheat and late blight of potato.

Reference Books:

1. Pelczar, Michael J., Jr.; Reid, Roger D; Microbiology; 4rd edition; New York : Mcgraw-Hill Book Company , 1974.
2. De Robertis, E.D.P.; Nowinski, Wiktor W.; Saez, Francisco A.; Cell Biology; Philadelphia : W.B. Saunders Company , 1970.
3. Powar, C.B.; Dagainawala, H.F.; General microbiology; vol.I-II; 2nd edition, reprint; Bombay : Himalaya Publishing House , 1986(1993)
4. Smith, Gilbert M; Cryptogamic Botany Algae & Fungi Volume 1; 2nd edition; McGraw-hill book Comp. Tokyo, 1955.
5. Vasishtha B.R. And A. K. Sinha- Botany for degree strudents Part 1 ALGAE; S. Chand & Company Ltd, 1st edition, revised 2005.
6. Vasishtha B.R. And A. K. Sinha- Botany for degree strudents Part 2 FUNGI; S. Chand & Company Ltd, 1st edition, revised 2005.

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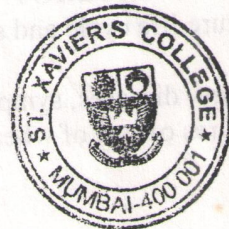
Trayal Mascara



7. Alexopoulos, Constantine J.; Mims, Charles W; Introductory mycology; 3rd edition; New Delhi : Wiley Eastern Limited , 1983.
8. Kar, Ashok Kumar; Gangulee, Hirendra Chandra; College botany : Volume II; 2nd edition; Kolkata : New Central Book Agency (P) Ltd , 1989, 2006.
9. Sharma, O.P.; Textbook of fungi; 3rd edition; New Delhi : Tata Mcgraw-Hill Publishing Company Limited , 1989.
10. Srivastava, J.P.; An introduction to fungi; 2nd edition; Allahabad : Central Book Depot, 1962.
11. Chopra, G.L.; A classbook of fungi; 7th edition; Jullundur : S. Nagin & Co. , 1964.
12. Sharma, O.P.; Textbook of algae; 3rd edition; New Delhi : Tata Mcgraw-Hill Publishing Company Limited , 1986

CIA- oral presentation

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Dept. of Botany

Date: _____

ASSESSMENT OF ORAL PRESENTATION

Name of student: _____

Title of oral presentation: _____

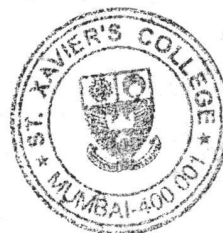
Assessment Grid : Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows

Presentation: 30 %

30% PRESENTATION	80-100%	60-80%	40- 60%	20-40%	0-20%
10% Presentation skills	Varied rate of delivery, Changed pitch for emphasis, No distracting mannerisms ,good eye contact, Confident body language, Connected with audience	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	No speech variation, Distracting mannerisms, no eye contact, dull, and reading from notes/visual aids
02 ----- Marks -----	2.0	1.6	1.2	0.8	0.4
10% Use of Visuals (Efforts to Aid Presentation)	Very good, relevant visuals, good font size/ image size, Appropriate number of words and images per slide, good colour schemes	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	Very poor visuals, visuals did not contribute to the presentation
02 ----- Marks -----	2.0	1.6	1.2	0.8	0.4
5% Timing and Pace of Talk	Right length and well paced	Right Length but too slow or too rushed	Long or short and too slow or too rushed	Too long or too short	Had to be stopped or less than 50% of the allocated time
01 ----- Marks -----	1.0	0.8	0.6	0.4	0.2
5% Audibility and Comprehensibility	Very clear and very precise	Clear, quite precise	Almost inaudible and difficult to understand	Almost inaudible or very difficult to understand	Inaudible or completely incomprehensible
01 ----- Marks -----	1.0	0.8	0.6	0.4	0.2

Total marks for presentation: _____ out of 06.

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Content: 70%

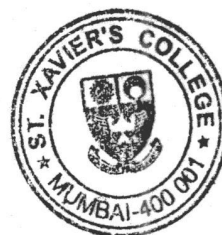
70%	CONTENT	80-100%	60-80%	40-60%	20-40%	0-20%
35%	Knowledge and Understanding Innovation	Excellent Impression of wide reading, good knowledge and complete understanding	Good	Satisfactory	Poor	Very Poor
07	----- Marks -----	7.0	5.6	4.2	2.8	1.4
10%	Structure of Presentation	Excellent Logical Structure, Clear Introduction, Body and Relevant Conclusion, sequence of information and ideas could be easily followed, Citation of source material	Good	Satisfactory	Poor	Very Poor
02	----- Marks -----	2.0	1.6	1.2	0.8	0.4
5%	Key Points/ Themes	Excellent Identified Key Points, Kept to the points through out the presentation- did not wander	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	1.0	0.8	0.6	0.4	0.2
10%	Ability to answer Questions	Excellent Answers accurate and full of confidence	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	2.0	1.6	1.2	0.8	0.4
10%	Creation of Interest/ Audience Participation	Excellent Created interest in the topic	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	2.0	1.6	1.2	0.8	0.4

Total for content: _____ out of 14; Total marks for oral presentation: _____ out of 20

Comments:

Name of the Faculty _____ . Signature of the Faculty _____

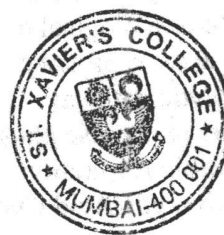
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Template:

UNITS or TOPICS	KNOWLEDGE	UNDERSTANDING	APPLICATION	ANALYSING / EVALUATING / CREATING	TOTAL MARKS
I	10	5	5	-	20
II	10	5	5	-	20
III	10	5	5	-	20
TOTAL MARKS	30	15	15	-	60
% WEIGH-TAGE	50	25	25	-	100

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**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER 3

COURSE: S.BOT.3.02

PLANT PHYSIOLOGY AND BIOCHEMISTRY

(45 L)

LEARNING OBJECTIVES

The students will be able to understand

- 1 the importance of minerals to plants
- 2 the catabolic process and synthesis of chemical energy in plants
- 3 the anabolic process in plants
- 4 and differentiate between light and dark reactions of photosynthesis
- 5 the respiratory process in presence of light
- 6 and differentiate between C₃, C₄ and CAM plants

