

**The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)**



**The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)**

**Syllabus for TYBSc
(June 2023 Onwards)**

Program: B.Sc.

Semester V

Course Title: BOTANY

Course Code	Paper Title	Credit
SBO501	PLANT DIVERSITY V	2.5
SBO502	PLANT DIVERSITY VI	2.5
SBOP501	PRACTICALS (501 & 502)	3.0
SBO503	FORM AND FUNCTIONS V	2.5
SBO504	CURRENT TRENDS IN PLANT SCIENCES III	2.5
SBOP502	PRACTICALS (503 & 504)	3.0

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1. Syllabus as per Choice Based Credit System

i) Name of the Programme	:	B. Sc (BOTANY)
ii) Course Code	:	SBO501
iii) Course Title	:	PLANT DIVERSITY V
iv) Semester wise Course Contents	:	Copy of the syllabus Enclosed
v) References and additional references	:	Enclosed in the Syllabus
vi) Credit structure	:	
No. of Credits per Semester	:	2.5 + 1.5 = 04
vii) No. of lectures per Unit	:	15
viii) No. of lectures per week	:	04
ix) No. of Practicals per week	:	01 (per batch of 25 students)
2. Scheme of marking		60 Marks External assessment 40 Marks Internal Assessment
3. Special notes, if any		No
4. Eligibility, if any		As laid down in the College Admission brochure / website
5. Fee structure		As per College Fee Structure specifications
6. Special Ordinance/Resolutions, if any		No

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Programme: T.Y.B.Sc

Semester: V

Course : PLANT DIVERSITY V

Course Code : SBO501

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
4	-	1	2.5	15	15	10		-	60	100

Max. Time, End Semester Exam (Theory) -2Hrs.

Course Objectives

1. To recognize and identify major groups of non-vascular plants.
2. To understand the phylogeny of nonvascular plants and study of their classification.
3. To explore the morphological, anatomical, embryological details as well as the economic importance of viruses, bacteria, algae and fungi.

Course (SBO501)			
Unit No.	Module No.	Content	Lectures
1		<p>Microbiology</p> <ul style="list-style-type: none"> • Types of Microbes: Characteristics of Viruses, Bacteria, Algae, Fungi, Protozoa, Mycoplasma and Actinomycetes. • Culturing: Types of Sterilization, media, staining, Colony characters, Types of Pure cultures 	15

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2	<p>Algae (G.M. Smith Classification System to be followed) Division Rhodophyta: Classification, General Characters and Economic Importance Structure, life cycle and systematic position of <i>Batrachospermum</i>. Division Chrysophyta: Classification and General Characters and Economic Importance. Structure, life cycle and systematic position of <i>Pinnularia</i>.</p>	15
3	<p>Fungi (G.M. Smith Classification System to be followed)</p> <ul style="list-style-type: none"> • Basidiomycetes: Classification, General characters and Economic Importance <ul style="list-style-type: none"> • Life cycle of <i>Agaricus</i> • Deuteromycetes: Classification, General Characters and Economic Importance • Life cycle of <i>Alternaria</i> 	15
4	<p>Plant Pathology</p> <ul style="list-style-type: none"> • Study of plant diseases: Causative organism, symptoms, predisposing factors, disease cycle and control measures of the following: <ul style="list-style-type: none"> • White Rust –<i>Albugo candida</i> • Wheat rust - <i>Puccinia</i> • Tikka disease of ground nut: <i>Cercospora</i> • Little Leaf of brinjal - <i>Mycoplasma</i> • Citrus canker –<i>Xanthomonas axonopodis</i> pv. <i>citri</i> • Leaf curl – leaf curl virus in Papaya. 	15
Total No. of Lectures		60

