AC/14.06.2021/RS1

SIES College of Arts, Science & Commerce (Autonomous)

RISE WITH EDUCATION

NAAC REACCREDITED - 'A' GRADE

SIES College of Arts, Science and Commerce (Autonomous)
Sion (West) Mumbai: 400022

Affiliated to Mumbai University

Syllabus under Autonomy - June 2021

Program: F. Y. B.Sc.

Course: Botany

Choice Based Credit System (CBCS)

with effect from the academic year 2021-22

PREAMBLE

The revised syllabus will be effective from the academic year 2021-22. Autonomy has given us the opportunity to frame the syllabus with a blend of Classical and Applied Botany which will open an array of opportunities in Higher Studies. It has been prepared keeping in view, the unique requirements of Botany students. The content caters to the current changing needs of the students. Hence, some of the modules of the existing syllabus have been upgraded with the new modules in order to make the learners aware about the recent developments in various branches of Botany (such as Thallophyta, Spermatophyta, Genetics, Cytology, Plant physiology, Environmental botany, Medicinal botany, etc.). Various interdisciplinary courses such as Microbiology, Biostatistics & Bioinstrumentation are also introduced to make the students at par with the updated tools and techniques.

Two papers of theory and practicals (Semester - I & Semester-II together) are compulsory for the students.

Each theory period shall be of 48 minutes duration. Theory component shall have 180 instructional periods. Each practical will be of 3 periods of 48 minutes each.

MODALITY OF ASSESSMENT:

Theory Examination Pattern

A) Internal Assessment – 40M

(20M Class Test + 15M Assignment/Case study/ ppt. + 05 Class participation)

B) **External examination – 60M** (Semester End Theory Assessment)

i. Duration - These examinations shall be of two hours duration.
ii. Theory question paper pattern: attached herewith.

Practical Examination Pattern:

A. Internal Examination: There will not be any internal examination/ evaluation for practicals.
B. External (Semester end practical examination).
The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination. In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Coordinator of the department; failing which the student will not be allowed to appear for the practical examination.

Overall Examination and Marks Distribution Pattern for Semester I

Course	PAPER I			PAPER II			Grand Total
	Internal	**External**	**Total**	**Internal**	**External**	**Total**	
Theory	40	60	100	40	60	100	**200**
Practicals	-	50	50	-	50	50	**100**

Overall Examination and Marks Distribution Pattern for Semester II

Course	PAPER I			PAPER II			Grand Total
	Internal	**External**	**Total**	**Internal**	**External**	**Total**	
Theory	40	60	100	40	60	100	**200**
Practicals	-	50	50	-	50	50	**100**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

After completing the graduation (B.Sc.) course in Botany, the learners would be able to -

PSO1: Identify the different groups of plants and gain the knowledge about plant biodiversity and its conservation.

PSO2: Learn different techniques, protocols, methodologies during study and apply them in future.

PSO3: Utilize the botanical knowledge for problem solving and for taking real time decisions while working with plants.

PSO4: Learn good laboratory practices and acquire research skills required for industrial support services.

PSO5: Inculcate scientific temperament, good reasoning power, technological and analytical skills while designing the experiments.

PSO6: Develop interest in pursuing higher studies in plant sciences and develop better future.

PSO7: Understand the scope, current trends, job prospects and career avenues in Botany.

PSO8: Share social and environmental consciousness with the fellow citizens and motivate them towards taking fundamental steps towards environmental conservation.

F.Y.B.Sc. Botany Syllabus (Restructured for Choice-Based Credit System)

To be implemented form the Academic Year 2021-2022

SEMESTER I

Course	Nomenclature	Credits	Topics
SIUSBOT11	PLANT DIVERSITY I	02	1. Microbiology & Algae 2. Fungi & Lichens 3. Bryophyta & Pteridophyta
SIUSBOT12	FORM AND FUNCTION I	02	1. Cell biology 2. Ecology 3. Genetics & Biometry
SIUSBOTP1.1	PLANT DIVERSITY I (PRACTICAL I) FORM AND FUNCTION I (PRACTICAL II)	01 01	Practicals based on Theory Topics