Unit I

(15)

RESPIRATION

- 1 Respiratory gas exchange
- 2 Respiratory substrates
- 3 Nature of biological oxidation
- 4 Outline of respiratory substrates
- 5 Glycolytic pathway
- 6 Oxidative pentose phosphate pathway
- 7 Anaerobic respiration
- 8 Tricarboxylic Acid Cycle
- 9 Respiratory chain
- 10 Significance of ATP
- 11 The chemiosmotic theory

Unit II

(15)

PHOTOSYNTHESIS

- 1 Efficiency of plants in converting radiant energy and matter
- 2 Light phase of photosynthesis
- 3 The chloroplast as the unit of photosynthesis
- 4 Reaction scheme for ATP and NADPH formation
- 5 Role of ATP and NADPH in CO₂ fixation
- 6 The path of carbon in photosynthesis – C₃, C₄ and CAM
- 7 Factors influencing photosynthesis

Unit III

(15)

PHOTORESPIRATION AND MINERAL NUTRITION

Photorespiration

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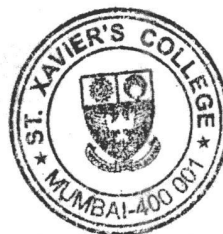


- 1 Biochemistry of photorespiration in C₃ plants
 - 2 Photorespiration in C₄ plants
 - 3 Regulation of photorespiration
- Mineral nutrition
- 1 Autotrophs and heterotrophs
 - 2 Criteria of essentiality of elements
 - 3 Essential elements
 - 4 Nutritional disorders of plants
 - 5 Sources of nutrients
 - 6 Mycorrhiza

Reference Books:

1. Noggle, Ray G.; Fritz, George J.; Introductory plant physiology; 2nd edition; New Delhi : Prentice-Hall Of India Private Limited , 1991.
2. Sinha, B.K.; Pandey, S.N.; Plant Physiology; 1st edition; New Delhi : Vikas Publishing House Pvt. Ltd. , 1981.
3. Verma, V.; Textbook of plant physiology; New Delhi : Ane Books India , 2007.
4. Salisbury, Frank B.; Ross, Cleon W.; Plant physiology; 3rd edition, Reprint; New Delhi : CBS Publishers & Distributors , 1986(2001).
5. Devlin, Robert M.; Witham, Francis H.; Plant Physiology; 4th edition, Indian reprint; Delhi : CBS Publishers & Distributors , 1986(2001).
6. Kochhar, P.L.; A textbook of Plant Physiology; 7th edition; Delhi : Atma Ram & Sons , 1964.
7. Verma S. K. Textbook of Plant physiology and Biochemistry ; 4th editon; S. Chand & Company Ltd, 2003.
8. Noggle, Ray G.; Fritz, George J.; Introductory plant physiology; 2nd edition; New Delhi : Prentice-Hall Of India Private Limited , 1991.
9. Verma, V. Verma, A.P.; A textbook of Plant Physiology; 8th edition; Emkay publications, Delhi, 2005.
10. Salisbury, Frank B.; Parke, Robert V.; Vascular plants : form and function; London : Macmillan & Co Ltd , 1964.
11. Calvin M., Bassham J.; The photosynthesis of carbon compounds; W.A. Benjamin Inc., New York, 1962.
12. Lehninger, A.L.; The mitochondrion: Molecular basis of structure and function; W.A. Benjamin, New York, 1964.
13. Murray, R.K., Granner, D.K., Mayes, P.A., Rodwell, V.W.; Harper's Biochemistry; Appleton and Lange, Prentice Hall, USA, 1988.
14. Heldt, Hans-Walter; Heldt, Fiona.; Plant biochemistry; 3rd Edition; Burlington : Elsevier Academic Press , 2005.
15. Sinha, R.K.; Modern plant physiology; 2nd edition; New Delhi : Narosa Publishing House , 2004.

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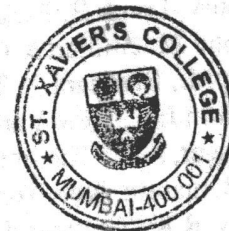


CIA- multiple choice questions.

Template:

UNITS or TOPICS	KNOWLEDGE	UNDERSTANDING	APPLICATION	ANALYSING / EVALUATING / CREATING	TOTAL MARKS
I	10	5	5	-	20
II	10	5	5	-	20
III	10	5	5	-	20
TOTAL MARKS	30	15	15	-	60
% WEIGH-TAGE	50	25	25	-	100

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**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER 3

COURSE: S.BOT.3.03

ANATOMY, EMBRYOLOGY AND PALYNOLOGY

(45)

LEARNING OBJECTIVES :

The students will be able to

1. differentiate between the normal and anomalous secondary growth
2. learn about the different meristems their locations and functions
3. learn the developmental stages of micro and megasporangium
4. understand the pollen morphology and the applications of palynology.

Unit I

(15)

ANATOMY

- 1 Normal secondary growth in Dicotyledonous stem and root
- 2 Anomalous secondary growth in the stems of *Bignonia*, *Salvadora*, *Achyranthes*, and *Dracaena*.
- 3 Anomalous secondary growth in the roots of Beet and Radish.
- 4 Root stem transition
- 5 Study of apical, lateral and root meristems

Unit II

(15)

EMBRYOLOGY

- 1 Structure of Microsporangium, microsporogenesis and development of male gametophyte
- 2 Structure of Megasporangium, megasporogenesis, and development of female gametophyte
- 3 Double fertilization and its significance
- 4 Development of embryo – Dicotyledonous type – *Capsella* type

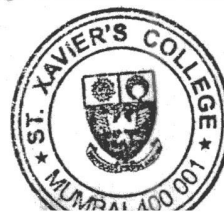
Unit III

(15)

PALYNOLOGY

- 1 Pollen and spore morphology- size and shape, polarity, apertures, exine stratification, construction of palynogram
- 2 Application of palynology in honey industry, coal and oil exploration, forensic sciences, pollen allergy
- 3 Pollen viability and storage- Causes for loss of pollen viability, tests for pollen viability, pollen storage.
- 4 Germination and growth of the pollen tube, factors affecting pollen tube growth

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Reference Books:

1. Eames, Arthur J.; MacDaniels, Laurence H.; An introduction to plant anatomy; 2nd edition. Reprint; New Delhi : Tata Mcgraw-Hill Publishing Company Limited, (1978, 2004)
2. Esau, Katherine; Anatomy of seed plants; 2nd edition; New York : John Wiley & Sons, 1977.
3. Gangulee, Das, and Dutta – College Botany Vol I.
4. Fahn, A; Plant anatomy; 4th edition. Indian reprint; New Delhi : Aditya Books (P) Ltd. , 1990(1997)
5. Maheshwari, P.; Introduction to the embryology of angiosperms; 2nd edition, reprint; New Delhi : Tata Mcgraw-Hill Publishing Company Limited , 1971.
6. Bhojwani, S.S.; Bhatnagar, S.P.; The embryology of angiosperms; revised edition; Delhi : Vikas Publishing House Pvt. Ltd. , 1996.
7. Nair, P.K.K.; Essentials of palynology; Bombay : Asia Publishing House , 1966.
8. Shivanna, K.R.; Pollen biology and biotechnology; New Delhi : Oxford & Ibh Publishing Co. Pvt. Ltd. , 2003.
9. Nair, P.K.K.; Advances in palynology; 1st edition; Lucknow : National Botanic Gardens , 1964.
10. Bhattacharya, Kashinath; Majumdar, Manas Ranjan; Bhattacharya, Swati Gupta; A textbook of palynology : Basic and applied; 1st edition; Kolkata : New Central Book Agency (P) Ltd , 2006

CIA- multiple choice questions, puzzles, quizzes.

Template:

UNITS or TOPICS	KNOWLEDGE	UNDERSTANDING	APPLICATION	ANALYSING / EVALUATING / CREATING	TOTAL MARKS
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TOTAL MARKS	30	15	15	-	60
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**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-IV

COURSE: S.BOT.4.01

PLANT DIVERSITY- III

(45)

LEARNING OBJECTIVES

The students will learn:

1. the life cycles of the individuals belonging to Bryophyta, Pteridophyta and Gymnosperms.
2. the geological time periods and the plants of past
3. the different methods of fossilization

Unit I

BRYOPHYTA

(15)

- 1 Structure, life cycle and systematic position of *Marchantia*, *Anthoceros* and *Funaria*.
- 2 Thallus organization in Bryophyta
- 3 Apogamy and apospory in Bryophytes

Unit II

PTERIDOPHYTA

(15)

- 4 Classification of Pteridophyta up to class
- 5 Salient features of Psilophyta, Lepidophyta, Calamophyta and Pterophyta.
- 6 Structure, life cycle and systematic position of *Selaginella* and *Equisetum* / *Adiantum*
- 7 Heterospory and origin of seed

Unit III

GYMNOSPERMS AND PALAEOBOTANY

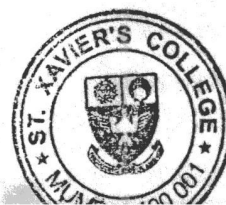
(15)

1. Classification of Gymnosperms up to class
2. Structure, life cycle and systematic position of *Cycas* / *Pinus* and *Gnetum*
3. Economic importance of Gymnosperms.
4. Palaeobotany- Geological time scale, fossil formation. Birbal Sahani Institute of Paleobotany – Lucknow, Study of Form Genera- *Lepidodendron*, *Lyginopteris*.

Reference Books:

3. Vasishtha B.R. And A. K. Sinha- Botany for degree students: Bryophyta; S. Chand & Company Ltd, 1st edition, revised 2005.
4. Vasishtha B.R. And A. K. Sinha- Botany for degree students: Pteridophyta; S. Chand & Company Ltd, 1st edition, revised 2005.
5. Smith, Gilbert M; Cryptogamic Botany Bryophyta & Pteridophyta Volume 2; 2nd edition; McGraw-hill book Comp. Tokyo, 1955.
6. Parihar, N.S.; Pteridophytes : An introduction to embryophyta, vol.II; 4th edition; Allahabad : Central Book Depot , 1962.

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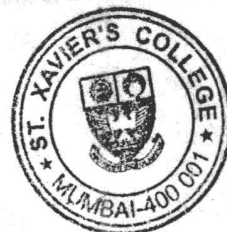
7. Kar, Ashok Kumar;Gangulee, Hirendra Chandra; College botany : Volume II; 2nd edition; Kolkata : New Central Book Agency (P) Ltd , 1989, 2006.
8. Dutta, A.C.; A Classbook of Botany; 15th edition; Calcutta: Oxford University Press, 1976.
9. Chamberlain, Charles Joseph;Coulter, John Merle; Morphology of Gymnosperms; 2nd edition; Allahabad : Central Book Depot , 1964.
10. Rashid, A.; An introduction to Bryophyta : Diversity, development and differentiation; 1st edition; New Delhi : Vikas Publishing House Pvt. Ltd. , 1998.
11. Chamberlain, Charles Joseph; Gymnosperms : structure and evolution; 2nd edition; New York : Dover Publications, Inc. , 1966.
12. Rashid, A.; An introduction to pteridophyta : diversity and differentiation; 4th edition; New Delhi : Vikas Publishing House Pvt. Ltd. , 1982.

CIA- multiple choice questions, puzzles, quizzes.

Template:

UNITS or TOPICS	KNOWLEDGE	UNDERSTANDING	APPLICATION	ANALYSING / EVALUATING/ CREATING	TOTAL MARKS
I	10	5	5	-	20
II	10	5	5	-	20
III	10	5	5	-	20
TOTAL MARKS	30	15	15	-	60
% WEIGH-TAGE	50	25	25	-	100

APPROVED SYLLABUS



**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER 4

COURSE: S.BOT.4.02

ANGIOSPERMS -II

(45)

LEARNING OBJECTIVES :

The students will learn:

1. the taxonomical terminology and understand the meaning of the same.
2. the various classification systems and understand the reasoning behind the same.
3. basics of Nomenclature

Unit I

MORPHOLOGY AND ECONOMIC BOTANY

(15)

- 1 Morphology of fruits
- 2 Economic botany: Fiber yielding plants, Paper yielding plants; Spices and condiments

Unit II

(15)

ANGIOSPERM FAMILIES

- 1 Study of the following angiosperm families – emphasis to be given to the peculiar structures found in plants and economic importance of these species – as per Bentham and Hooker's System.
 1. Anacardiaceae
 2. Rutaceae
 3. Combrataceae
 4. Myrtaceae
 5. Apiaceae
 6. Rubiaceae
 7. Apocynaceae
 8. Commelinaceae

Unit III

(15)

TAXONOMIC LITERATURE, NOMENCLATURE AND HERBARIUM TECHNIQUES

Taxonomic structure; Major and Minor Categories

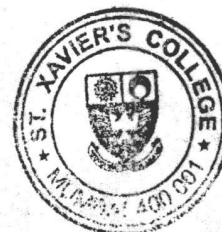
Taxonomic Literature – Flora, Monographs, Revision, Journals.