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1. Syllabus as per Choice Based Credit System

i) Name of the Programme	:	B. Sc (BOTANY)
ii) Course Code	:	SBO502
iii) Course Title	:	PLANT DIVERSITY-VI
iv) Semester wise Course Contents	:	Copy of the syllabus Enclosed
v) References and additional references	:	Enclosed in the Syllabus
vi) Credit structure	:	
No. of Credits per Semester	:	2.5 + 1.5 = 04
vii) No. of lectures per Unit	:	15
viii) No. of lectures per week	:	04
ix) No. of Practicals per week	:	02 (per batch of 25 students)
2. Scheme of marking		60 Marks External assessment 40 Marks Internal Assessment
3. Special notes, if any		No
4. Eligibility, if any		As laid down in the College Admission brochure / website
5. Fee structure		As per College Fee Structure specifications
6. Soecial Ordinance/Resolutions, if any		No

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Programme: T.Y.B.Sc

Semester: V

Course PLANT DIVERSITY – VI

Course Code : SBO502

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
4	-	1	2.5	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives

1.	To recognize and identify major groups of vascular plants.
2.	To understand the phylogeny of vascular plants and study of their classification.
3.	To understand the phylogeny of vascular plants and study of their classification.

Course (SBO502)			
Unit No.	Module No.	Content	Lectures
1		Paleobotany <ul style="list-style-type: none"> ● <i>Lepidodendron</i>– All form genera root, stem, bark, leaf, male and female fructification. ● <i>Lyginopteris</i>– All form genera root, stem, leaf, male and female fructification. ● <i>Pentoxylon</i>– All form genera. Contribution of Birbal Sahni, Birbal Sahni Institute of Paleobotany, Lucknow	15
2		Angiosperms I <ul style="list-style-type: none"> ● Complete classification of Bentham and Hooker (only for prescribed families), Merits and demerits ● Bentham and Hooker's system of classification for flowering plants up to family with respect to the following prescribed families and economic and medicinal importance for members of the families. (Special stress on fruit morphology to be given) 	15

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		<ol style="list-style-type: none"> 1. Capparidaceae 2. Cucurbitaceae 3. Mimusoideae 4. Umbelliferae 5. Rubiaceae 6. Scrophulariaceae 7. Commelinaceae 	
3		<p>Anatomy I</p> <ul style="list-style-type: none"> ● Anomalous secondary growth: Definition, types, Anomalous secondary growth in Stems of <i>Bignonia</i>, <i>Salvadora</i>, <i>Achyranthes</i>, <i>Dracaena</i>. Storage roots of Beet, Radish ● Root stem transition: Definition and types ● Types of Stomata– Anomocytic, Anisocytic, Diacytic, Paracytic, and Graminaceous 	15
4		<p>Palynology</p> <ul style="list-style-type: none"> ● Pollen Morphology ● Pollen viability–storage ● Germination and growth of pollen ● Application of Palynology in honey industry, coal and oil exploration, forensic science 	15
		Total No. of Lectures	60

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SBOP501		PRACTICAL –I AND II	
PRACTICAL-I		PLANT DIVERSITY V	
		Credits 1.5	
Sr. No.	Description		
1	Microbiology <ul style="list-style-type: none"> • Study of aeromicrobiota by petriplate exposed method: Fungal culture, Bacterial culture. • Determination of Minimum Inhibitory Concentration (MIC) of sucrose against selected microorganism. • Study of antimicrobial activity by the disc diffusion method. 		
2.	Algae (G.M. Smith Classification System to be followed) <ul style="list-style-type: none"> ● <i>Batrachospermum</i> ● <i>Pinnularia</i> 		
3.	Fungi (G.M. Smith Classification System to be followed) Study of stages in the life cycle of the following Fungi from fresh / preserved material and permanent slides <ul style="list-style-type: none"> ● <i>Agaricus</i> ● <i>Alternaria</i> 		
4.	Plant Pathology Study of the following fungal diseases: <ul style="list-style-type: none"> ● White rust in Cruciferae (Brassicaceae) ● Wheat rust - <i>Puccinia</i> ● Tikka disease in Groundnut ● Little leaf of brinjal ● Citrus canker ● Leaf curl in Papaya Leaf 		