SEMESTER II

Course	Nomenclature	Credits	Topics
SIUSBOT21	PLANT DIVERSITY I	02	1. Gymnosperms 2. Angiosperms 3. Systematic Botany
SIUSBOT22	FORM AND FUNCTION I	02	1. Anatomy 2. Physiology 3. Medicinal Botany & Horticulture
SIUSBOTP2.1	PLANT DIVERSITY I (PRACTICAL I) FORM AND FUNCTION I	01 01	Practicals based on TheoryTopics

	(PRACTICAL II)		

Semester I SIUSBOT11	**L**	**Cr.**
Paper I – PLANT DIVERSITY I	**45**	**02**

Learning Objectives:

The course entitled Plant Diversity-I includes the units on Microbiology & Algae, Fungi & Lichens, Bryophyta & Pteridophyta. Students will be able to understand the morphological and systematic knowledge about different microbes & plant groups. The course will enable them to make use of this knowledge in other disciplines wherever applicable. The course will provide insight into the diversity of microbes and lower plants. The course will provide knowledge about life cycle pattern and economic importance of different plant groups.

Course Outcomes:

After completion of the course, learners would be able to understand:

CO1: The fundamental concepts /diversity related to different Microorganisms.

CO2: Chlorophyta and Cyanophyta among algae along with the life-cycles, range of thallus, economic importance of algae.

CO3: Identification and classification of Phycomycetes from Fungi based on generalcharacters & life cycles.

CO4: Basic structure & classification of lichens, their modes of nutrition & economic and ecological importance.

CO5: Hepaticeae from Bryophytes along with life cycles.

CO6: *Nephrolepis* from Pteridophytes along with life cycles.

CO7: Types of stele found in Pteridophytes.

CIA – Class Test (20M) + Assignment/ Case Study/ Presentation/ Survey report (15M) + Class Participation (5M)

UNIT I – MICROBIOLOGY & ALGAE		**15**	
1	**General Characteristics of Virus**: Structure and classification as plant,animal & bacterial virus. (2L)		
2	**General Characteristics of Bacteria**: Ultrastructure and types of reproduction. (3L)		
3	Life Cycle of *Nostoc* w. r. t. systematic position with reasons (classification according to G. M. Smith), Habit, Habitat, Structure of thallus, structure of typical cell, Reproduction - Vegetative and Asexual. (3L)		
4	**General characters of Chlorophyta**: Range of thallus; types of chloroplasts. (2L)		
5	Life Cycle of *Spirogyra* w. r. t. systematic position with reasons (classification according to G. M. Smith), Habit, Habitat, Structure of thallus, structure of typical cell, Reproduction - Vegetative, Asexual and Sexual. (3L)		
6.	**Algae in biotechnology**: Algae as source of Biofertilizers, Food & Nutraceuticals, Biofuel, Medicines & in Industry. (2L)		
UNIT II - FUNGI AND LICHENS		**15**	
1	**Introduction to true fungi**: Definition, General characteristics, Affinities with plants and animals, Modes of nutrition in fungi – saprophytic and parasitic (1L)		
2	**General characters of Phycomycetes**: Occurrence; hyphal structure; modesof nutrition, reproduction; alternation of generations. (2L)		
3	**Life Cycle of *Rhizopus*** w. r. t. Systematic position with reasons (classification according to G. M. Smith), Occurrence, Structure of thallus, Reproduction – Vegetative, Asexual and Sexual. (3L)		

4	**Fungi in Biotechnology**: • Fungi as a source of Biofertilizers and PGR in Agriculture; (1L) • Fungi for the production of Flavours & textures, Fermented products; (1L) • Fungi in Food and nutrition (1L) • Fungi in Medicine. (1L)		
5	**Lichens**: Classification, Internal structure of thallus, Reproduction & fructification, Ecological significance & Economic importance. (5L)		
UNIT III - BRYOPHYTA & PTERIDOPHYTA		**15**	
1	**General characters of Hepaticae**: Occurrence, thallus structure, vegetative reproduction, sexual reproduction, sporophyte structure, alternation of generation; adaptations of bryophytes to land habit. (3L)		
2	**Life Cycle of *Riccia*** w. r. t. systematic position with reasons (classification according to G. M. Smith), Habit, habitat, external and internal structure of thallus, Reproduction- vegetative, asexual and sexual- Structure of sex organs, fertilization, structure of mature sporophyte, structure of spore. (5L)		
3	**Life Cycle of *Nephrolepis*** w. r. t systematic position with reasons (classification according to G. M. Smith), Habit, habitat, external and internal structure, Structure of sporangia and spores (Asexual reproduction), Structure of prothallus and sex organs with sexual reproduction. (5L)		
4	**Types of stele** found in Pteridophytes. (2L)		

