

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



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Syllabus for T.Y.B.Sc.

(June 2023 Onwards)

Program: B.Sc.

Semester VI

Course Title: BOTANY

Course Code	Paper Title	Credit
SBO601	PLANT DIVERSITY VII	2.5
SBO602	PLANT DIVERSITY VIII	2.5
SBOP601	PRACTICALS (601 & 602)	3.0
SBO603	FORM AND FUNCTIONS VI	2.5
SBO604	CURRENT TRENDS IN PLANT SCIENCES IV	2.5
SBOP602	PRACTICALS (603 & 604)	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	:	SBO601
iii) Course Title	:	PLANT DIVERSITY-VII
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. Soecial Ordinance/Resolutions, if any		No

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Programme: TYBSc
Course PLANT DIVERSITY VII

Semester: VI
Course Code : SBO601

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 recognize and identify and understand the life cycles of bryophytes.
2. To study in detail classification and general characters of three classes of Pteridophytes and identify as well as describe the lifecycles of one example from each class.
3. To study evolutionary aspects and economic utilization of Bryophytes and Pteridophytes.
4. To identify, describe and study in detail the life cycles of three Gymnosperms.

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Course (SBO601)			
Unit No.	Module No.	Content	Lectures
1		Bryophyta (G. M. Smith Classification system to be followed) <ul style="list-style-type: none"> • Life cycle of <i>Marchantia</i> • Life cycle of <i>Pelia</i> 	15
2		Pteridophyta (G. M. Smith Classification System to be followed) <ul style="list-style-type: none"> • Calamophyta – Classification, general characters; Life cycle of <i>Equisetum</i> • Pterophyta - Classification, general characters; Life cycle of <i>Marselia</i> 	15
3		Bryophytes and Pteridophytes: Applied aspects <ul style="list-style-type: none"> • Economic importance of Bryophytes. • Evolution of Sporophyte and Gametophyte in Bryophytes. • Economic importance of Pteridophytes • Types of Sori and Evolution of Sori in Pteridophytes. 	15
4		Gymnosperms (Chamberlain's Classification System to be followed) <ul style="list-style-type: none"> • Life cycle of <i>Gnetum</i> • Life cycle of <i>Ephedra</i>. • Distribution of Gymnosperms in India 	15
Total No. of Lectures			60

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1. Syllabus as per Choice Based Credit System

2.

i) Name of the Programme	:	BSc (BOTANY)
ii) Course Code	:	SBO602
iii) Course Title	:	PLANT DIVERSITY-VIII
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.Social Ordinance/Resolutions, if any		No

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Programme: TYBSc

Semester: VI

Course : PLANT DIVERSITY – VIII

Course Code : SBO602

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 study contribution of Botanical gardens, BSI to Angiosperm study and provide plant description, describe the morphological and reproductive structures of seven families.
- 2.To gain exposure to a phylogenetic system of classification.
- 3.To gain insight into the anatomical adaptations of different ecological plant groups.
- 4.To understand development plant of male and female gametophytes, embryonic structure and development.
- 5.To understand the different aspects and importance of Biodiversity and utilize them for conservation of species so as to prevent further loss or extinction of Biodiversity and preserve the existing for future generations.

Course (SBO602)			
Unit No.	Module No.	Content	Lectures
1		Angiosperms II <ul style="list-style-type: none"> • Bentham and Hooker's system of classification for flowering plants up to family with respect to the following prescribed families and economic importance, medicinal importance and fruit morphology for members of the families 1. Rhamnaceae 2. Combretaceae 3. Asteraceae 4. Asclepiadaceae 5. Labiatae 6. Euphorbiaceae 7. Graminae (Poaceae) 	15