Characters of Taxonomic importance – Anatomy, Palynology and Embryology.

Herbarium – Blatter Herbarium; techniques used in preparation of herbarium specimens.

Nomenclature: ICBN.

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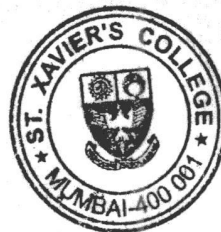


Reference Books:

1. Dutta, A.C.; A Class-book of Botany; 15th edition; Calcutta: Oxford University Press, 1976.
2. Sivarajan, V.V.; Introduction to the principles of plant taxonomy; 2nd edition; Cambridge : Cambridge University Press , 1991.
3. Subramaniam, N.S.; Modern plant taxonomy; New Delhi : 1st edition; Vikas Publishing House Pvt. Ltd. , 1995.
4. Lawrence, George H.M.; Taxonomy of Vascular Plants; 1st edition; New Delhi : Oxford & IBH Publishing Co., 1967.
5. Sharma, O.P.; Plant Taxonomy; 1st edition, reprint; New Delhi : Tata McGraw-Hill Publishing Co. Ltd. , 1993(2002)
6. Gangulee, Das, and Dutta – College Botany Vol I. 1st edition, reprint; New Central Book Agency (P) Ltd., 1991.
7. Judd, Walter S.;Campbell, Christopher S.;Kellog, Elizabeth A.;Stevens, Peter F.; Plant systematics : a phylogenetic approach; 2nd edition; Sunderland : Sinauer Associates, Inc. , 2002.
8. Singh, Gurcharan; Plant systematics : theory and practice; 2nd edition; New Delhi : Oxford & IBH Publishing Co. Pvt. Ltd. , 2004;
9. Gupta, Raj Kumar; Textbook of systematic botany; 5th edition; Delhi : Atma Ram & Sons , 1981.
10. Naik, V.N.; Taxonomy of angiosperms; 1st edition; New Delhi : Tata McGraw-Hill Publishing Company Limited , 1984.
11. Chamberlain, Charles Joseph;Coulter, John Merle; Morphology of Angiosperms Delhi : Logos Press , 1909(1987).
12. Subhash Chandra Datta; A handbook of Systematic Botany; 1st edition; Asia Publishing House New York , 1965.

CIA- oral presentation OR multiple choice questions, puzzles, quizzes.

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Dept. of Botany

Date: _____

ASSESSMENT OF ORAL PRESENTATION

Name of student: _____

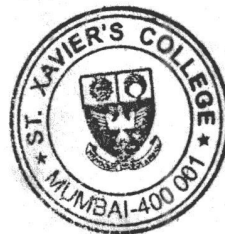
Title of oral presentation: _____

Assessment Grid : Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows

Presentation: 30 %

30%	PRESENTATION	80-100%	60-80%	40- 60%	20-40%	0-20%
10 %	Presentation skills	Varied rate of delivery, Changed pitch for emphasis, No distracting mannerisms ,good eye contact , Confident body language, Connected with audience	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	No speech variation, Distracting mannerisms, no eye contact, dull, and reading from notes/visual aids
02	----- Marks -----	2.0	1.6	1.2	0.8	0.4
10 %	Use of Visuals (Efforts to Aid Presentation)	Very good, relevant visuals, good font size/ image size, Appropriate number of words and images per slide, good colour schemes	Good but a few weaknesses	Good but a few weaknesses with one pronounced weakness	Several Weaknesses	Very poor visuals, visuals did not contribute to the presentation
02	----- Marks -----	2.0	1.6	1.2	0.8	0.4
5%	Timing and Pace of Talk	Right length and well paced	Right Length but too slow or too rushed	Long or short and too slow or too rushed	Too long or too short	Had to be stopped or less than 50% of the allocated time
01	----- Marks -----	1.0	0.8	0.6	0.4	0.2
5%	Timing and Pace of Talk	Right length and well paced	Right Length but too slow or too rushed	Long or short and too slow or too rushed	Too long or too short	Had to be stopped or less than 50% of the allocated time
01	----- Marks -----	1.0	0.8	0.6	0.4	0.2
5%	Audibility and Comprehensibility	Very clear and very precise	Clear, quite precise	Almost inaudible and difficult to understand	Almost inaudible or very difficult to understand	Inaudible or completely incomprehensible
01	----- Marks -----	1.0	0.8	0.6	0.4	0.2

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Total marks for presentation: _____ out of 06.

Content: 70%

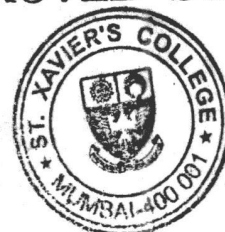
70%	CONTENT	80-100%	60-80%	40- 60%	20-40%	0-20%
35%	Knowledge and Understanding Innovation	Excellent Impression of wide reading, good knowledge and complete understanding	Good	Satisfactory	Poor	Very Poor
07	----- Marks -----	7.0	5.6	4.2	2.8	1.4
10%	Structure of Presentation	Excellent Logical Structure, Clear Introduction, Body and Relevant Conclusion, sequence of information and ideas could be easily followed , Citation of source material	Good	Satisfactory	Poor	Very Poor
02	----- Marks -----	2.0	1.6	1.2	0.8	0.4
5%	Key Points/ Themes	Excellent Identified Key Points, Kept to the points through out the presentation- did not wander	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	1.0	0.8	0.6	0.4	0.2
10%	Ability to answer Questions	Excellent Answers accurate and full of confidence	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	2.0	1.6	1.2	0.8	0.4
10%	Creation of Interest/ Audience Participation	Excellent Created interest in the topic	Good	Satisfactory	Poor	Very Poor
	----- Marks -----	2.0	1.6	1.2	0.8	0.4