Semester I SIUSBOT12	**L**	**Cr.**
Paper II – FORM AND FUNCTION I	**45**	**02**

Learning Objectives:

The course entitled Form and Function-I comprises of units on Cell Biology, Ecology, Genetics and Biometry. The course will provide knowledge about the basic principles of plant cell organelles and their ultra-microscopic structure. The course will enhance their knowledge in Mendelian Genetics, multiple alleles, epistatic and non-epistatic interactions. The course will enable students to perform experiments; gather data, test hypotheses, and draw conclusions and understand the use of biometrics in biological sciences. The course will also help them to acquire knowledge about basic ecological concepts such as energy flow, ecosystem & it's types, bioremediation as well as biodiversity.

Course Outcomes:

After completion of the course, learners would be able to understand:

CO1: The basic components of cells, the structure, function & importance of cell components.

CO2: The process of cell division & its significance.

CO3: Basic ecological concepts of producers & consumers, energy flow in ecosystem & productivity of an ecosystem.

CO4: The concept of Bioremediation and its types.

CO5: Concept of Biodiversity & its significance along with biodiversity hotspots in India. **CO6:** Basics of genetic inheritance, genetic variations, Mendelian genetics and its modifiedratios.

CO7: The concept of Multiple alleles & their inheritance.

CO8: Measures in Biometry.

CIA – Class Test (20M) + Assignment/ Case Study/ Presentation / Projects based onpopulation genetics / Survey and Biostatistical Analysis (15M) + Class Participation (5M)

UNIT I - CELL BIOLOGY		**15**
1	**General structure** of prokaryotic cell and eukaryotic plant cell. (2L)	
2	**Ultrastructure and functions** of Cell wall, Plasma membrane. (4L)	
3	**Ultrastructure and functions of the cell organelles**, viz: Chloroplast &	

	Endoplasmic reticulum. (4L)	
4	**Ultrastructure and functions** of eukaryotic nucleus, chromosomes. (3L)	
5	**Mitosis** in plant cell and its significance. (2L)	
UNIT II – ECOLOGY		**15**
1.	Energy pyramids, energy flow in an ecosystem. (5L)	
2.	**Bioremediation** – Definition, Principles, Introduction to Microremediation and Phytoremediation. (5L)	
3.	**Biodiversity**- Definition, significance and major hotspots in India. (5L)	
UNIT III - GENETICS AND BIOMETRY		**15**
1	**Mendelian Genetics**: Genotype and Phenotype, monohybrid, dihybrid crosses & Mendel's Principles. Problems based on monohybrid & dihybrid ratio. (2L)	
2	**Test cross & Back cross** with the help of suitable examples. Problems based on monohybrid & dihybrid test cross. (1L)	
3	**Intra-locus (allelic) gene interaction**: Dominance relationships (Complete dominance, Incomplete dominance, Co-dominance & Lethal	
	genes) and Multiple alleles. Problems based on complete dominance, incomplete dominance, co-dominance, lethal genes & multiple alleles. (4L)	
3	Inter-locus (non-allelic) gene interaction: Non-epistatic interaction & epistatic interactions (Dominant Epistasis, Recessive Epistasis, Polymeric Gene Interaction, Duplicate Dominant Epistasis, Duplicate Recessive Epistasis & Dominant – recessive interaction) Problems based on Non- epistatic interaction & epistatic interactions. (4L)	
4	Biometry: Definition, meaning, characteristics, applications & limitations; common statistical terms. (1L)	
5	Measures of central tendency: Concept, merits, demerits and problems based on Mean, Median, Mode and Standard deviation. (3L)	