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SBOP501		PRACTICAL –I AND II	
PRACTICAL-II		PLANT DIVERSITY VI	
		Credits 1.5	
Sr. No.	Description		
1	<p>Paleobotany Study of the following form genera with the help of permanent slides/ photomicrographs.</p> <ul style="list-style-type: none"> ● <i>Lepidodendron</i> ● <i>Lyginopteris</i> ● <i>Pentoxylon</i> 		
2	<p>Angiosperms I</p> <ul style="list-style-type: none"> • Study of one plant from each of the following Angiosperm families as per Bentham and Hooker's system of classification. <ul style="list-style-type: none"> ● Capparidaceae ● Cucurbitaceae ● Mimusoideae ● Umbelliferae (Apiaceae) ● Rubiaceae ● Scrophulariaceae ● Commelinaceae • Morphological peculiarities and economic importance of the members of the above-mentioned Angiosperm families • Identifying the genus and species of a plant with the help of Flora 		
2	<p>Anatomy I</p> <ul style="list-style-type: none"> • Study of anomalous secondary growth in the stems of the following plants using double staining technique. <ul style="list-style-type: none"> 1) <i>Bignonia</i> 2) <i>Salvadora</i> 3) <i>Achyranthes</i> 4) <i>Dracaena</i> • Study of anomalous secondary growth in the roots of 1. Beet 2. Radish • Types of Stomata <ul style="list-style-type: none"> 1) Anomocytic 2) Anisocytic 3) Diacytic 4) Paracytic 5) Gramineous 		
3	<p>Palynology I</p> <ul style="list-style-type: none"> • Study of pollen morphology (NPC Analysis) of the following by Chitale's Method <ul style="list-style-type: none"> 1) <i>Hibiscus</i> 2) <i>Datura</i> 3) <i>Ocimum</i> 4) <i>Crinum</i> 5) <i>Pancreatium</i> 6) <i>Canna</i> • Determination of pollen viability • Pollen analysis from honey sample – unifloral and multifloral honey • Effect of varying concentration of sucrose on In vitro Pollen germination 		

1. Syllabus as per Choice Based Credit System

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i) Name of the Programme	:	B. Sc (BOTANY)
ii) Course Code	:	SBO503
iii) Course Title	:	FORM AND FUNCTIONS - V
iv) Semester wise Course Contents	:	Copy of the syllabus Enclosed
v) References and additional references	:	Enclosed in the Syllabus
vi) Credit structure	:	
No. of Credits per Semester	:	2.5 + 1.5 = 04
vii) No. of lectures per Unit	:	15
viii) No. of lectures per week	:	04
ix) No. of Practicals per week	:	01 (per batch of 25 students)
2.Scheme of marking		60 Marks External assessment 40 Marks Internal Assessment
3.Special notes, if any		No
4.Eligibility, if any		As laid down in the College Admission brochure / website
5.Fee structure		As per College Fee Structure specifications
6.Social Ordinance/Resolutions, if any		No

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Programme: T.Y.B.Sc

Semester: V

Course FORM AND FUNCTIONS V

Course Code : SBO503

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
4	-	1	2.5	20	15	05		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives

- 1.To acquire knowledge about two important organelles and molecular mechanisms of translation
- 2.To understand water relations of plants, inorganic and organic solute transport, and apply the knowledge to manage mineral nutrition and survival in challenging abiotic stresses
- 3.To understand succession in plant communities and study remediation technologies in order to apply knowledge acquired for cleanup of polluted sites.
- 4.To get exposure to principles and techniques of plant tissue culture and apply these studies for improving agriculture and horticulture and to become an entrepreneur.

