



K. J. Somaiya College of Science and Commerce,

Vidyavihar, Mumbai-400077

Autonomous - Affiliated to University of Mumbai (Reaccredited by NAAC with Grade A)

Revised Syllabus T.Y.B.Sc. (Autonomous)

Semester V & VI

Program: T.Y.B.Sc.

Course: BOTANY

To Be Implemented from

Academic Year 2020-2021





PREAMBLE

The revised syllabus will be effective from the academic year 2020-2021. Autonomy has given us the opportunity to frame the syllabus with a blend of Traditional and modern botany which will open the vistas in higher studies. Autonomy has also helped to develop the skill, research and consultancy. It has been prepared keeping in this view the unique requirement of botany students. The course contains diverse range of fields; study of sustainable agriculture to entrepreneurship skills. Botany is one of the oldest branches of plant sciences. It is surprisingly useful in areas which have applications in early medicine those are coming from plant extract. A study in Botany is as important today as it ever was. It provides not only hands on experience and professional input but it also develops analytical and commenting attitude. Climate change is expected to have profound effect on world such criticism can be well evaluated by students after completing this program. To sum up about programme; the curriculum is a source of huge information to develop scientific attitude among students to make them curious and critical thinkers.







Graduate Attributes

Every student shall have following on completion of a programme:

- Disciplinary Knowledge Depth of core and disciplinary knowledge
- Resourceful and Responsible Ability to motivate, capable of handling independent work
- Learning and Research skills Equipped to seek knowledge and to continue learning throughout their lives.
- Global Awareness An understanding of international traditions and practices both within and beyond their discipline.
- Reflective Learning Set aspirational goals for continuous personal and professional growth.





		SEMESTER V		
Course	Module		Credit	Hours/ course
	Γ	<u>Core Course: I</u> Microbiology and Phycology	02	30
		Environmental Microbiology		
20US5BOMP1		Applied Microbiology		
		Algae		
20US5BOC2		<u>Core Course: II</u> Cryptogams	02	30
	I	Fungi		
	11	Phytopathology		
		Bryophytes		
201165800082	Cytoge	Core Course: III Enetics and Computational Biology	02	30
20035600065		Cytogenetics		
		Molecular Biology		
		Data Analysis and Validation		
	-		1	1
		<u>Core Course: IV</u> Environmental Botany	02	30
2011S5B0EVB4	I	Global Environmental Issues		
	11	Environmental Health		
		Environmental Management Systems and Audit		
Sele	ect any On	e discipline specific elective course following	from the	
20115580185	Dis	<u>scipline Specific Elective Course: V</u> Industrial Botany	02	30
2003300103	I	Small Scale Industry		
	11	Role of Plants in Industry		
		Nanotechnology and IPR		
20US5BOEB5	Di	<u>scipline Specific Elective Course: V</u> Economic Botany	02	30
		Agronomy		
		Plant Products		
		Crops and Super food		





Sele	ct any C	One discipline specific elective course	from the	
20US5BOMB6	<u> </u>	Discipline Specific Elective Course: VI Medicinal Botany	02	30
		Monographs of Drug		
		Plants as Traditional Medicine		
		Biodiversity		
20US5BOPP6		Discipline Specific Elective Course: VI Plant Propagation	02	30
	I	Propagation Practices		
		Propagation Environment		
		Pests and Disease Management		
	Select a	ny One Skill Enhancement course from following	m the	
		Skill Enhancement Course: VII	02	30
20US5BOLA7		Landscape Architecture		
	<u> </u>			
		Computational Modeling for Landscaping		
20US5BOPHT7		Skill Enhancement Course: VII Post-Harvest Technology and Preservation	02	30
	I	Post-harvest Technology		
	II	Methods of Preservation		
		Processing		
Course Code		PRACTICAL HEADINGS	Credits	Hours / week
20US5BOMP1	Microl	biology and Phycology	1	
20US5BOC2	Crypto	ogams	1	
20US5BOCCB3	Cytoge	enetics and Computational Biology	1	
20US5BOEVB4	Enviro	onmental Botany	1	
20US5BOIB5	Indust	rial Botany	1	
		OR		1
20US5BOEB5	Econo	mic Botany	1	
20US5BOMB6	Medic	inal Botany	1	
		OR		1
20US5BOPP6	Plant F	Propagation	1	





		SEMESTER VI		
Course	Module		Credit	Hours/ course
		<u>Core Course: I</u> Vascular Plants Diversity	02	30
		Pteridophytes		
20US6BOVPD1	П	Gymnosperms		
		Taxonomy		
20US6BOFF2		Core Course: II Forms and Function	02	30
	<u> </u>	Anatomy		
	11	Palynology		
		Embryology		
20US6B0EB3		<u>Core Course: III</u> Functional Botany	02	30
	I	Plant Physiology		
	11	Phytochemistry and		
		Pharmacognosy		
		Seed technology		
		<u>Core Course: IV</u> Forestry	02	30
	I	Forest Mensuration		
200300014	11	Forest Protection		
		Forest Economics		
Sele	ect any On	e discipline specific elective course following	from the	
20US6BOAB5		Ayurvedic Botany	02	30
	I	Alternate Medicine		
	11	Conventional Medicine		
		Ethnobotany		
		coinling Specific Floating Courses V	02	20
20030806413		Green House Technology	02	30
		Green House Construction and Economics		
		Green House Management		1
		Crop protection and Marketing		
				1





Selec	ct any C	One discipline specific elective course	from the	
20US6BOPB6	<u> </u>	Discipline Specific Elective Course: VI Plant Biotechnology	02	30
	I	Plant Tissue Culture		
		Micro-propagation		
		Biotechnology		
20US6BOFI6		<u>Discipline Specific Elective Course: VI</u> Floriculture	02	30
	I	Commercial Floriculture		
		Edible Flowers		
		Cut Flowers and Dry Flowers		
S	Select a	ny One Skill Enhancement course from following	m the	
20US6BOSP7	Sus Nat	Skill Enhancement Course: VII stainable Practices (Subhash Palekar tural Farming)	02	30
	I	Spiritual farming		
		Soil Health		
		Precision farming		
2011568057		Skill Enhancement Course: VII Entrepreneurship	02	30
2003000027	I	Entrepreneurship		
		Business Policies		
		Sources of Finance		
	1			
Course Code		PRACTICAL HEADINGS	Credits	Hours / week
20US6BOVPD1	Vascul	ar Plants Diversity	1	
20US6BOFF2	Forms	and Function	1	
20US6BOFB3	Functi	onal Botany	1	
20US6BOF4	Forest	ry	1	
20US6BOAB5	Ayurve	edic Botany	1	
		OR		
20US6BOGHT5	Green	House Technology	1	
20US6BOPBT6	Plant E	Biotechnology	1	
		OR		
20026B0F16	Floricu	liture	1	