	Semester I **SIUSBOTP1.1: Plant Diversity I** **(Practical-I) &Form and Function I** **(Practical-II)**	**L**	**Cr**
	Course Outcomes: After completion of the course, learners would be able to understand: **CO1:** Structure and diversity of bacteria and virus in the microbial world. **CO2:** Diversity of lower plants, their life cycle, types of thallus and chloroplast and applications of green algae for commercial purposes. **CO3:** Detail about life cycle, mode of nutrition in fungi and their selection forobtaining economically important products. **CO4:** Life cycle, types of thallus and gametophytes in bryophytes and pteridophytes. **CO5:** Lichens w.r.t types and structure and their economic and ecologicalsignificance. **CO6:** Different stages of mitosis and karyotypes. **CO7:** Basic concept and functions of cell organelles. **CO8:** Data presentation and biostatistical analysis using biometric measures. **CO9:** Ecological adaptations in different groups of plants and biodiversity hotspots of India. **CO10:** Solving of genetic problems based on different ways of inheritance.		

	PRACTICAL-I (PLANT DIVERSITY-I) **Learning Objectives:** 1. The course will teach the use of microscope and technique of microscopy. 2. It will help them to learn about Bacteria & virus. 3. It will provide an insight into the diversity of lower plants and theirapplications for commercial purposes. 4. The course will elaborate the life cycle, mode of nutrition in fungi andtheir selection for obtaining economically important products. 5. It will give insight into the life cycle, types of thallus and gametophytes in bryophytes and pteridophytes. 6. The course will help them to explore the world of lichens w.r.t types and structure and their economic and ecological significance.	**30**	**1**
1	Study of bacteria using Gram staining method.	3	
2	Study of viruses from photomicrographs.	1	
3	Study of stages in the life cycle of *Nostoc* from fresh/ preserved material and permanent slides.	2	
4	Study of stages in the life cycle of *Spirogyra* from fresh/ preserved materialand permanent slides.	3	
5	Economic importance of algae: *Spirulina* (Nutraceutical), *Ulva* (Biofuel), *Ascophyllum* (Alginates), *Gelidium* (Agar) *Anabaena* (Biofertilizer)	3	
6	Study of types of chloroplasts in Chlorophyta.	2	
7	Study of range of thallus in Chlorophyta.	1	
8	Study of stages in the life cycle of *Rhizopus* from fresh/ preserved material and permanent slides.	2	
9	Study of Lichens: Morphological types, Internal structure of thallus.	2	
10	Economic importance of Fungi: Agriculture (AMF); Fermentation (Yeast); Nutrition and Nutraceuticals (Mushroom); Medicine (*Penicillium notatum*).	3	

11	Study of stages in the life cycle of *Riccia* from fresh/ preserved materials and permanent slides.	2	
12	Study of stages in the life cycle of Nephrolepis: Mounting of ramentum, hydathode, T.S. of rachis, T.S. of pinna of Nephrolepis passing through sorus, prothallus and sex organs.	3	
13	Types of stele found in pteridophytes with the help of permanent slides: Protostele: Haplostele, Actinostele, Plectostele, Mixed. Siphonostele: Ectophloic, Amphiphloic, Solenostele: Dictyostele.	3	

	PRACTICAL-II (FORM AND FUNCTION-I) **Learning Objectives:** 1. The course will provide a detailed study of different stages of mitosis and Karyotypes. 2. It will elaborate the ultrastructure and functions of plant cell organelles. 3. It will provide a tool of biostatistical analysis of mean, median, mode and standard deviation. 4. It will teach them to present biological data with the help of frequency distribution, graphical representation of data- frequency polygon, histogram, pie chart. 5. It will help them to identify plants adapted to different environmental conditions. 6. The course will enable them to view the plant diversity in different biodiversity hotspots of India. 7. It will teach them to solve Genetics problems on multiple alleles, ABO blood groups, monohybrid cross and dihybrid cross.	**30**	**1**
1	Study of various stages of mitosis in root tip cells (*Allium)*	3	
2	Study of Karyotypes: Human – Normal male and normal female	2	
3	Study of Karyotypes: *Allium cepa*.	1	
4	Identification of parts of cell and cell organelles with the help of photomicrographs: Plasma membrane, Chloroplast, Endoplasmic reticulum, Eukaryotic nucleus.	3	
5	Identification of plants adapted to different environmental conditions:	6	
	Hydrophytes: Free floating (Eichhornia); Rooted floating (Nymphaea); Submerged (Hydrilla), Mesophytes (Vinca); Hygrophytes (Typha), Xerophytes: Succulent (Opuntia); Woody Xerophyte (Nerium); Halophyte (Avicennia).		
6	Study of biodiversity hotspots in India.	3	
7	Study of Genetics problems based on theory.	3	
8	Frequency distribution, graphical representation of data: frequency polygon, histogram, pie chart.	3	