Total for content: _____ out of 14; Total marks for oral presentation: _____ out of 20

Comments:

Name of the Faculty _____ . Signature of the Faculty _____

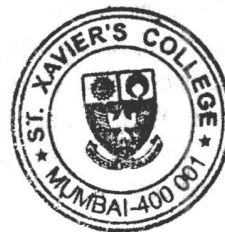
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TOTAL MARKS	30	15	15	-	60
% WEIGH-TAGE	50	25	25	-	100

APPROVED SYLLABUS



**SYLLABUS UNDER AUTONOMY
BOTANY**

**SEMESTER 4
MEDICINAL BOTANY AND TOOLS OF ANALYSIS**

**COURSE: S.BOT.4.03
(45)**

LEARNING OBJECTIVES

The students will learn:

1. the uses of plants in medicine.
2. the methods of evaluation of crude drugs and the adulterants used.
3. the working and use of instruments in plant science.
4. the important websites and databases available on the internet.
5. to compare the significant difference/s in 2 or more samples.
6. to test whether an observed ratio may be taken as fit for an expected ratio.

Unit I

(20)

MEDICINAL BOTANY:

- 2 Classification of crude drugs
- 3 Pharmacognosy – definition and scope
- 4 Analytical Pharmacognosy – Drug adulteration, methods of drug evaluation, phytochemical investigations.
- 5 Bioprospection of plant species in relation to medicinal plants
- 6 Plants used in treatments of various ailments – Ginger, Turmeric, Tulsi, Garlic, Cinnamon, Nutmeg, Coriander, Clove
- 7 Herbal cosmetics

Unit II

(10)

INSTRUMENTATION

Principle, working and applications of:

- 1 pH meter ✓
- 2 Colorimeter ✓
- 3 Light/phase contrast and electron microscopes } omit later to 4.01 M.Sc
- 4 Chromatography - Paper, Thin layer and Column chromatography ✓
- 5 Gel electrophoresis - techniques of protein staining.

Unit III

(15)

BIOSTATISTICS

- 1 Frequency distribution - graphical representation, distribution of data in Biology
- 2 Standard deviation
- 3 Testing of hypothesis: Student's t-test (paired and unpaired and Correlation

BIOINFORMATICS

- 1 Introduction to bioinformatics, internet and its uses, world wide web,

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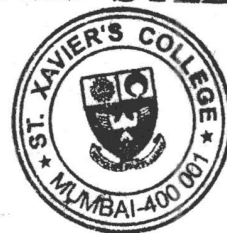
2. Tools used in bioinformatics related to biotechnology; NCBI data models and other data bases, services offered by NCBI and EBI.

Reference Books:

1. Mahajan, B.K.; Methods in biostatistics; 6th edition; New Delhi : Jaypee Brothers, 1997.
2. Kandavel, D.; Pandian, T.T.; Textbook of biotechnology; 1st edition; New Delhi : I.K. International Publishing House Pvt. Ltd , 2008.
3. Kokate, C.K.; Purohit, A.P.; Gokhale, S.B.; Pharmacognosy; 39th edition; Pune : Nirali Prakashan , 2007.
4. Ignacimuthu, S.; Basic bioinformatics; 4th edition; New Delhi : Narosa Publishing House , 2005.
5. Ignacimuthu, S.; Basic biotechnology; 1st edition; New Delhi : Tata McGraw-Hill Publishing Co. Ltd. , 1995.
6. Rastogi, Veer Bala.; Fundamentals of Biostatistics; 2nd edition, reprint; New Delhi : Ane Books India , 2006(2008).
7. Trease George Edward; A text book of Pharmacognosy ; 7th Edition; Bailliere, Tindall & Cox, London , 1957.
8. Qadry, J.S.; Pharmacognosy; 16th edition; N.A. : Author , 2010.
9. Trease, George Edward; Evans, William Charles; Pharmacognosy; 11th edition; London : Cassell & Company Ltd. , 1978.
10. Chatwal, Gurdeep R.; Anand, Sham K.; Instrumental methods of chemical analysis : Analytical chemistry; 5th edition. / ed. by M.Arora and Aseem Anand; Mumbai : Himalaya Publishing House , 2002.
11. Bennett, Alva H.; Osterberg, Harold; Jupnik, Helen; Richards, Oscar W.; Phase microscopy : principles and applications; 1st edition; New York : John Wiley & Sons, Inc. , 1951.
12. Tribe, Michael A.; Eraut, Michael R.; Snook, Roger K.; Light microscopy; Cambridge : Cambridge University Press , 1975.
13. Haggis, G.H.; The electron microscope in molecular biology; reprint, 1968.

CIA- multiple choice questions, puzzles, quizzes.

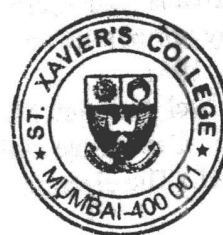
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TOTAL MARKS	30	15	15	-	60
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APPROVED SYLLABUS



ST. XAVIER'S COLLEGE (autonomous)

S. Y. B. Sc.
Course for Arts
Syllabus (effective from June 2011 onwards)

SEMESTER-IV

COURSE: S.BOT.4.04(GARDEN ART) (45)

LEARNING OBJECTIVES

The students will be able to:

1. know the different methods of plant propagation
2. learn about the different requirements for cultivation of plants (pots, watering, pest control etc
3. learn about the types of gardens and landscaping
4. know about and to make flower arrangements and bonsai.

Unit I Introduction to the 'garden art' (15)

- Introduction to plant organs and their functions
- Soil and Types of soil
- Pots and potting
- Water requirements
- Fertilizers / Manures
- Pest and diseases and their control
- Weeds and their control

Unit II Methods of propagation (15)

- Garden Implements and accessories
- Propagation of plants

1. Seeds
2. Cutting
3. Layering
4. By division
5. Grafting
6. Budding
7. Hybridization –cross pollination and evolving new species

The students will be visiting a nursery and make a report (compulsory)

Unit III Landscaping and flower arrangement

(15)

Landscaping

- Types of Garden
- Garden designing
- Introduction to different plants cultivated in the garden
 1. Flowering trees
 2. Foliage trees
 3. Flowering shrubs
 4. Hedges and Edges
 5. Climbers, Creepers
 6. Cacti and Succulents
 7. Herbs: Annuals and Biennials
 8. Bulbous plants
 9. Orchids
 10. Lawns

Flower arrangement and Bonsai

- Ikebana theory and practical
- Bonsai Theory and practical
- Visit to different gardens (compulsory)

**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-V

COURSE: S.BOT.5.01

CYTOGENETICS, MOLECULAR BIOLOGY AND BIOTECHNOLOGY (60 L)

LEARNING OBJECTIVES :

The Students will be able to understand

1. The mechanism, role and importance of cell division, linkage and crossing over.
2. The various gene mutations, their adverse affects in man and advantages in plant breeding.