	<u> </u>	SEMESTER V, CORE COURSE I	
Code		Microbiology and Phycology	Credits
			02
20US5BOMP1	1		Hours/
			course
			30
Module I:	1	Environmental Microbiology	
	Lear	rning Objective –	
	i.	To select and apply effective treatment	
		methods to sewage.	
	ii.	To enlist the composition of air micro biota	
	iii.	To measure the components of air quantitatively	
	Lea	rning Outcome – Students will be able to;	
	i.	Implement the effective and efficient method to treat	
		the waste water.	
		Analyse the air microflora and mycoflora.	
	1	Waste water: Sources of waste water, Chemical and	
		Microbiological characteristics and treatment (Primary,	
		Secondary and Tertiary treatment)	
	2	Microbiology of Air- Microbial component of	
		atmosphere,	
		aeromicrobiological techniques for microflora	
	3	Principles and methods of air sampling- Air sampler and	
		Culture plate technique	
Module II:		Applied Microbiology	
	Lear	rning Objectives –	
	i.	To insight the designing of fermenter.	
	ii.	To design and plan the production strategies for	
		different products.	
	Lea	rning Outcomes – Students will be able to;	
	i.	Formulate the production process of	
		valuable compounds.	
	Ref	frame and modify the upstream and downstream	
		processing for finished products.	
	1	Industrial Fermentation – Fermenter (Construction and	
		working), Types of commonly used culture system,	
	2	Media, Inoculum, Harvesting, Recovery and Production	
	2	Production of Antibiotic – Peniciliin	
	3	Production of Organic acid – Giutamic acid	
	4	Production of Vinegar	





Module III:		<u>Algae</u>
	Lea	rning Objectives –
	i.	To compare the stages of life cycle in different algae.
	ii.	To develop the methodology for algal cultivation.
	Lea	rning Outcomes – Students will be able to;
	i.	Differentiate between various stages of
		development in algae.
	1	Life cycle, Systematic position, Occurrence, Thallus
		structure and Reproduction of the following – Chara,
		Ectocarpus, Polysiphonia
	2	Patterns of life cycle – Haplontic, Diplontic,
		Diplohaplontic and Haplobiontic
	3	Methods of Algal Collection, Preservation, Preparation
		of Herbarium.

	SEMESTER V, PRACTICAL I	
Code		Credits
		01
20US5BOMPP		No. of
		practicals
1	Study of aeromicrobiota by exposed petri-plate method.	1
2	Study of sewage sample by serial dilution.	1
3	Determination of Chemical Oxygen Demand of sewage water.	1
4	Air sampler – Tilak and Rotarod (Demonstration)	
5	Determination of MIC of sugar.	1
6	Study of antimicrobial activity by agar-cup method.	1
7	Quantitative estimation of Vinegar using titrimetry.	1
8	Study of stages in the life cycle of the following types from the	
	fresh / preserved material and permanent slides;	
	Chara, Cosmarium, Ectocarpus, Polysiphonia.	
9	Preparation of algal herbarium (Demonstration)	
10	Chromatographic separation of photosynthetic pigments	1
	from suitable alga.	
11	Demonstration of cultivation of algae.	2





- 1. Prescott, L.M., Harley J.P., Klein D. A. (2005) Microbiology, McGraw Hill, India. 6th edition.
- 2. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.
- 3. Tortora, G.J., Funke, B.R., Case. C.L. (2007) Microbiology. Pearson Benjamin Cummings, San Francisco, U.S.A. 9th edition.
- 4. Kale V. V. and Bhusari K. P. (2015) Applied microbiology. Himalaya Publication house, Mumbai.
- 5. Bilgarmi, K.S and Saha, L.C. (1996) A text book of Algae. CBS Publishers, New Delhi
- 6. Bold, H.C. and Wynne, M.J. (1995) Introduction to Algae. Prentice Hall of India, New Delhi
- 7. Kashyap, A.K. and Kumar, H.D. Recent advances in Phycology. Rastogy & company.
- 8. Kumar, H.D. (1985) Algal cell biology. East West Press, New Delhi.
- 9. Kumar, H. D. (1999) Introductory Phycology. East West Pvt. Ltd., New Delhi.
- 10. Pandey, B.P. (2004) Algae. S.Chand & Company Ltd., New Delhi.
- 11. Sharma, O.P. (2002) Text book of Algae. Tata McGraw Hill Publ. Comp. Ltd., New Delhi.
- 12. Sharma, P.D. (2003) A Text book of Botany-Lower plants. Rastogi Publications, Meerut.
- 13. Smith, G.M. (1976) Cryptogamic Botany Vol.1.Tata Mc Graw Hill Publ. Comp. Ltd., New Delhi.
- 14. Vashishta, B.R. (1999) Algae. S. Chand & Company, New Delhi.







	SEMESTER V, CORE COURSE II	Hours /
		course
		30
Code	<u>Cryptogams</u>	Credits
		02
20US5BOC2		
Madulali		
Module I:	<u>Fungi</u>	
	Learning Objectives –	
	i. To give comparative account of two divisions of fungi.	
	ii. To outline the stages of development on fungi.	
	Learning Outcome – Students will be able to;	
	i. Compare and contrast between two divisions of fungi.	
	ii. Draw and label different stages of development in life	
	cycle of fungi.	
	1 Fungi- General characteristics of Class Basidiomycetes and	
	Deuteromycetes with respect to vegetative structure and	
	reproduction.	
	2 Structure, Life cycle and Systematic position of-	
	Phycomycetes-Saprolegnia	
	Ascomycetes-Penicillium	
	Basidiomycetes- Puccinia	
	Deuteromycetes- Fusarium	
Module	Phytopathology	
<u>II:</u>	Learning Objective –	
	i. To identify the diseased plants.	
	ii. To name the techniques of disease control.	
	iii. To uncover the industrial importance of fungi.	
	Learning Outcome – Students will be able to;	
	i. Suggest the remedies for diseased plants.	
	ii. Suggest the strategies to control the spread of disease in a field.	
	iii. Investigate the possible use of fungi in industry to recover	
	the valuable products.	
	1 Study of plant diseases; Causative agent, Symptoms,	
	Predisposing factors, Disease cycle and Control measures of	





		following diseases – Tikka disease of Ground nut, Early and	
		Light Blight of Potato, Smut of Jowar	
	2	Physical, Chemical and Biological control methods of plant	
		disease.	
	3	Fungal enzymes and Utilization of Nutrients.	
	I		
Module III:		<u>Bryophytes</u>	
	Lea	rning Objective –	
	i.	To compare the internal and external morphology of class representative bryophytes.	
	ii.	Appreciate the contribution of different scientist in study of Bryophytes.	
	Lea	rning Outcomes – Students will be able to:	
	i.	Identify and classify the bryophytes belongs to division Musci	
	ii.	Draw and label the stages of development in life cycle of	
		Bryophyta.	
	1	General characteristics of Division – Musci	
	2	Systematic position (Classification by G.M.Smith), Occurrence,	
		Thallus structure, reproduction – Marchantia, Sphagnum.	
	3	Contribution of Prof. Shivram Kashyap in Indian Bryology.	
Code		SEMESTER V. PRACTICAL II	Credits
			01
20US5B0CP	-		No of
200000000			nracticals
1	Stuc	dy of following types with the belo of fresh material, permanent	
I	slide	es and photomicrographs. Sancelegnia Penicillium Puccinia	2
	Fus	arium	
2	Cult	uring of Saprolegnia	1
2	Stuc	ty of following plant diseases on the basis of disease symptoms:	1
5	Tikk	a disease of Ground nut. Farly and Late Blight of Potato. Smut	
	of Jo	owar, Leaf curl disease	
4	Extr	raction of Invertase from Yeast and study of its activity.	1
5	Isola	ation and identification of fungus from fruits	1
6	Stuc	dy of the following types with the help of fresh material.	2
	perr Sph	manent slides and photomicrographs- <i>Marchantia</i> and agnum.	