9	Calculation of mean, median and mode.	3	
10	Calculation of standard deviation.	3	

	Semester II SIUSBOT21	**L**	**Cr.**
	Paper I – PLANT DIVERSITY I	**45**	**02**

Learning Objectives:

The course entitled Plant Diversity-I includes units on Gymnosperms, Morphology of Angiosperms, Wonders of plant kingdom and Systematic Botany. Students will be able to understand Gymnosperms w. r. t. life cycle, plant body, alternation of generations and economic importance. The course will give an idea about the significance of rare and endangered gymnosperms. The course will enable them to understand different systems of classification, study about angiosperm families w.r.t their systematic position and their economic importance. The course will help them to observe the morphology and variations of leaves and inflorescence in angiosperms and also explore some interesting wonders of plant
kingdom. They will be able to apply the knowledge to understand different uses of plants.

Course Outcomes:

After completion of the course, learners would be able to understand:

CO1: Gymnosperms w. r. t. their life cycle, morphological & anatomical structure withreproduction in *Cycas*.

CO2: Economic and ecological importance of gymnosperms.

CO3: Affinities of gymnosperms with pteridophytes and angiosperms.

CO4: Geological time scale & its significance.

CO5: Rare and endangered gymnosperms in the world.

CO6: Basic methods of Angiosperm classification.

CO7: The diversity of plants & their parts and be able to describe & identify them in the fieldalong with their economic importance.

CO8: Morphology of angiosperms w. r. t. different forms of leaves & inflorescence.

CO9: Wonders of the plant kingdom with their interesting and unique aspects.

CIA – Class Test (20M) + Assignment/ Case Study/ Presentation / Field reports / Exhibition reports (15M) + Class Participation (5M)

	UNIT I – GYMNOSPERMS	**15**	
1	**Life cycle of *Cycas*** w. r. t. systematic position with reasons(classification according to C. J. Chamberlain), Habit, Habitat, Distribution, Morphology and Anatomy of Stem, leaf, root and reproductive organs- Male cone, Microsporophyll, microspores and megasporophyll, ovule, megaspore; structure of seed; Utilization and economic importance. (8L)		
2	Affinities of gymnosperms with pteridophytes and angiosperms. (2L)		
3	Economic and Ecological importance of Gymnosperms. (2L)		
4	Geological time scale. (2L)		
5	Rare and endangered gymnosperms. (1L)		
	UNIT II – MORPHOLOGY OF ANGIOSPERMS & WONDERS OF PLANT KINGDOM	**15**	
1	**Morphology of leaf**: Simple leaf, types of compound leaves, phyllotaxy, types of stipules, leaf apex, leaf margin, leaf shapes, venation. (5L) **Modifications of leaf**: Spine, tendril, hooks, phyllode, pitcher. (1L)		
2	**Types of Inflorescence**: • Racemose: Simple raceme, spike, catkin, spadix, panicle,corymb, umbel, capitulum. (3L) • Cymose: Monochasial, dichasial, polychasial. (1L) • Compound: Cyathium, Verticellaster, Hypanthodium. (1L)		
3	**Wonders of plants**: *Rafflesia arnoldii*, Carnivorous plants (Venus Fly trap, Sundew), *Adansonia*, *Sequoia*, Strangler Fig, *Dracaena cinnabari*; Plant mimicry – Orchids. (4L)		
	Unit III – SYSTEMATIC BOTANY	**15**	
1.	Systems of classification: General scheme of natural (Bentham & Hooker), artificial (Linnaeus) & phylogenetic (Hutchinson) systems classification of angiosperms with their merits & demerits. (3L)		
2	Study of the following families according to Bentham and Hooker system of classification with special emphasis on morphological peculiarities and		

	economic importance: Annonaceae, Cruciferae, Malvaceae, Convolvulaceae, Euphorbiaceae, Amaryllidaceae. (12L)		