UNIT-I Linkage and crossing over (15)

- Meiosis, Comparison of Mitosis and Meiosis;
- Linkage- Coupling and Repulsion Hypothesis;
- Crossing over- Chromosome mapping, Three point test cross, Interference and coincidence, Tetrad analysis in *Neurospora*; Crossing over between centromere and gene (first and second division segregation)

UNIT II Inheritance and Molecular biology (15)

- Cytoplasmic Inheritance- Streptomycin sensitivity in *Chlamydomonas*, Kappa particles in *Paramecium*, CO₂ sensitivity in *Drosophila* (sigma factor); Plastid inheritance - variegation in *Mirabilis jalapa*; Male sterility in plants.
- DNA- Central dogma of protein synthesis, Transcription, Genetic code, Translation.

UNIT III Mutation (15)

- Gene Mutations: Types - somatic / germ line, spontaneous / induced, gross / point - base pair substitutions - transversion, transition; Effect of substitution mutation on the phenotype - Missense, Nonsense, Neutral, Silent mutations.
- Chromosomal Mutations (Chromosomal Aberrations)- Structural Changes in Chromosomes; Deletion / Deficiency; Duplication, Translocation, Inversion;
- Numerical Changes in Chromosomes: Aneuploidy- Monosomy, Nullisomy, Trisomy, Tetrasomy, Euploidy- Monoploidy and haploidy, Polyploidy, Autopolyploids, Allopolyploids. Role of mutations in plant breeding and crop improvement.
- Role of mutations in plant breeding and crop improvement.

UNIT IV Biotechnology (15)

- Recombinant DNA technology; Transgenic plant production by *Agrobacterium* mediated gene transfer; Transgenic plants used for improving quality of seeds, edible vaccines; Restriction enzymes; Cloning vectors,.



Fragy Mascarenhas
APPROVED SYLLABUS

Continuous internal Evaluation (CIA)

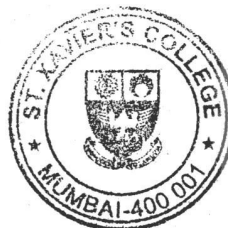
Theory CIA I & II - presentation Or MCQ

Practical CIA - Problems on Genetics.

Reference Books

1. Concepts of Genetics W. S. Klug, M. R. Cummings, C. A. Spencer. 8 Edition, Pearson Education International (2006)
2. Introduction to Genetic Analysis A. J. Griffiths, S. R. Wessler, R. C. Lewontin, S. B. Carroll. 9th Edition, Freeman and Company (2008)
3. Molecular Biology of the Gene J. D. Watson, T. A. Baker, S. P. Bell, A. Gann, M. Levine, R. Losick. 5th Edition, Pearson Education (2004)
4. Principles of Genetics P. Snustad, M. Simmons, 4th Edition, John Wiley and Sons Co., (2006)
5. Genetics : A Conceptual Approach B. Pierce, 3rd Edition, Freeman & Co., (2008)
6. iGenetics Peter Russell, 2nd Edition, Pearson International, (2006)
7. Gupta, P.K. (1990). Genetics. Rastogi Publications

Trayas Mascarenhas Sr
APPROVED SYLLABUS



Use

**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-V

COURSE: S.BOT.5.02

PLANT DIVERSITY IV – ANGIOSPERMS

(60 L)

LEARNING OBJECTIVES :

The Students will be able to understand

1. Taxonomic Terminology.
3. Various classification systems and the reasoning behind the same.
4. Learn various plant families and their economic importance.

UNIT I Economic and Medicinal Botany

(15)

- Timber Yielding Plants
- Oil Yielding Plants
- Dye Yielding plants

Minimum 5 examples from each category

Students are expected to know – Botanical name, family, part used, current market and its conservation status.

UNIT II Plant Systematics-I- Classification systems

(15)

- Study of the various classifications systems: Cronquist, Takhtajan and APG I-III
- Characters of Taxonomic importance – Anatomy, Palynology and embryology.
- Nomenclature: ICBN – History, Introduction of principles, Rules and recommendation
- Conservation methods of Plant Conservation, Botanical Survey of India – Its role in conservation of Biodiversity, IUCN – Red data book.

Unit III Plant Systematics-II - Angiosperm families

(15)

- Study of the following families – emphasis to be given on its peculiar characteristics and economic importance – as per Bentham Hooker's system . Current position according to APG III System
- Capparidaceae and Cleomaceae, Sterculiaceae and Tiliaceae, Solanaceae, Asclepiadaceae, Acanthaceae, Verbenaceae, Arecaceae, Zingiberaceae, Cannaceae, Musaceae and Poaceae.

UNIT IV Biodiversity

(15)

- Definition, Levels of Biodiversity.
- Importance and status of biodiversity.
- Loss of Biodiversity – reasons; Measures to conserve the biodiversity.
- Distribution of Flora found in various forest types of India.
- Biodiversity Act, 2002.



Frazer Mascarenhas *Ushe*
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Continuous internal Evaluation

CIA -2 Field Trips and reports Or MCQ

Practical CIA – Field Visit based assignment.

Reference Books:

1. Dutta, A.C., A Class book of Botany. 15th edition. Calcutta. Oxford Univ Press 1976.
2. Simpson M. G. Plant Systematics IInd ed, Academic Press, 2010.
3. Şivarajan, V.V. Introduction to the principles of plant taxonomy IInd Ed. Cambridge Univ. Press. 1995.
4. Stuessy Tod F., Plant Taxonomy: The Systematic Evaluation of Comparative Data. Columbia Univ. Press. 2008.
5. Barry g. Hall , Phyogenetic tree made easy - How to ... Manual 3rd ed.
6. Phillippe Lemey, Macro Salemi, Anne-Mieke Vandamme, Phylogenetic Handbook - A practical approach to phylogenetic analysis and hypothesis testing -
7. Singh Gurucharan, Plant Systematics – Theory and Practice 3rd edition 2010.