References:

- 1. Sharma, P.D. (2011) Plant Pathology, Rastogi Publication, Meerut, India.
- 2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996) Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
- 3. Mehrotra, R.S. (1991) Plant Pathology, Tata Mc Graw Hill Co.Delhi
- 4. Chattergee, P.B. (1997) Plant Protection Techniques, Bharati Bhawan, Publ. Patana

T. Y. B.Sc. Syllabus

- 5. Agrios, G.N. (2006) Plant Pathology, Elsevier Academic Press.
- 6. Pandey, B.P. (2009) Plant Pathology, S.Chand Co.
- 7. Agrias G. (2005) Plant Pathology, 5th Ed. Elsevier Academic Press
- 8. Sharma, P.D. (2003) A Text book of Botany-Lower plants. Rastogi Publications, Meerut.
- 9. Ainsworth, G.C., Sparrow, K.E., Sussman. The Fungi. Academic Press, New York
- 10. Sharma O.P. (1989) Textbook of Fungi. Tata McGraw Hill, New Delhi.
- 11. Dube H.C. (1996) An Introduction to Fungi. Vikas Publishing House Private Ltd., New Delhi.
- 12. Vashishta B.R. (1999) Botany for Degree Students. S. Chand and Company Ltd, New Delhi.
- 13. Gangulee H.C and Kar. A. K. (1994) College Botany Vol.II. New Central Book Agency Ltd. Calcutta.





	SEMESTER V Core Course III	Hours / course
		30
Code	Cytogenetics and Computational Biology	Credits
		02
20US5BOCCB3		
Module I:	Cytogenetics	
	Learning Objective –	
	i. To summarize Chromosomal basis of inheritance	
	Learning Outcome – Students will be able to;	
	i. Correlate phenotypic abnormalities with its genetic	
	basis	
	1 Mechanism of crossing over and linkage	
	2 Chromosomal basis of inheritance; Tetrad Analysis in	
	Neurospora	
	3 Sex determination in higher organisms	
	4 Chromosomal aberrations with reference to Philadelphia	
	chromosome, Cri-Du-Chat, Patau and Edwards syndrome.	
Module II:	Molecular Biology	
	Learning Objective –	
	i. To relate the source and effects of mutations.	
	Learning Outcome – Students will be able to;	
	i. Categorize the phenotypic abnormalities with	
	related mutations.	
	ii. Predict the possibility of oncogenesis.	
	1 DNA Transformation- Definition, Natural and Artificial.	
	2 Mutation- Definition, Types of mutation	
	3 Mutagens- Physical (Radiation), Chemical (Alkylating,	
	Interchelating, HNO ₂).	
	4 Mutations involved in causes of cancer.	





Module III:		Data Analysis and Validation				
	Lear	Learning Objectives –				
	i.	To identify appropriate statistical analysis for				
		validation of data.				
	ii.	To locate the source of information.				
	Lear	rning Outcome – Students will be able to;				
	i.	Confirm statistical significance of available data.				
	ii.	To retrieve the appropriate information pertinent to				
		study.				
	1	Probability				
	2	Regression				
	3	Student's t-test (paired and unpaired)				
	4	Chi-square test (contingency table 2 x 2 and 2 x 3)				
	5	Organization of Biological data and Databases				
	6	Exploration of databases, Retrieval of desired data, BLAST				

Code	SEMESTER V, PRACTICAL III	Credits
		01
20US5BOC		No. of
CBP		practicals
1	Problems based on Tetrad analysis	1
2	Study of following disorders using karyograms: Philadelphia	1
	chromosome, Cri-Du-Chat, Patau syndrome and	
	Edwards syndrome.	
3	Study of transposable elements in Maize using photomicrograph.	1
4	Study of artificial transformation and Blue-white colony selection	1
	using photomicrograph.	
5	Problems based on Linear Regression.	1
6	Problems based on Student's t test.	1
7	Problems based on Chi-square test (contingency table 2 x 2 and 2	1
	x 3).	
8	BLAST: N-BLAST, P-BLAST.	1





- Somanyan T. Y. B.Sc. Syllabus
- 1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991) Principles of Genetics, John Wiley & sons, India. 8th edition.
- 2. Russell, P. J. (2010) iGenetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd Edition.
- Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007) Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
- 4. Glick, B.R., Pasternak, J.J. (2003) Molecular Biotechnology-Principles and Applications of recombinant DNA. ASM Press, Washington.
- 5. Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics. _II Edition. Benjamin Cummings.
- 6. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi
- 7. Lewin B. 2000. Genes VII. Oxford University Press, New York.
- 8. Gupta P.K (1995) Genetics and Cytogenetics. Rastogi Publications, Meerut.
- 9. Pawar C.B 2003 (First Edition). Genetics Vol. I and II. Himalaya Publishing House, Mumbai.
- 10. Strickberger 2005. (Third Edition). Genetics. Prentice Hall of India Pvt. Ltd., New Delhi.
- 11. Verma P.S. and Agarwal V.K. (1991), Genetics. S Chand Comp. Ltd. Ramnagar, New Delhi.
- 12. Ahluwalia K.B 2005 (First Edition). Genetics. New Age International Private Ltd. Publishers, New Delhi.
- 13. Bailey, N. Statistical methods in Biology.
- 14. Panse and Sukatme Statistical methods in Biology.
- 15. Snedecure, G.W. and Cochran- Statistical methods
- 16. Purohit S.G., Ranade V.D., Dusane A.V. (2002) Introduction to Biometry Narendra Prakashan Pune.
- 17. Rastogi V. B. (2017) Fundamentals of Biostatistics. Medtech, New Delhi.
- 18. Mahajan B. K. (1991) Methods of Biostatistics. Jaypee brothers, New Delhi.
- 19. Prasad S. (2006) Elements of Biostatistics. Jogi Publications, Meerut.
- 20. Kar D.K. and Halder S. (2006) Plant Breeding and Biometry. New Central Book Agency (P) Ltd., Kolkata.