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		<ul style="list-style-type: none"> • Hutchinson's classification system of Angiosperms. Brief Introduction, Merits and Demerits 	
2		Anatomy II <ul style="list-style-type: none"> • Ecological anatomy (with one example each) <ol style="list-style-type: none"> 1. Hydrophytes – submerged, floating, rooted 2. Mesophytes 3. Sciophytes 4. Halophytes 5. Epiphytes 6. Xerophytes 	15
3		Embryology of Angiosperms <ul style="list-style-type: none"> • Microsporangium, Microsporogenesis, Development of male gametophyte • Megasporangium, Types of ovules, • Megasporogenesis- Development of <i>Polygonum</i> type of embryo sac • Double fertilization : Process and Significance • Development of Dicot embryo –<i>Capsella</i> 	15
4		Plant Geography <ul style="list-style-type: none"> • Phytogeographical regions of India. • Biodiversity: <ol style="list-style-type: none"> 1. Levels of biodiversity 2. Importance and status of biodiversity 3. Loss of biodiversity 4. Conservation of biodiversity 5. Genetic diversity- Molecular characteristics 	15
Total No. of Lectures			60

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SBOP601		PRACTICAL I & II	
PRACTICAL-I		PLANT DIVERSITY VII	Credits 1.5
Sr. No.	Description		
1	Bryophyta (G.M. Smith Classification System to be followed) <ul style="list-style-type: none"> • Study of stages in the life cycle of the following Bryophyta from fresh / preserved material and permanent slides <ol style="list-style-type: none"> 1. <i>Marchantia</i> 2. <i>Pelia</i> 		
2	Pteridophyta (G.M. Smith Classification System to be followed) <ul style="list-style-type: none"> • Study of stages in the life cycles of the following Pteridophytes from fresh / preserved material and permanent slides <ol style="list-style-type: none"> 1. <i>Equisetum</i> 2. <i>Marselia</i> 		
3	Bryophytes and Pteridophytes: Applied aspects <ul style="list-style-type: none"> • Economic importance of Bryophyta • Economic importance of Pteridophyta • Types of Sporophytes in Bryophyta (from Permanent slides) • Types of Sori and Soral Arrangement in Pteridophytes 		
4	Gymnosperms (Chamberlain's Classification System to be followed) <ul style="list-style-type: none"> • Study of stages in the life cycles of the following Gymnosperms from fresh / preserved material and permanent slides. <ol style="list-style-type: none"> 1. <i>Gnetum</i> 2. <i>Ephedra</i> 		

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SBOP601		PRACTICAL I & II	
PRACTICAL-II		PLANT DIVERSITY VIII	
		Credits 1.5	
Sr. No.	Description		
1	<p>Angiosperms II</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. <ol style="list-style-type: none"> 1. Rhamnaceae 2. Combretaceae 3. Asteraceae 4. Asclepiadaceae 5. Labiatae 6. Euphorbiaceae 7. Graminae (Poaceae) • Morphological peculiarities and economic importance of the members of the above-mentioned Angiosperm families • Identify the genus and species with the help of flora 		
2	<p>Anatomy II</p> <ul style="list-style-type: none"> • Study of Ecological Anatomy of <ol style="list-style-type: none"> 1. Hydrophytes: <i>Hydrilla</i> stem, <i>Nymphaea</i> petiole, <i>Eichhornia</i> offset 2. Epiphytes: Orchid root 3. Sciophytes: <i>Peperomia</i> leaf 4. Xerophytes: <i>Nerium</i> leaf, <i>Opuntia</i> phylloclade 5. Halophytes: <i>Avicennia</i> leaf and pneumatophore, 6. Mesophytes: <i>Vinca</i> leaf 		
3	<p>Embryology</p> <ul style="list-style-type: none"> • Study of various stages of Microsporogenesis, Megasporogenesis and Embryo Development with the help of permanent slides / photomicrographs • Mounting of Monocot (Maize) and Dicot (Castor and Gram) embryo • <i>In vivo</i> growth of pollen tube in <i>Portulaca / Vinca</i> 		
4	<p>Plant Geography</p> <ul style="list-style-type: none"> • Study of phytogeographic regions of India • Problems based on Simpson's diversity Index 		

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Programme: TYBSc

Semester: VI

Course FORMS AND FUNCTION – VI

Course Code : SBO603

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 study various plant biomolecular structures and appreciate the structures, role, functions and applications of enzymes.
- 2.To gain insight into the Nitrogen and plant hormone metabolism with applications of the same in agriculture and horticulture.
- 3.To understand principles of genetic mapping , mutations and solve problems based on them, gain knowledge of various metabolic disorders and their implications.
- 4.To generate and test hypotheses, make observations, collect data, analyze and interpret results, derive conclusions, and evaluate their significance within a broad scientific context, using suitable statistical techniques.