Frage Mascarenhas & Ushe
APPROVED SYLLABUS



SYLLABUS UNDER AUTONOMY

T. Y. B. Sc. BOTANY PRACTICALS

List of practicals and the skeleton question paper for the same

The total practical assessment consist of 50 marks, which includes 15 marks for Practical CIA, 05 marks for Journal and 30 marks for End Semester Practical Exam.

SEMESTER V

Course: S.BOT PR.5.01

- 1) Study of smear preparation for stages of meiosis using any suitable plant material.
 - 2) Tetrad analysis in *Neurospora*.
 - 3) Genetic mapping using 3 point test cross data.
 - 4) Identification of cloning vectors, Ti plasmid for the production of transgenic plants.
 - 5) Study of inheritance pattern with reference to plasmid inheritance.
 - 6) Quantitative estimation of plant genomic DNA and plant RNA. (Demo)
 - 7) DNA sequencing – Sangers method.
 - 8) Determining the sequence of amino acids in the protein molecule synthesized from the given m-RNA strand (prokaryotic and eukaryotic).
 - 9) Isolation of ~~plus~~ *Agrobacterium* sp. from soil sample. (Demo)
- b Separation of digested samples of genomic DNA by agarose gel Electrophoresis*
- Practical skeleton question paper*

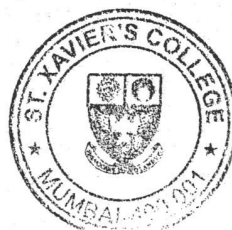
Duration: 2hr

Total Marks:30

	Marks
Q.1. Perform smear preparation for meiosis / estimation of DNA / estimation of RNA of given material A.	09
Q.2. Perform tetrad analysis / three point test cross of the given material B.	06
Q.3. Determine the DNA sequence / amino acid sequence in a protein molecule with the help of given data.	06
Q.4. Identify and describe the specimen D.	04
Q.5. Viva- voce	05

Frage Mascarenhas Sr *Ushe*

APPROVED SYLLABUS



SYLLABUS UNDER AUTONOMY

T. Y. B. Sc. BOTANY PRACTICALS

List of practicals and the skeleton question paper for the same

The total practical assessment consist of 50 marks, which includes 15 marks for Practical CIA, 05 marks for Journal and 30 marks for End Semester Practical Exam.

SEMESTER V

Course: S.BOT PR.5.02

1. Morphology and Identification of two Timber Yielding plants
2. Morphology and Identification of two oil yielding plants
3. Morphology and Identification of two dye yielding plants.
4. Study of the following families: Minimum two species each from the families prescribed in theory.
5. Identification of Genus and Species. At least Three specimen from any families prescribed in the theory for FYBSc to TYBSc.

Practical skeleton question paper

Duration: 2hr

Total Marks:30

	Marks
Q.1. Identify giving morphology and state economic importance of specimen A and B.	06
Q.2. Classify the specimen C and D upto their families giving reasons. Give floral formula, sketch and label LS of flower and TS of ovary.	14
Q.3. Identify the genus and species of the specimen using flora.	05
Q.4. Viva- voce	05

Frazer Mascarenhas Sr
Usha
APPROVED SYLLABUS



**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-VI

COURSE: S.BOT.6.01

PLANT PHYSIOLOGY AND BIOCHEMISTRY III

(60 L)

LEARNING OBJECTIVES:

The students will be able to understand

- the biochemical steps involved in nitrogen assimilation in plants and will be able to differentiate between the process of inorganic and organic nitrogen fixation
- the phenomenon of transformation of vegetative axis into reproductive axis and the substances responsible for this transformation
- the process of seed germination and know the factors which facilitate the germination
- the physiology of fruit ripening
- the time measuring mechanism in plants
- the aging process in plants

UNIT I Nitrogen metabolism and Fruit ripening process

(15)

1. Assimilation of inorganic nutrients

- N₂ cycle
- Reduction of nitrate
- Assimilation of ammonia
- Biological nitrogen fixation
- Biochemistry of biological nitrogen fixation
- Effects of nitrogen assimilation on carbohydrate utilization

2. Physiology of fruit ripening

UNIT II Plant Growth

(15)

3. Vegetative growth

- Definition
- Quantitative aspects of growth of annual plants
- Factors affecting growth

4. Reproductive growth

- Initiation of flower primordia
- Environment and flower initiation (photoperiodism and vernalization)
- Florigen

UNIT III Plant growth substances

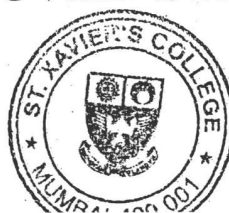
(15)

5. Plant growth substances

- biosynthesis, physiological role and practical applications of following:

- Auxins

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Ushu

- Gibberellins
- Cytokinins
- Ethylene
- Abscisic acid

- Growth retarding chemicals

UNIT IV Physiology of seeds, Aging processes and Time measuring mechanism

(15)

6. Physiology of seeds

- Seed germination
- Morphological and biochemical changes accompanying seed germination
- Dormancy

7. Aging and senescence

8. Biological clock

Continuous internal Evaluation (CIA)

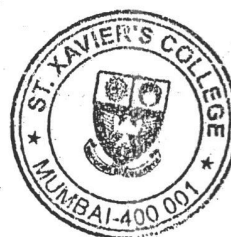
CIA I & II – MCQ / Quiz / short answer question / home work – assignment – problem solving

Reference Books:

1. Noggle and Fritz, Introduction to Plant Physiology
2. Mukherji and Ghosh, Plant Physiology
3. Salisbury and Ross, Plant Physiology
4. Verma S K and Verma M A, Textbook of Plant Physiology and Biochemistry and Biotechnology
5. Devlin, R., Plant Physiology
6. Sinha, Plant Physiology
7. Hans Heldt, Plant Biochemistry
8. Taize and Zigger, Plant physiology

Use

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**SYLLABUS UNDER AUTONOMY
BOTANY**

SEMESTER-VI

COURSE: S.BOT.6.02

ECOLOGY AND ENVIRONMENTAL BOTANY

(60 L)

LEARNING OBJECTIVES :

The Students will be able to understand

1. The role and importance of biotic and abiotic of environment factors in the sustenance of plant life.
2. Causes, consequences, prevention, remediation of pollution and efforts taken in reducing or controlling the pollution causing factor.
3. The importance of phytogeography and forestry for man and the legal enforcements imposed by government in preventing the loss to the natural regional flora.