Course (SBO503)			
Unit No.	Module No.	Content	Lectures
1		Cytology and Molecular Biology <ul style="list-style-type: none"> ● Structure and function and types of chromosome, giant chromosomes Protein Synthesis: Central dogma of Protein synthesis Transcription in prokaryotes and eukaryotes: promoter sites, initiation, elongation and termination. RNA processing: Adenylation & Capping	15
2		Plant Physiology I <ul style="list-style-type: none"> ● Water relations: Concept of water potential and factors affecting water potential, osmosis, transpiration, imbibition 	15

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		<p>(root pressure and guttation)</p> <ul style="list-style-type: none"> ● Translocation of solutes: Composition of phloem sap, girdling experiment. ● Pressure flow model (Munch's hypothesis): Phloem loading and unloading, anatomy of sieve tube elements and mechanisms of sieve tube translocation. ● Mineral Nutrition: Role of Macro and Micro nutrients, physiological functions and deficiency symptoms. 	
3		<p>Environmental Botany</p> <ul style="list-style-type: none"> ● Bioremediation: Principles, factors responsible and microbial population in bioremediation. ● Phytoremediation: Types (Phytoextraction, Rhizofiltration, Phytostabilization, Phytodegradation, Phytovolatilization) ● Plant succession: Hydrosere and Xerosere – Formation of Barren Space, Succession on the Land Citing Different Seres leading up to the Climax, Succession in Water. 	15
4		<p>Plant Tissue Culture</p> <ul style="list-style-type: none"> ● Aspects of Micro-propagation with reference to Banana cultivation ● Somatic Embryogenesis and Artificial Seeds. ● Protoplast Fusion and Somatic Hybridization: ● i) Concept, Definition and various methods of Protoplast Fusion ● ii) Applications of Somatic Hybridization in Agriculture 	15
		Total No. of Lectures	60

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1. Syllabus as per Choice Based Credit System

i) Name of the Programme	:	B.Sc (BOTANY)
ii) Course Code	:	SBO504
iii) Course Title	:	CURRENT TRENDS IN PLANT SCIENCES - III
iv) Semester wise Course Contents	:	Copy of the syllabus Enclosed
v) References and additional references	:	Enclosed in the Syllabus
vi) Credit structure	:	
No. of Credits per Semester	:	2.5 + 1.5 = 04
vii) No. of lectures per Unit	:	15
viii) No. of lectures per week	:	04
ix) No. of Practicals per week	:	01 (per batch of 25 students)
2.Scheme of marking		60 Marks External assessment 40 Marks Internal Assessment
3.Special notes, if any		No
4.Eligibility, if any		As laid down in the College Admission brochure / website
5.Fee structure		As per College Fee Structure specifications
6.Social Ordinance/Resolutions, if any		No

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Programme: T. Y. B. Sc

Semester: V

Course : CURRENT TRENDS IN PLANT SCIENCES – III

Course Code : SBO504

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
4	-	1	2.5	20	15	05		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives

1.	To learn ethnobotanical principles, applications and utilize indigenous plant knowledge for the cure of common human diseases and improvement of agriculture.
2.	To get exposure to the technique of mushroom cultivation and explore the possibility of entrepreneurship in the same.
3.	To gain knowledge about the latest molecular biology techniques for isolation and Characterization of genes.
4.	To learn principles and application of commonly used techniques in instrumentation
5.	To gain proficiency in the monograph study and pharmacognostic analysis of six medicinal plants.

Course (SBO504)			
Unit No.	Module No.	Content	Lectures
1		Ethnobotany and Mushroom Industry <ul style="list-style-type: none"> ● Ethnobotany- Definition, history, sources of data and methods of study, ● Contribution of S.K.Jain in the field of Ethnobotany ● Applications of ethnobotany: <ol style="list-style-type: none"> 1. Ethno-medicines. 2. Agriculture. 3. Edible plants. ● Traditional medicines used by tribals in Maharashtra towards <ol style="list-style-type: none"> 1. Skin ailments: <i>Rubia cordifolia</i>, <i>Sandalwood</i> 2. Liver ailments: <i>Phyllanthus</i>, <i>Andrographis</i> 	15