Course (SBO603)			
Unit No.	Module No.	Content	Lectures
1		Plant Biochemistry <ul style="list-style-type: none"> • Structure of biomolecules: Carbohydrates (sugars, starch, cellulose, pectin, lipids (fatty acids and glycerol), proteins (primary, secondary and tertiary proteins with examples of each) • Enzymes: Nomenclature, classification, mode of action, properties of enzymes. 	15
2		Plant Physiology II <ul style="list-style-type: none"> • Nitrogen Metabolism: Nitrogen cycle, root nodule formation, and leghaemoglobin, nitrogenase activity, assimilation of nitrates, (NR, NiR activity), assimilation of ammonia, (amination and transamination reactions), nitrogen assimilation and carbohydrate utilization. 	15

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		<ul style="list-style-type: none"> Physiological effects and commercial applications of Auxins, Gibberillins, Cytokinins and Abscisic acid. 	
3		<p>Genetics</p> <ul style="list-style-type: none"> Genetic mapping in eukaryotes: discovery of genetic linkage, gene recombination, construction of genetic maps, three- point crosses and mapping chromosomes, problems based on the same Gene mutations: definition, types of mutations, causes of mutations, induced mutations, the Ame's test Metabolic disorders– enzymatic and non-enzymatic: Gene control of enzyme structure Garrod's hypothesis of inborn errors of metabolism, Phenyl ketone urea. 	15
4		<p>Biostatistics</p> <ul style="list-style-type: none"> Test of significance student's <i>t</i>-test – Paired and Unpaired. Regression. 	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	:	SBO604
iii) Course Title	:	CURRENT TRENDS IN PLANT SCIENCE – IV
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: TYBSc

Semester: VI

Course name: CURRENT TRENDS IN PLANT SCIENCE – IV

Course Code : SBO604

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 gain insight into recent molecular biology techniques for DNA analysis, amplification and Barcoding techniques and applications therein.
- 2.To understand and apply tools of Bioinformatics for data retrieval and phylogenetic analysis.
- 3.To learn about the sources of economically important plants in the field of fats and oils and apply it for extraction, dealing with entrepreneurship in the field
- 4.To gain knowledge and proficiency in preservation of post harvest produce and explore the possibility of entrepreneurship in the field..

Course (SBO604)			
Unit No.	Module No.	Content	Lectures
1		Plant Biotechnology II and Molecular biology <ul style="list-style-type: none"> • DNA sequence analysis– Maxam – Gilbert Method and Sanger’s method, Pyro Sequencing. • Polymerase Chain Reaction (PCR) : Principles, working and applications. Types of PCR, Designing of Primers Molecular Biology: <ul style="list-style-type: none"> • The genetic code: Characteristics of the genetic code • Translation in Prokaryotes and eukaryotes. 	15
2		Bioinformatics <ul style="list-style-type: none"> • Organization of biological data, Types of Biological databases • Exploration of data bases, retrieval of desired data, BLAST (Types of BLAST, Applications). • Molecule visualization tools – RASMOL, SPDBV, 	15

