

**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 T.Y.B.Sc.

(June 2020 Onwards)

Program: B.Sc.

Semester 6

Course Title: BOTANY

Course Code	Paper Title	Credit
SBO601	PLANT DIVERSITY VII	2.5
SBO602	PLANT DIVERSITY VIII	2.5
SBOP602	PRACTICALS (601 & 602)	3.0
SBO603	FORM AND FUNCTION IV	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	:	BSc (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. Social 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 Content			
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> • Life cycle of <i>Sphagnum</i> 	15
2		Pteridophyta (G. M. Smith Classification System to be followed) <ul style="list-style-type: none"> • Lepidophyta – Classification, general characters; Life cycle of <i>Lycopodium</i> • Psilophyta – Classification, general characters; Life cycle of <i>Psilotum</i> • Pterophyta - Classification, general characters; Life cycle of <i>Marselia</i> 	15
3		Bryophytes and Pteridophytes: Applied aspects <ul style="list-style-type: none"> • Ecology of Bryophytes. • Economic importance of Bryophytes. • Bryophytes as Indicators. • Evolution of Sporophyte and Gametophyte in Bryophytes. • Economic importance of Pteridophytes • Diversity and distribution of Indian 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 	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
Course PLANT DIVERSITY – VIII

Semester: VI
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.

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Course Content			
Unit No.	Module No.	Content	Lectures
1		<p>Angiosperms II</p> <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 <ol style="list-style-type: none"> 1. Rhamnaceae 2. Combretaceae 3. Asteraceae 4. Asclepiadaceae 5. Labiatae 6. Euphorbiaceae 7. Graminae (Poaceae) <ul style="list-style-type: none"> • Hutchinson's and Engler & Prantl's classification system of Angiosperms .Brief Introduction, Merits and Demerits 	15
2		<p>Anatomy II</p> <ul style="list-style-type: none"> • Ecological anatomy <ol style="list-style-type: none"> 1. Hydrophytes – submerged, floating, rooted 2. Hygrophytes -<i>Typha</i> 3. Mesophytes 4. Sciophytes 5. Halophytes 6. Epiphytes 7. Xerophytes 	15
3		<p>Embryology of Angiosperms</p> <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 embryo –<i>Capsella</i> 	15
4		<p>Plant Geography (Shifted from Paper – IV)</p> <ul style="list-style-type: none"> • Phytogeographical regions of India. • Biodiversity: <ol style="list-style-type: none"> 1. Definition, diversity of flora found in various forest types of India 2. Levels of biodiversity 	15

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		3. Importance and status of biodiversity 4. Loss of biodiversity 5. Conservation of biodiversity 6. Genetic diversity- Molecular characteristics	
Total No. of Lectures			60

PRACTICAL		SBOP601
PRACTICAL-I		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> 3. <i>Sphagnum</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>Lycopodium</i> 2. <i>Psilotum</i> 3. <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> • Economic importance of Gymnosperms 	

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PRACTICAL –		SBOP601
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 3. Sciophytes: <i>Peperomia</i> leaf 4. Xerophytes: <i>Nerium</i> leaf, <i>Opuntia phylloclade</i> 5. Halophytes: <i>Avicennia</i> leaf and pneumatophore, <i>Sesuvium / Sueda</i> leaf 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 • Preparation of vegetation map using Garmin's GPS Instrument • Problems based on Simpson's diversity Index sucrose on <i>In vitro</i> Pollen germination 	

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1. Syllabus as per Choice Based Credit System

i) Name of the Programme	:	B. Sc (BOTANY)
ii) Course Code	:	SBO603
iii) Course Title	:	FORM AND FUNCTIONS-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 FORMS AND FUNCTION – IV

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.

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Course Content			
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 (amino acids) • Enzymes: Nomenclature, classification, mode of action, Enzyme kinetics, Michaelis-Menten equation, competitive, non- competitive and un-competitive inhibitors. 	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. • Physiological effects and commercial applications of Auxins, Gibberillins, Cytokinins and Abscisic acid. 	15
3		Genetics <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
		Biostatistics (Shifted from Paper – II) <ul style="list-style-type: none"> • Test of significance student's <i>t</i>-test – Paired and Unpaired. • Regression. • ANOVA (one way). 	15
4.		Total No. of Lectures	60

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1. Syllabus as per Choice Based Credit System

i) Name of the Programme	:	BSc (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
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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

Semester: VI

Course 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..

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Course Content			
Unit No.	Module No.	Content	Lectures
1		Plant Biotechnology II <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 • DNA barcoding: Basic features, nuclear genome sequence, chloroplast genome sequence, <i>rbcL</i> gene sequence, <i>mat K</i> gene sequence, present status of barcoding in plants. 	15
2		Bioinformatics (Shifted from Paper – III) <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, • Multiple sequence analysis and phylogenetic analysis 	15
3		Economic Botany <ul style="list-style-type: none"> • Essential Oils: Extraction, perfumes, perfume oils, oil of Rose, Sandalwood, <i>Patchouli</i>, <i>Champaca</i>, grass oils: <i>Citronella</i>, Vetiver. • Fatty oils: Drying oil (Linseed and Soyabean oil), semidrying oils (Cotton seed, Sesame oil) and non-drying oils (Olive oil and Peanut oil), • Vegetable Fats: Coconut and Palm oil 	15
4		Post Harvest Technology <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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PRACTICAL –III AND IV		SBOP603
PRACTICAL-III		FORM AND FUNCTION IV
		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 • Effect of GA on seed germination • 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 • ANOVA (One Way) 	

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PRACTICAL –III AND IV		SBOP604
PRACTICAL-IV		CURRENT TRENDS IN PLANT SCIENCES III
		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 Palm oil 	
4	Post-Harvest Technology <ul style="list-style-type: none"> • Preparation of <ol style="list-style-type: none"> 1. Squash 2. Jam 3. Jelly 4. Pickle 	



Dr. Aparna Saraf
(VC Nominee)

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Syllabus Prepared by:

1. Dr. M A Deodhar: Chairperson, Syllabus Committee

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