	SEMESTER V, CORE COURSE IV	Hours /
		course 30
Code	<u>Environmental Botany</u>	Credits
		02
20US5BOEVB4		
Module I:	Global Environmental Issues	
	Learning Objectives –	
	i. To outline the effect of changing environment.	
	ii. To state the consequences of increased industrialization	
	Learning Outcome – Students will be able to;	
	i. Correlate the industrialization and its associated hazardous	
	effects.	
	ii. Examine the possible cause of damage to the environment.	
	1 Climate change- Causes, Effect and Solution	
	2 Bioleaching	
	3 Case Studies- Rainbow valley of Mount Everest, Love canal	
	tragedy, Bhopal gas tragedy, Brown naze (U.K.), Nuclear Winter,	
	Arsenic poisoning in west Bengai, Fluoride poisoning in Pulijab	
	(Endemic nuclosis)	
	Automobile, Plastic.	
Module II [.]	Environmental Health	
<u>module n.</u>	Learning Objective –	
	i. To evaluate the effects of toxic chemicals on environment.	
	Learning Outcome – Students will be able to:	
	i. Predict the risk of environment damage.	
	ii. Sort the risk factors causing hazards to the environment.	
	1 Ecotoxicology: Toxic agents; Pesticides, Fertilizers, Chemical	
	carcinogen.	
	² Environmental Risk Assessment; Definition, Scope, Objective,	
	Basic steps in risk assessment; hazard identification, Exposure	
	assessment, Dose-response assessment, risk characterization,	
	Case study	





Module III:		Environmental Management Systems and Audit
	Le	earning Objective –
		i. To discuss the strategies of environment management.
	i	i. To infer the role of law and NGO's in environment
		management.
	ii	i. To analyse the past, present and future status of environment.
	Le	earning Outcome – Students will be able to;
		i. Describe the strategies of environment management.
	i	i. Suggest the appropriate legal actions towards environment
		protection.
	1	Environmental audit- Scope and objectives, Types, Procedure
		and Case study.
	2	Environmental management- Current issues and Problems.
	3	Water, Soil, Wetland management.
	4	Environment Protection Acts
	5	Role of NGO in environment management, Role of Inter-
		governmental panel on climate change (IPCC) and Conference of
		the parties (CoP's)
	6	Environmental education and awareness

Code	SEMESTER V, PRACTICAL	Credits	
		01	
20US5BO		No. of	
EVBP		practicals	
1	Detection of Heavy metals from waste water.	1	
2	Demonstrate the effect of heavy metals on seed germination.	1	
3	Determination of Acidity and Alkalinity of given water sample.	1 📊	
4	Determination of Hardness of given water sample.	1	
5	Determination of Dissolved oxygen and Biological Oxygen Demand for	1	
	given water sample.		
6	Determination of organic matter content of polluted and unpolluted soil sample.	1	
7	Determination of nitrates in water sample collected from different	1	
	sources.		
8	Determination of sulphates in water sample collected from different	1	
	sources.		
9	Preparation of report of environment risk assessment- Case study.	1	
10	Environmental impact assessment- Case study.	1	



- Somanyan T. Y. B.Sc. Syllabus
- 1. Environmental Protection and Laws Jadhav and Bhosale, V.M.Himalaya publ. House
- 2. Kormondy, E.J. (1996) Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.
- 3. Ambasht, R.S. and Ambasht, N.K. (2008) A text book of Plant Ecology, CBS Publishers & Distributors PVT. LTD.
- 4. Majumdar, R and Kashyap, R (2019) Practical Manual of Ecology and Environmental Science, Prestige Publishers, New Delhi.
- 5. Odum E.P. (1978) Ecology. Oxford and IBS Publishing Co., New Delhi.
- 6. Sharma P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut.
- 7. Fulekar M.H. (2014) Environmental Biotechnology. Science Publisher, USA.





	SEMESTER V DSEC I Select any One DISCIPLINE SPECIFIC ELECTIVE COURSE I from the following	Hours/ course 30
Code	Industrial Botany	Credits
		02
20US5BOIB5		
Module I:	Small Scale Industry	
	Learning Objectives –	
	i. To emphasize on status of small scale industry.	
	ii. To define the production process of some valuable products.	
	Learning Outcome – Students will be able to;	
	i. Formulate the plant based products to suffice daily need.	
	1 Scope, Role and Importance of Small Scale Industry; Khadi	
	and Village Industry Commission, Contribution of MSME	
	2 Nutraceutical products: Protein bar using natural products	
	3 Source, Extraction and Applications of edible pigments-	
	Beetroot, Red cabbage, Broccoli, Carrot	
	4 Plants used in homeopathic drugs – <i>Calendulla</i> - skin	
	infection, <i>Argemon</i> - rheumatism, <i>Atropa</i> - fever and headache,	
	<i>Centella</i> - wound healing, <i>Cinchona</i> - malaria	
<u>Module II:</u>	<u>Role of Plants in Industry</u> Learning Objectives –	
	 To prepare the formulations and obtain the finished products at small scale. 	
	ii. To comprehend concepts of industrial enzymes	
	Learning Outcome – Students will be able to;	
	i. Establish small scale industry to produce various plant	
	base products sufficing daily need.	
	ii. Produce the herbal pharmaceutical products as a part of	
	small scale industry.	
	iii. To use enzymes for industrial applications	
	1 Cosmaceuticals: Shampoo, Anti-ageing cream	
	2 Pharmaceuticals: Triphala Churna, Shatavari Kalp and	
	Chyavanprash	





	3	Study of enzymes- Proteinase, and Lipase from plant
		sources;
		extraction, purification and applications in industry.
Module III:		Nanotechnology and IPR
	Lear	ning Objectives –
	i.	To develop techniques of nanotechnology
	ii.	To elucidate concepts of IPR
	Lear	ning Outcome – Students will be able to;
	i.	Suggest use of nano-medicine in certain scenario
	ii.	Practice IPR
	1	Nanotechnology: Source, Processing, Uses of Nano
		medicines.
	2	Applications of nanotechnology in Agriculture and Research.
	3	Introduction of IPR, Concept of copyright, trademark, trade
		secret and patents.
	4	Plant Breeder's and Farmer's rights

Code	DSEC-I, PRACTICAL I	Credits
		01
20US5BOIBP		No. of
		Practicals
1	Formulation of protein bar using natural products.	1
2	Preparation of herbal shampoo.	1
3	Preparation of triphala churna.	1
4	Preparation of Shatavari kalp.	1
5	Preparation of chyavanprash.	1
6	Extraction and identification of edible pigments from Beetroot,	1
	Red cabbage, Broccoli, Carrot using paper chromatography.	
7	Identification of plants used in homeopathic drug- Calendulla-	
	skin infection, Argemon- rheumatism, Atropa- fever and	
	headache, <i>Centella</i> - wound healing, <i>Cinchona-</i> malaria.	
8	Synthesis of nanoparticles from plant extracts using silver nitrate	1
	(Demonstration).	
9	Extraction of proteinase from suitable plant source (Coriandrum	1
	leaf, <i>Moringa</i> leaf, <i>Murraya</i> leaf)	
10	Extraction of Lipase from suitable plant source. (Sunflower	1
	seeds, white melon)	