Semester II SIUSBOT22		**L**	**Cr.**
Paper II – FORM AND FUNCTION I		**45**	**02**
CIA – Class Test (20M) + Assignment/ Case Study/ Presentation/Project based on Preparation of herbal cosmetics and horticulture (15M) + Class Participation (5M)			
UNIT I – ANATOMY		**15**	
1	**Simple tissues** - Parenchyma, Collenchyma, Sclerenchyma. **Complex tissues** – Xylem and Phloem. (5L)		
2	**Epidermal Tissue System**: Epidermal Tissue System- Functions of epidermis, Epidermal appendages - A) Hair-Root hair, Unicellular hair and Multicellular hair B) Scales C) Colleters D) Water vesicles/Bladders. (5L)		
3	**Primary structure** of dicot and monocot root, stem and leaf with stomata. (5L)		
UNIT II – PHYSIOLOGY		**15**	
1.	**Photosynthesis**: Introduction and significance, site of photosynthesis, photosynthetic pigments- nature and functions, role of light, absorption and action spectrum, photosynthetic unit, photoluminescence, Emerson's effect, photosystems, Factors affecting photosynthesis. (5L)		
2	**Light reaction**- Photolysis of water, photophosphorylation: cyclic, noncyclic, chemiosmotic pathway. (4L)		
3	**Dark reaction**- C_3 cycle, C_4 cycle & CAM. (3L)		
4	**Enzymes** - Classification, mode of action, enzyme specification and inhibition. (3L)		
UNIT III - MEDICINAL BOTANY AND HORTICULTURE		**15**	
1	**Aromatherapy**: Introduction and health benefits (1L) Aromatherapeutic applications of Sandal wood oil, Lavender oil, Geranium oil, Lemon oil. (4L)		

2	**Herbal cosmetics**: Definition, Advantages, Classification (1L) Herbal cosmetics for skin care: Face Mask & Bath oil (2L) Herbal cosmetics for hair care: Herbal shampoo, herbal oil, herbal dye, herbal hair cream and herbal hair gel. (3L)		
3	**Horticulture**: Definition, Branches, Importance (1L) Horticulture: Career scope and job prospects (1L) New trends in horticulture: Window gardening, City farming, Matrix planting (3L)		

	Semester II **SIUSBOTP2.1: Plant Diversity I (Practical-I) &** **Form and Function I (Practical-II)**	**L**	**Cr**
	Course Outcomes: After completion of the course, learners would be able to understand: **CO1:** The detailed structure and life cycle of *Cycas*. **CO2:** Economic and ecological significance of gymnosperms along with some rare and endangered gymnosperms in the world. **CO3:** Variations in the morphology of leaves and inflorescence in angiosperms. **CO4:** Systematic study of six angiosperm families with plants of economicimportance. **CO5:** The techniques to observe and understand the primary anatomicalstructure of vegetative parts of dicots and monocots. **CO6:** Identification of some important medicinal plants and their uses in various aspects of human health and cosmetics. **CO7:** Technique of paper chromatography. **CO8:** New and upcoming gardening techniques and operations. **CO9:** Activity of enzyme amylase under optimum conditions.		