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3	<p>Economic Botany</p> <ul style="list-style-type: none"> • Essential Oils: Extraction, perfumes, perfume oils, oil of Rose, <i>Patchouli</i>, Sandalwood, grass oils: <i>Citronella</i>, Vetiver. • Fatty oils: Drying oil (Soybean oil), semidrying oils (Cotton seed) and non-drying oils (Peanut oil), • Vegetable Fats: Coconut oil 	15
4	<p>Post Harvest Technology</p> <ul style="list-style-type: none"> • Storage of Plant Produce –Preservation of Fruits and Vegetables <ol style="list-style-type: none"> 1. Drying (Dehydration) – Natural conditions – Sun drying, Artificial Drying – Hot Air Drying, Vacuum Drying, Osmotically Dried Fruits, Crystallized or Candied Fruits, Fruit Leather, Freeze Drying) 2. Freezing (Cold Air Blast System, Liquid Immersion method, Plate Freezers, Cryogenic Freezing, Dehydro-Freezing, Freeze Drying), 3. Canning 4. Pickling (in Brine, in Vinegar, Indian Pickles) 5. Sugar Concentrates (Jams, Jellies, Fruit juices) 6. Food Preservatives 7. Use of Antioxidants in Preservation 	15
Total No. of Lectures		60

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SBOP602		PRACTICAL-III & IV	
PRACTICAL-III		FORM AND FUNCTION VI	Credits 1.5
Sr. No.	Description		
1	Plant Biochemistry <ul style="list-style-type: none"> • Estimation of proteins by Biuret method • Effect of temperature on the activity of amylase • Effect of pH on the activity of amylase • Effect of substrate variation on the activity of amylase 		
2	Plant Physiology II <ul style="list-style-type: none"> • Determination of alpha-amino nitrogen • Estimation of reducing sugars by DNSA method 		
3	Genetics <ul style="list-style-type: none"> • Problems based on three-point crosses, construction of chromosome maps • Identification of types of mutations from given DNA sequences • Study of mitosis using pre-treated root tips of <i>Allium</i> 		
4	Biostatistics <ul style="list-style-type: none"> • <i>t</i>-test (paired and unpaired) • Problems based on regression analysis 		

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SBOP602		PRACTICAL-III & IV	
PRACTICAL-IV		CURRENT TRENDS IN PLANT SCIENCES IV	Credits 1.5
Sr. No.	Description		
1	Plant Biotechnology II <ul style="list-style-type: none"> • DNA sequencing by Sanger's Method and Pyro Sequencing Method • DNA barcoding of plant material by using MEGA Software 		
2	Bioinformatics <ul style="list-style-type: none"> • BLAST: nBLAST, pBLAST • Multiple sequence alignment • Phylogenetic analysis • RASMOL/SPDBV 		
3	Economic Botany <ul style="list-style-type: none"> • Demonstration: Extraction of essential oil using Clevenger • Thin layer chromatography of essential oil of <i>Patchouli</i> and <i>Citronella</i> • Saponification value of Coconut oil • Rancidity of peanut oil 		
4	Post-Harvest Technology <ul style="list-style-type: none"> • Preparation of Squash 		

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Semester End Theory Assessment - 60 marks

- i. Duration - These examinations shall be of 2 hours duration.
- ii. Paper Pattern:
 - 1. There shall be 05 questions each of 12 marks. On each unit there will be one question & last question will be based on all the 04 units.
 - 2. All questions shall be compulsory with internal choice within the questions.

Questions Options Marks Questions on

Q.1) Any 2 out of 4	12 Marks	Unit I
Q.2) Any 2 out of 4	12 Marks	Unit II
Q.3) Any 2 out of 4	12 Marks	Unit III
Q.4) Any 2 out of 4	12 Marks	Unit IV
Q.5) Any 4 out of 5	12 Marks	All Units

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Syllabus Prepared by:
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4. Dr. Rajni Shirsat: Member, Syllabus Committee Assistant. Professor, KET's V.G.Vaze College (Autonomous), Mulund (East), Mumbai.
5. Ms. Siddhi Baskaware: Member, Syllabus Committee Assistant Professor, KET's V.G.Vaze College (Autonomous), Mulund (East), Mumbai.
6. Ms. Nupoor Telawane: Member, Syllabus Committee Assistant Professor, KET's V.G.Vaze College (Autonomous), Mulund (East), Mumbai.