- Somanja T. Y. B.Sc. Syllabus
- 1. <u>http://newhorizonindia.edu/nhc_kasturinagar/wpcontent/uploads/2</u> 017/10/Unit-2.pdf
- 2. Annual report of Ministry of Micro,Small and Medium Enterprises –(MSME) of India, Government of India , <u>www.msme.gov.in</u>.
- 3. Annual report of Ministry of Micro, Small and Medium Enterprise-[MSME] of India, (2010-11), Introduction: Background of MSMEs, Development Commissioner (MSME), Government of India. http://msme.gov.in/MSME Annual-Report-2010-11-English.pdf, accessed on April 5, 2011.
- 4. Ganguli P. (2001). Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw-Hill.
- 5. Miller A.R. and Davis M.H. (2000). Intellectual Property: Patents, Trademarks and Copyright in Nutshell, West Group Publishers.
- 6. Acharya N. K. (2001). Textbook on intellectual property rights, Asia Law House.
- Sathya Prabhu, D., Apoorva, S., Nandita, J., Palani Chamy and Devi Rajeswari, V (2018) Purification of protease enzyme from the leaf, seed and pod samples of *Vicia faba L*. International Food Research Journal 25(5): 1904-1911.
- 8. Mali A. S., Karekar P, Yadav A. V. (2015) Formulation and Evaluation of Multipurpose Herbal Cream. International Journal of Science and Research (IJSR). 4 (11): 1495-1498.





	SEMESTER V. DSEC- I	Hours /
	<u></u>	course
		30
Code	Economic Botany	Credits
		02
20US5BOEB5	Agronomy	
	Learning Objectives –	
	i. To correlate the cultivation practices and industrial	
	production of valuable products.	
	ii. To Comment on plants as a source of essential nutrients.	
	Learning Outcome – Students will be able to;	
	i. Describe the industrial production of certain valuable	
Modulo I:	products.	
<u>iniouule I.</u>	cultivation processing and uses of Latey vielding plant.	
	Pubber: Classification, Pubber industry	
	2 Pulp and Paper industry. Source, processing and uses	
	2 Coreals and millet. Pagi Dearl millet	
	A Spices- Nutmer Black cardamom	
	+ Spices- Nutricy, Diack cardamoni	
Module II:	Plant Products	
	Learning Objectives –	
	i. To identify the significance of plants as a source of	
	commercial products.	
	ii. To explain the industrial production of economic	
	Learning Outcome – Students will be able to:	
	i Identify the plants as a source of commercial products	
	ii Predict the valuable economic products present in	
	plants.	
	iii. Demonstrate the industrial process of oil manufacturing.	
	1 Non-alcoholic beverages: Cultivation and processing of Tea,	
	Benefits of Green tea	
	2 Perfume producing plants: Rose, Lemongrass, Jasmine,	
	lavender.	
	3 Oil producing plants: Classification of oils, different plants	
	producing edible oil, Cultivation and extraction of Olive and	
	Sunflower oil.	





	-		
Module III:		Crops and Super Food	
	Le	earning Objective –	
		i. To recognize the importance of plants as a source of	
		nutrients.	
	j	ii. To describe the cultivation practices of plants having	
		economically important products.	
	Le	earning Outcome – Students will be able to;	
		i. Discover the alternative source of major nutrients.	
	i	ii. Integrate the cultivation process of a plant with	
		downstream processing to acquire finished products.	
	1	Plants as source of protein: Soybean.	
	2	Sugar and sugar products: Cultivation of sugarcane,	
		manufacturing of sugar and by-products of sugar industry.	
	3	Starch and starch product: Chestnut	
	4	Nutritional value of Super food: Broccoli, Oats, Chia seeds,	
		Edible sea-weeds	

Code	DSEC-I Practical-I	Credits
		01
20US5BOE		No. of
BP		practicals
1	Identification of sources and products of rubber with the help of	1
	photomicrograph	
2	Identification of plants used in manufacture of paper.	1
3	Identification of Sources of latex- Hevea brasiliensis, Calatropis	1
	gigentia, Ficus elastica, Cryptostegia grandiflora, Manihot	
	glaziovii with the help of photomicrograph.	
4	Determination of Ca ²⁺ from Ragi extract.	1
5	Determination of lodine number and Rancidity of edible oil.	1
6	Estimation of saponification value of given oil sample.	1
7	Identification of free fatty acids in given oil sample using Thin	1
	layer chromatography.	
8	Preparation of Soybean milk. (Ref. M. Swaminathan- Human	1
	nutrition and diet).	
9	Identification of sugars present in given sample by Paper	1
	chromatography	
10	Extraction of starch from chestnut.	1





11	Extraction of essential oil from suitable plant material.	1
12	Estimation of phenols from tea samples.	1
13	Identification of nutritional value of super food-Oats, Broccoli,	1
	chia seeds, Fox nut	

- 1. Sen S (1992). Economic Botany, New Central Book Agency, Kolkata.
- 2. Kochhar, S.L. (2012) Economic Botany in Tropics, MacMillan & Co. New Delhi, India.





	SEMESTER V, DSEC- II Select any One DISCIPLINE SPECIFIC	Hours / course
	ELECTIVE COURSE II from the following	30
Code	<u>Medicinal Botany</u>	Credits
		02
20US5BOMB6		
<u>Module I:</u>	<u>Monograph of Drug</u> Learning Objective –	
	i. To interpret the internal and external morphology of medicinal plants.	
	ii. To Record the active constituents from medicinal plants.	
	Learning Outcome – Students will be able to;	
	i. Identify the potential use of plants as medicine.	
	ii. Determine the impurities present in drug.	
	 Monograph of drugs with respect to biological sources, geographical distribution, macroscopic and microscopic characteristics, chemical constituents, therapeutic uses and adulterants of the following plants /plant part: Datura (leaf) Flaxseed (seed) Arjuna (bark) Asparagus (root) Turmeric (rhizome) Tinospora (stem) 	
Module II:	Plants as Traditional Medicine	
	Learning Objective –	
	i. To interpret the internal and external morphology of	
	medicinal plants.	
	n. To Record the active constituents from medicinal plants	
	Learning Outcome – Students will be able to:	
	i Identify the potential use of plants as medicine	
	ii. Determine the impurities present in drug.	





	1 Symptoms, Causes and Plants used as traditional medicine
	for the treatment of- Anaemia, Diabetes, Hypertension,
	laundice Asthama
	2 Course Composition and Theremoutic value of the
	source, composition and inerapeutic value of the
	following plants:
	Cereals-Millets (Barley)
	Pulses- Gram, Pea
	Fruits- Amla, Guava
Module III:	Biodiversity
	Learning Objective –
	i. To state the role of various institutes in plant
	conservation
	Learning Outcome Students will be able to:
	1. Identify the rare and endangered medicinal plants of
	India.
	ii. Report the legal action for biodiversity conservation.
	1 Rare and endangered medicinal plants of India.
	2 Biodiversity laws in India and conventions.
	3 Economic value of Biodiversity, trade, restrictions, economic
	4 Centres for medicinal plants conservation in India- CDRI,
	TKDL, FRLHT, TBGRI, TAMPCOL

	DSEC-II, Practical II	
Code		Credits
		01
20US5BOM		No. of
BP		Practicals
1	Monograph of drug with respect to biological sources,	3
	geographical distribution, macroscopic and microscopic	
	characteristics, chemical constituents, therapeutic uses and	
	adulterants of the following plants / plant part:	
	Dhatura (leaf), Flaxseed (seed), Arjuna (bark), Shatavari (root),	
	Turmeric (rhizome), Guduchi (stem)	
2	Plants as a source for treatment of following diseases-	1
	Anaemia, Diabetes, Hypertension, Jaundice, Asthama	
3	Therapeutic value of Indian plant	1
	food- Cereals- Millets (Barley)	
	Pulses- Gram, Pea, Fruits- Amla, Guava	







4	Comparative account of Kasturirangan report on biodiversity	
	of Western Ghats.	
5	Identification of rare and endangered medicinal plants of India.	1
6	Identification of some important medicinal and aromatic	1
	plants of India	

- 1. Trivedi P C, (2006) Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
- 2. Purohit and Vyas, (2008) Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.