	PRACTICAL-I (PLANT DIVERSITY-I) **Learning Objectives:** 1. The course will provide a detailed study of *Cycas* pinna, Megasporophyll, Microsporophyll, Coralloid root, Microspore structure. 2. It will help them to understand the morphology of leaves and inflorescence in angiosperms. 3. It will provide a detailed systematic study of six angiosperm families. 4. It will help them to explore some fascinating plant wonders. 5. The course will highlight the economic and ecological importance of gymnosperms along with some rare and endangered gymnosperms.	**30**	**01**
1	Study of stages in the life cycle of *Cycas*: T.S of leaflet (*Cycas* pinna – section cutting), coralloid root, microsporophyll, microspore, Megasporophyll, Ovule (Specimens or slides to be shown).	3	
2	Economic importance of Gymnosperms: Sago (*Cycas*); Turpentine (*Pinus*); Chilgoza (*Pinus*); Ornamental (*Araucaria*).	1	
3	Identification of some rare and endangered gymnosperms: *Welwitschia mirabilis; Ginkgo biloba; Encephalartos altensteinii; Encephalartos woodii*.	1	
3	Leaf morphology: As per theory	3	
4	Types of inflorescence: As per theory	3	
5	Wonders of plants: Carnivorous plants (Pitcher); *Lodoicea maldivicia*; Bioluminescent fungi (*Panellus stipticus*); *Victoria regia;* Plant mimicry – *Boquila trifoliata*.	1	
6	Study of Family: Annonaceae, Cruciferae.	6	
7	Study of Family: Malvaceae, Convolvulaceae.	6	
8	Study of Family: Euphorbiaceae, Amaryllidaceae.	6	

	PRACTICAL-II (FORM AND FUNCTION-I)	**L**	**Cr.**
		30	**01**
	Learning Objectives: 1. The course will provide a detailed study of anatomical structures of root, stem, leaf, types of stomata and epidermal outgrowths. 2. It will help them to identify some important medicinal plants and their products useful in human health and cosmetics. 3. The course will help them to understand the application of anthocyanin as indicator of pH change. 4. It will help them to study gardening techniques and operations. 6. They will learn technique of paper chromatography through separation ofplant pigments. 7. It will enable them to observe the action of enzyme amylase under optimum conditions.		
1	Primary structure of dicot and monocot root.	3	
2	Primary structure of dicot and monocot stem.	3	
3	Primary structure of dicot and monocot leaf with stomata.	3	
4	Study of Epidermal tissue system in plants as per theory.	3	
5	Change in colour because of change in pH: Anthocyanin: black grapes/Purple cabbage.	2	
6	Separation of photosynthetic pigments by paper chromatography.	3	
7	Study of activity of enzyme amylase on starch.	3	
8	Applications of Aromatherapy: Sandal wood oil, Lavender oil, Geranium oil, Lemon oil.	3	
9	Plants used in skin care herbal cosmetics: *Aloe vera, Azadirachta indica,Curcuma longa*. (Demonstration of preparation of herbal cosmetics)	2	
10	Plants used in hair care herbal cosmetics: *Lawsonia inermis, Eclipta alba,Sapindus mukorossi*. (Demonstration of preparation of herbal cosmetics)	2	
11	Study of gardening techniques and operations used in Window gardening, City farming, Matrix planting. (Demonstration)	3	

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FIRST/SECOND SEMESTER

CLASS: F.Y.B.SC **SUB: BOTANY** **PAPER: I/II**

DAY: **DATE:** **TIME:** **MARKS: 60**

N.B.: **1) All questions are Compulsory.**

2) Figures to the right indicate marks.

3) Draw neat labelled diagrams wherever necessary.

Q.1	**a)**	Unit I: Long answer question	**(10)**
		OR	
	a)	Unit I: Long answer question	
	b)	Unit I: Short answer question	**(05)**
		OR	
	b)	Unit I: Short answer question	
Q.2	**a)**	Unit II: Long answer question	**(10)**
		OR	
	a)	Unit II: Long answer question	
	b)	Unit II: Short answer question	**(05)**
		OR	
	b)	Unit II: Short answer question	
Q.3	**a)**	Unit III: Long answer question	**(10)**
		OR	
	a)	Unit III: Long answer question	

	b)	Unit III: Short answer question	**(05)**
		OR	
	b)	Unit III: Short answer question	
Q. 4		**Write notes on the following:**	**(15)**
	i)	Unit I	
		OR	
	i)	Unit I	
	ii)	Unit II	
		OR	
	ii)	Unit II	
	iii)	Unit III	
		OR	
	iii)	Unit III	

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