UNIT I Ecological factors (Abiotic)

(15)

- Light- quality, duration, absorption, intensity, effects on plants;
- Temperature- variation due to altitude, effects on plants, thermal constant and stratification;
- Water- Precipitation, moisture, measurement of rainfall.
- Wind - speed, advantages and damage cause to plants.

Unit I by 14 Dec

UNIT II Ecological factors (Soil and biotic factors)

(15)

- Soil- soil profile, texture, classification, moisture, water, organic matter, atmosphere, temperature, organisms;
- Biotic- community relationships- mutualism, mycorrhizae, commensalisms, proto cooperation, competition, amensalism and saprophytes.

Unit III Pollution

(15)

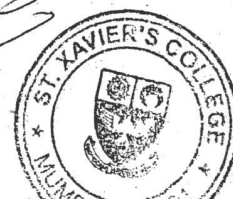
- Air pollution- causes and consequences of polluting gases; ozone depletion, greenhouse effect, global warming, acid rain, smog;
- Water pollution- causes and consequences of eutrophication, sewage, industrial waste, heavy metals, oil in sea;
- Soil pollution- Organic and inorganic chemicals in the soil, bioagents and toxins; Phytoremediation;
- Effect of Air, Water and Soil pollution on vegetation.

UNIT IV Phytogeography and Forestry

(15)

- Phytogeography- Plant distribution, theories on plant distribution, static phytogeography, endemism, major biomes of the world, minor biomes; Phytogeographical regions of India;
- Forestry- destruction of forest, deforestation, afforestation, reforestation; forest research, education and training institutes; Biosphere reserves.

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- Forest Conservation act, 1980; Indian Forests Act (Revised) 1982; The Indian Wildlife (Protection) Act – 1972 amended 1991.

Continuous internal Evaluation (CIA)

CIA I & II - Presentation Or MCQ

Practical CIA – Industrial visit based assignment. (To study the process of manufacturing products / generation / treatment process, etc)

Reference Books:

1. R.S. Ambast - A text book of plant ecology.
2. Fundamental of Ecology (1971): EP Odum; WB Saunders Company.
3. Jogdand, SN 1995. Environmental Biotechnology. Himalaya Publishing House, Mumbai.
4. Ecology and environment; PD Sharma, Rastogi publications, Meerut. 7th ed – 2004.
5. Environmental chemistry by B. K. Sharma, Goel publication house, Meerut, Sixth revised edition – 2001.
6. Ecology- N.S. Subrahmanyam and A.V.S.S. Sambamurty, Narosa Publishing House, 2000;
7. Environmental Chemistry, A. K. Day, Fourth Edition, New Age International Publishers-2002
8. Environmental Science; by-Santra SC; Central Publ. New Delhi.
9. Plant Ecology & Soil Science - Sukila, P & Chandel

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BOTANY
T. Y. B. Sc
Theory Skeleton Question Paper

Duration: 2 hrs

Total Marks: 60

(COURSES: S.BOT 5.01, 5.02, 6.01, and 6.02)
N.B. All questions are compulsory

	Marks
Q.1.A. Long Answer Question- any one out of two . (10 marks each)	10
B. Short Answer Question- any one out of two . (5 marks each)	05
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B. Short Answer Question- any one out of two . (5 marks each)	05
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B. Short Answer Question- any one out of two . (5 marks each)	05
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B. Short Answer Question- any one out of two . (5 marks each)	05

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SYLLABUS UNDER AUTONOMY

T. Y. B. Sc. BOTANY PRACTICALS

List of practicals and the skeleton question paper for the same

The total practical assessment consist of 50 marks, which includes 15 marks for Practical CIA, 05 marks for Journal and 30 marks for End Semester Practical Exam.

SEMESTER VI

Course: S.BOT PR.6.01

1. To study the activity of nitrate reductase.
2. To estimate the α -amino nitrogen.
3. To estimate the total protein content by Lowry's method.
4. Separation of amino acids by paper chromatography.
5. Inhibition of seed germination by inhibitors in fruit juices.
6. Mobilization of starch during seed germination by amylases (qualitative)
7. Effect of GA3 on seed germination (demonstration)
8. Amylase activity in GA3 treated and untreated seeds.
9. Estimation of total soluble sugars in unripe and ripe fruits.
10. Separation of organic acids by chromatography.

Practical skeleton question paper

Duration: 2hr

Total Marks:30

	Marks
Q.1. Perform the physiology experiment A allotted to you.	15
Q.2. Comment on the given experiment B and C (minor expt)	10
Q.3. Viva- voce	05

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SYLLABUS UNDER AUTONOMY

T. Y. B. Sc. BOTANY PRACTICALS

List of practicals and the skeleton question paper for the same

The total practical assessment consist of 50 marks, which includes 15 marks for Practical CIA, 05 marks for Journal and 30 marks for End Semester Practical Exam.

SEMESTER VI

Course: S.BOT PR.6.02

- 2-1. Study of ecological instruments i.e. lux meter, rain ^{all} gauge, hygrometer, wet and dry bulb thermometer, wind anemometer, maximum and minimum thermometer, barometer.
- 3 2. To study the chemical characters (moisture, carbonate, nitrate, base deficiency, pH) of soil by use of rapid tests. *pg 566. Sub & Sam. ✓ = in T.Y Zoology*
- 4 3. Determination of COD in water sample
- 5 4. Determination of BOD in water sample
- 6 5. Determination of salinity and chlorinity of water sample
- 7 6. Estimation of organic matter and organic carbon from soil.
- 1,7 7. Determination of percent leaf area injury of different infected leaf samples
- 8 8. Estimation of nitrates from soil sample
9. Study of phytogeographical regions of India, their climatic condition, altitude, vegetation, and present ecological status

Practical skeleton question paper

Duration: 2hr

Total Marks:30

	Marks
Q.1. Perform the major ecology experiment A.	10
Q.2. Perform the minor experiment B.	06
Q.3. Identify and describe the specimen / instruments C, D and E.	09
Q.4. Viva-voce.	05



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