	<u>SEMESTER V, DSEC- II</u>	Hours/ course 30
Code	Plant Propagation	Credits 02
20US5BOPP6		
Module I:	Propagation PracticesLearning objectives –i.To grow new plants from different parts of plants.ii.To differentiate between plants propagated by sexual and asexual method of reproductionLearning outcomes – Students will be able to;i.Identify vegetative and reproductive structures of plants.ii.Plan the propagation of different plant species from seed, cutting and layering.1Advantages and disadvantages of seed propagation, factors affecting propagation.2Propagation by specialized techniques- Apomixis, Aerial-Bulbils, Sub-aerial- Runner, offset, Sub-terrestrial- Bulbs, Corms, Rhizomes.3Artificial methods- Cutting; root, stem and leaf4Use of PGR's for rooting	
Module II:	Propagation Environment Learning objectives – i. To give insight of greenhouse technology. ii. To give an account of recent advances in plant propagation practices. Learning outcomes – Students will be able to; i. Propagate the plants using advance techniques and manage them. 1 Equipment: propagation frames, net house, bottom heat box, mist propagation unit, plastic tunnels, propagation units, growing rooms 2 Media and Nutrition: Soil, Sand, Peat, Sphagnum moss, Vermiculite, Shredded bark, Coir, Compost 3 Environmental factors: Light, Water, Humidity control,	





Module III:	Pest and Disease Management
	Learning objectives –
	i. To outline the different pests and diseases associate with
	plants.
	ii. To suggest the methods of controlling pests, insects and
	weed.
	Learning outcomes – Students will be able to;
	i. Identify and sustainably manage them in various plant
	productions
	1 Commonly occurring pests and diseases and control measures
	Slugs and snails, millipedes, caterpillars, Aphids, mealy-bugs,
	Powdery mildew, White blisters, Downy mildew
	2 Weed- categorizing of weeds, control and prevention methods
	of weed

	DSEC-II, Practical II	
Code		Credits
		01
20US5BOPPP		No. of
		Practicals
1	Study of seed dormancy and methods employed to overcome	1
	seed dormancy (Mechanical and chemical)	
2	Garden implements and uses	1
3	Identification of types of containers for potting	1
4	Seed Propagation techniques	
5	Study of specialized vegetative structures as mentioned in	2
	theory	
6	Propagation by cutting, layering, budding, grafting	2
7	Demonstration of hydro culture.	1
8	Study of following diseases using specimen /	1
	photomicrograph- Powdery mildew, White blisters, Downy	
	mildew	
	Pests- slugs and snails, millipedes, caterpillars, Aphids,	
	mealybugs	
9	Identification of weeds (season wise)	1







- 1. Sadhu N. K. (1999). Plant Propagation. New Age International Pvt. Ltd., New Delhi.
- 2. Bhattacharya S. K. (2011) Landscape gardening and design with plants Raj Publication, New Delhi
- 3. Mehaboob A. S. (2010). Handbook of landscape gardening and environment.





	SEMESTER V, SEC- I Select any One SKILL ENHANCEMENT course from the following	Hours/ course 30
Code	Landscape Architecture	Credits
20US5BOLA7		02
<u>Module I:</u>	Landscape designingLearning objectivesi. To outline the different locations to establish the gardenLearning outcome – Students will be able to;i. Set up the garden at different locations1 History, objectives, principle and categories of landscape design2 Materials used for landscape design.3 Garden location: Arches and pergolas, Edge and Hedge, Flower bed, Avenues and Park, Lawn,4 Entrances and exits, garden walls, fencing, surfaces and	
	levers, pavings and galden wark	
	 Learning objective – To develop the skill of garden set up with peculiar features. Learning outcome – Students will be able to; Plan several layouts of gardens. Suggest the improvements in existing layout of gardens. Case study- site survey, choosing a style, visualising the design, formal and informal. Garden case history- adding privacy to the garden, practical and natural style, utilising the available space, opening a view and reorienting a garden. Applications of CAD in landscape garden designing, 2D drawing by AutoCAD 	





Module III:		Landscape Style
	Lea	irning objectives –
	i.	To orient with different styles of garden
	ii.	To review the different architecture and layout of gardens
	Lea	rning outcome – Students will be able to;
		i. Describe the characteristic features of specific garden
		type.
	1	Socio-political history, Expression, Architecture
		characteristics, elements
	2	Types of garden - Mughal, English, Spanish, Japanese,
		French, Italian
	3	Water garden, Herb garden, Rock garden

	SEC-I, Practical I	
Code		Credits
		00
		No. of
		Practicals
1	Working models / Projects	

- 1. Bhattacharya S. K. (2011) Landscape gardening and design with plants Raj Publication, New Delhi
- 2. Mehaboob A. S. (2010). Handbook of landscape gardening and environment.





	SEMESTER V, SEC- I	Hours /
		30
		00
Code	Post-Harvest Technology	Credits
		02
0US5BOPHT7		
Module I:	Post-harvest Technology	
	Learning objectives –	
	i. To maintain quality of food.	
	ii. To reduce the lose between harvest and consumption.	
	Learning outcome – Students will be able to;	
	i. Infer the quality of food (appearance)	
	ii. Predict the loss at each stage between harvest and	
	1 Maturity maturity index (visual indices seed development	
	start of bud damage calendar date)	
	2 Factors responsible for maturity and ripening, chemicals used	
	in ripening.	
	3 Factors for delaying ripening (physical or biotic,	
	physiological).	
	4 Harvest: methods- hand and mechanical	
	Time of harvest, handling of harvested products- precooling,	
	washing, sorting, grading, sizing and curing	
	Factors responsible for deterioration of harvested fruits.	
Module II:	Methods of Preservation	
	Learning objectives –	
	i. To employ the various methods of preservation	
	ii. To distinguish between methods of preservation	
	Learning outcomes – Students will be able to;	
	i. Compare and contrast preservation methods for food	
	ii. Distinguish between preservation methods for natural	
	food	
	1 Principle and different methods of preservation.	
	2 Storage of fresh produce- types of storage of fruits and	





 1	
	vegetables.
3	Methods of storage- pre-storage treatment, irradiation and
	low cost storage
4	Preservation by Low temperature- study of freezing process
	of fruits and vegetables, High temperature- Sun drying,
	Canning, and Preservation by chemicals- sugar, salt, acetic
	acid.