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		<p>3. Wound healing and ageing: <i>Centella, Terminalia</i>.</p> <p>4. Fever: <i>Tinospora cordifolia</i></p> <p>5. Diabetes: <i>Momordica charantia, Syzygium cuminii</i></p> <p>● Mushroom industry:</p> <p>1. Detail general account of production of mushrooms with respect to methods of Composting, spawning, casing, harvesting of mushroom. Cultivation of <i>Agaricus</i> mushroom.</p> <p>2. General account of mushrooms: Nutritional value, picking and packaging, economic importance</p>	
2		<p>Plant Biotechnology I</p> <ul style="list-style-type: none"> ● Construction of genomic DNA libraries, Chromosome libraries and c- DNA libraries. ● Identification of specific cloned sequences in c-DNA libraries and Genomic libraries ● Analysis of cloned DNA sequences: Hybridization (Southern Hybridization). 	15
3		<p>Instrumentation</p> <p>Colorimetry and Spectrophotometry (Visible and UV) – Instrumentation, working, principle and applications.</p> <p>Chromatography: General account of Column chromatography. Principle and bedding material involved in adsorption and partition chromatography, ion exchange chromatography, molecular sieve chromatography.</p>	15
4		<p>Pharmacognosy and Medicinal Botany</p> <ul style="list-style-type: none"> ● Monographs of drugs with reference to biological sources, geographical distribution, common varieties, macro and microscopic characters, chemical constituents, therapeutic uses, adulterants- <i>Strychnos</i> seeds, <i>Senna</i> leaves, Clove buds, <i>Allium sativum</i>, <i>Acorus calamus</i> and <i>Curcuma longa</i> 	15
		Total No. of Lectures	60

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SBOP502		PRACTICAL –III AND IV	
PRACTICAL-III		FORM AND FUNCTIONS - V	
		Credits 1.5	
Sr. No.	Description		
1	Cytology and Molecular Biology 1. Mounting of Giant chromosomes from <i>Chironomous</i> larva 2. Smear preparation from <i>Tradescantia</i> buds 3. Predicting the sequence of amino acids in the polypeptide chain that will be formed following translation(Eukaryotic)		
2	Plant Physiology I 1. Estimation of Phosphate phosphorus (Plant acid extract) 2. Estimation of Iron (Plant acid extract) (Note: Preparation of a standard graph and determination of the multiplication factor for Phosphate / Iron estimation using a given standard phosphate / Standard Iron solution should be done in regular practical as this will also be put as a question in practical exam)		
3	Environmental Botany Estimation of the following in given water sample 1. Dissolved oxygen demand 2. Biological oxygen demand 3. Hardness 4. Salinity and Chlorinity		
4	Micropropagation Plant Tissue culture: 1. Identification – Multiple shoot culture, hairy root culture, somatic embryogenesis 2. Preparation of stock solutions for preparation of MS medium (Note: Concept of preparation of specified molar solutions should be taught and problems based on preparation of stock solutions for tissue culture media will be given).		

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SBOP502		PRACTICAL –III AND IV	
PRACTICAL-IV		CURRENT TRENDS IN PLANT SCIENCES III	Credits 1.5
Sr. No.	Description		
1	Ethnobotany and mushroom industry 1. Study of plants mentioned in theory for Ethnobotany 2. Mushroom cultivation (To be demonstrated) 3. Identification of various stages involved in mushroom cultivation – spawn, pin head stage, mature/ harvest stage of <i>Agaricus</i>		
2	Biotechnology I 1. Growth curve of <i>E. coli</i> 2. Plasmid DNA isolation and Separation of DNA using AGE 3. Southern blotting		
3.	Instrumentation 1. Demonstration of Beer Lambert's Law 2. Experiment based on Ion exchange chromatography for demonstration 3. Experiments based on separation of dyes/plant pigments using gel column chromatography.		
4.	Pharmacognosy Macroscopic/ Microscopic characters and Chemical tests for active constituents of the following plants. 1. <i>Allium sativum</i> 2. <i>Acorus calamus</i> 3. <i>Curcuma longa</i> 4. <i>Senna angustifolia</i> 5. <i>Strychnos nux-vomica</i> 6. <i>Eugenia caryophyllata</i>		

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Syllabus Prepared by:

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