Module III:	Processing
	Learning objective –
	i. To depict the processing of raw material.
	Learning outcomes – Students will be able to;
	i. Infer the processing.
	ii. Comment on quality of food processing.
	1 Processing of Raw material; Fruits and Vegetables
	2 Green and Ripe Mango processing
	3 Quality control in food processing industry- rocess,
	inspection, sensory evaluation, packaging, labelling, storage.
	By-products of Citrus industry- Oil, dry citrus peel
	4 Apple waste- application of pectin in medicine and nutrition

	<u>SEC-I, Practical I</u>	
Code		Credits
		00
		No. of
		Practicals
1	Projects/ Start up	

References:

1. Shrivastava R. P. and Kumar S (1994) Fruit vegetable preservation. International Books Distributing Company, Lucknow.







	<u>SEMESTER VI, CORE COURSE I</u>	Hour/ course
		30
Code	Vascular Plants Diversity	Credits
		02
20030000101		02
Module I:	Pteridophytes	
	Learning Objectives –	
	i. To comprehend general features of <i>Lycopodium</i> and	
	Adiantum, and fossil Pteridophytes	
	Learning Outcome – The student will be able to;	
	<i>i.</i> Distinguish <i>Lycopodium</i> from <i>Adiatum</i>	
	ii. Compare fossil genera with current Pteridophytes	
	iii. Predict evolutionary pattern by comparing fossil	
	and existing organism.	
	General characters of division Pterophyta	
	Systematic position, Structure and Life cycle of Lycopodium,	
	and Adiantum	
	Study of fossil - Calamites, Lepidodendron	
	Contribution of Dr. Birbal Sahani to Paleobotany	
Module II:	Gymnosperms	
	Objectives:	
	i. To identify distinguishing features of class-	
	Gnetopsida.	
	ii. To review characters of fossil gymnosperms	
	Outcomes:	
	The student will be able;	
	<i>i.</i> To Classify and distinguish <i>Gnetum</i> and <i>Ephedra</i>	
	ii. To compare the stages of life cycle in class	
	representatives plants of Gnetopsida	
	iii. To compare fossil genera with existing	
	gymnosperms	
	iv. To sort gymnosperms in different parts of India	




	Systematic position, Structure, Anatomy, Life cycle, and Economic importance of the following genera (Classification by Pant); <i>Gnetum</i> , <i>Ephedra</i>	
	Distribution of Cymposporms in India	l
Module III:	<u>Taxonomy</u>	
	Learning Objectives:	l
	 To comprehend Bentham and Hooker's system of classification 	
	ii. To employ the morphological peculiarities to classify the plants to respective families.	1
	iii. Recognise tools of angiosperm taxonomy	l
	Learning Outcome:	l l
	The student will be able to;	l l
	i. Classify plants as per Bentham and Hooker systems of classification	
	ii. Use the tools for angiosperm taxonomy	l
	iii. Classify the plants to respective families.	l l
	 iv. Predict the economic uses of plants belong to particular family. 	
	Systemic Botany –	
	Bentham and Hooker's system of classification for flowering plants upto family, with respect to the following prescribed families and economic and medicinal importance of members of the families; Magnoliaceae, Capparidaceae, Cucurbitaceae, Umbelliferae, Asclepiadaceae, Lamiaceae, Convolvulaceae, Amaranthaceae,	
	Palmaceae	
	Z Tools of Angiosperm Taxonomy –	
	Library, Journals, Periodicals, Floras, Monographs	





	<u>SEMESTER VI , PRACTICAL I</u>	
Code		Credits
		01
20US6BOVPDP		No. of
		Practicals
1	Study of stages in the life cycle of the following types. Fresh or preserved material and permanent slides; <i>Lycopodium, Adiantum, Marsilea</i>	02
2	Study of soral structures of following types; Ophioglossum, Osmunda, Lygodium, Pleopeltis, Pteris, Asplenium, Nephrolepis	
3	Study of stages in the life cycle of the following types. Fresh or preserved material and permanent slides; <i>Gnetum, Ephedra</i>	02
4	Study of fossils; <i>Calamites, Lepidodendron, Lyginopteris, Pentoxylon</i>	
5	Study of one plant each from the following Angiosperm families; Magnoliaceae, Myrtaceae, Capparidaceae, Cucurbitaceae, Umbelliferae, Apocynaceae, Asclepiadaceae, Labiatae, Convolvulaceae, , Amaranthaceae Palmaceae	06
6	Identification of genus and species of the plants from the families studied at F.Y.B.Sc. and S.Y.B.Sc. Using Cooke's flora.	01

- 1. Parihar, N.S. 1980. An introduction to Embryophyta Vol. II. Pteridophyta Central Book Depot, Allahabad.
- 2. Rashid, A. 1999. Pteridophyta. Vikas Publishing House, New Delhi
- 3. Sambamurthy AVSS, A Textbook of Bryophyta, Pteridophyta, Gymnosperms and Paleobotany
- 4. Sharma, O.P 2006. Text book of Pteridophyta. . Macmillan India Ltd., New Delhi.
- 5. Smith,G.M. 1976. Cryptogamic Botany Vol.II. Tata McGraw Hill, Publishing Co. Ltd. New Delhi.
- 6. Bhatnagar,S.P. and Alok Moitra 1997.Gymnosperms.New Age Publications ,New Delhi.
- 7. Biswas ,C.and Johri,B.M.1999. The Gymnosperms. Narosa Publishing House, New Delhi.







- 8. Chamberlain, C.J. 1955. Gymnosperms-structure and evolution. Dover Publications, Inc. New York.
- 9. Chamberlain, C.J. 2000 Gymnosperms CBS Publishers, New Delhi.
- 10. Coulter and Chamberlain,1964. Morphology of Gymnosperm Central Book Depot, Allahabad.
- 11. Ramanujan, C G.K.1976. Indian Gymnosperms in time and space. Today and Tomorrows printers and publishers, New Delhi.
- 12. Sharma, O.P. 1997. Gymnosperms, Pragati Prakasan, Meerut.
- 13. Vashishta, P.C. 1999. Gymnosperms, S. Chand & Company, New Delhi.
- 14. Scott, D.H.1962. Studies in Fossil Botany .Hafner Publishing Co., New York.
- 15. Shukla,A.C.and Misra,S.P.1975.Essentials of Paleobotany. Vikas Publishing House, New Delhi.
- 16. Lawrence GHM (1964), Taxonomy of Vascular Plants, Mac Millon Co., New York
- 17. Rendle AB (1967), Classification of flowering plants, Cambridge University Press
- 18. Sharma OP (1990) Plant Taxonomy, Oxford Publishers, New Delhi
- 19. Singh G (1999), Plant systematics: Theory and Practice, Oxford IBH.
- 20. Hooker JD (1879), Flora of British India. Reeve &Co., London 14.
- 21. Hutchinson J (1959), Families of flowering plants, Cambridge University Press
- 22. Lawrence GHM (1955), An Introduction to plant Taxonomy, Central Book Depot







	SEMESTER VI, CORE COURSE II	Hours/
		course
		30
Codo	Former and Function	Cradita
	Forms and Function	Credits
20056B0FF2		02
	0	
<u>Iviodule I:</u>	Anatomy	
	Learning Objectives –	
	i. To recognise the structural and functional	
	ii To locate anomalous secondary growth in plants	
	and infer differences between primary and	
	secondary growth.	
	Learning Outcome –	
	The student will be able to;	
	i. Differentiate cambium from other plant tissues	
	ii. Demonstrate anomalous secondary growth in plants	
	1. Meristem – Definition and Classification	
	2. Cambium – Origin, Function, Structure, Cell division	
	3. Anomalous secondary growth –	
	Dicot stem; Bignonia, Aristolochia, Achyranthes	
	Monocot stem; Draceana	
	Dicot root; Storage root (Beta, Raphanus) Root-Stem	
	transition	
Modulo II:	Palypology	
	Learning Objectives –	
	i To recognise features of spore and pollen	
	morphology.	
	ii. To develop analytical methods for pollen.	
	iii. To give insight on pollen morphology in plants.	
	Learning Outcome – The student will be able to;	
	i. Distinguish between different pollen and spore samples	
	ii. Analyse pollen samples	
	iii. Evaluate the quality of honey	





1	Pollen and Spore morphology –
	Size and Shape, Polarity, Apertures (NPC),
	Exine stratification, Exine excrescences,
	Construction of palynogram
2	2. Mellitopalynology –
	Geographical and floral origin of honey, Chemical
	analysis, Physical adulteration, Honey as environmental
	monitors
3	8. Pollen viability and storage –
	Tests for pollen viability, Causes of loss of pollen
	viability, Pollen storage

Module III:	<u>Embryology</u>
	Learning Objectives –
	i. To comprehend structural features of anther and
	ovule, process of fertilization and development of embryo.
	Learning Outcome – The student will be able;
	i. To explore the stages of embryogenesis.
	ii. To compare and contrast between the
	developmental stages of micro and megaspore in
	plants.
	1. Microsporangium –
	Structure of anther, Microsporogenesis, Role of
	tapetum in microsporogenesis, Development of
	male gametophyte
	2. Megasporangium – Types of ovules, Megasporogenesis,
	Organisation of female gametophyte (<i>Polygonum</i> type of
	embryo sac)
	3. Fertilization – Double fertilization and its significance
	4. Development of embryo –
	Dicotyledonus type (<i>Capsella</i> type)





	<u>SEMESTER VI</u> , <u>PRACTICAL II</u>	
Code		Credits
		01
20US6BOFFP		No. of
		Practicals
1	Study of cambium using photomicrograph	01
2	Study of anomalous secondary growth in following	03
	plant parts – Dicot stem; <i>Bignonia, Aristolochia</i> ,	
	Achyranthes	
	Monocot stem; Draceana, Dicot root; Storage root (Beet,	
	Raphanus)	
3	Study of following types of stomata- Anemocytic, Anisocytic,	
	Diacytic, Paracytic	
4	Determination of pollen viability	01
5	In vivo growth of pollen tube in Portulaca	01
6	To study the germination of pollen grains and growth of	
	pollen tube in varying concentration of sucrose.	
7	Study of airborne pollen grains using gravity slide sampler.	01
8	Study of pollen morphology (NPC analysis) of the following	01
	by Chitley's method; <i>Hibiscus, Datura, Oscimum,</i>	
	Crinum, Pancratium, Canna, Bougainvillea	
9	Pollen analysis of honey sample.	01
10	Study of various stages of Microsporogenesis,	01
	Megasporogenesis and embryo development with the help	
	of permanent slides /	
	photomicrographs	
11	To mount embryo of Citrus, Cucurbita, Scoparia and Maize	01

- 1. Chandurkar, P.J. 1966. Plant anatomy. Oxford & IBH Publication Co., New Delhi.
- 2. Cutler, D.F., 1978 . Applied Plant Anatomy . Orient Longman, New Delhi.
- 3. Cutler, E.G. 1978. Plant Anatomy (Vol.I, II.) Edward Arnold, London.
- 4. Eames ,A.J.,& Mac Daniels,L.H. 1979.An introduction to Plant Anatomy .Mc Graw Hill New York.
- 5. Esau, K.1974. Plant Anatomy. Wiley Eastern Ltd., New Delhi





- 6. Esau, K.2002. The anatomy of seed plants. John Wiley & Sons, New York.
- 7. Fahn, A. 1989. Plant Anatomy, Pergamon press, Oxford, New York.
- 8. Foster, A.S. 1960. Practical Plant Anatomy. Van Nostrand & East West, New Delhi.
- 9. Metcalfe, C.R. and Chalk ,L.1950.Anatomy of the dicotyledons and Monocots (Vol.I, II), Oxford University Press, London.
- 10. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms, Vikas Publishing House Pvt. Ltd. New Delhi.
- 11. Johri, B.M. 1984. 1984. Embryology of Angiosperms. Springer Verlag. Berlin.
- 12. Maheswari, P. 1980. Recent Advances in the Embryology of Angiosperms.
- 13. Pandey, A.K. 1997. Introduction to Embryology of Angiosperms. CBS Publishers and Distributors, New Delhi.
- 14. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
- 15. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
- 16. Nair, P.K. K. (1970). Pollen Morphology of Angiosperms, Latest Ed., Scholar Publications





		SEMESTER VI, CORE COURSE III	Hours / course		
			30		
		- ·· · ·	0		
Code		Functional Botany	Credits		
20US6B0FB3			02		
Module I:		Plant Physiology			
	Lea	arning Objectives –			
	i	To review process of transpiration and respiration.			
	ii.	To infer the physiological significance of			
		transpiration and respiration in plant.			
	Lea	arning Outcome – The student will be able;			
	i.	To scrutinise the process of transpiration and respiration			
	ii. To suggest the frequency of watering to the plants				
	1.	Transpiration: Guttation and Transpiration, Opening			
		and closing of stomata, Factors affecting rate of			
		transpiration, Significance of transpiration, Relation			
		between Respiration			
		and Transpiration			
	2.	Respiration: Biological significance of respiration,			
		Mechanism of aerobic respiration – Glycolysis, ICA			
		cycle, ATP synthesis, Energetics of respiration,			
Module II:		Phyto-chemistry and			
		<u>Pharmacognosy</u>			
	Lea	arning Objectives –			
	i	To recognise classes, adulterants and quality of the			
		crude drugs and secondary metabolites.			
	1.	skills for modicinal produce			
	iii	To develop analytical techniques for			
	ш.	secondary			
		metabolites.			
	Le	arning Outcomes – The student will be able to			
	i.	Classify crude drugs.			





	ii. Check the purity and quality of the drug.
	iii. Purify and process secondary metabolites.
	 Phyto-chemistry Classification of secondary metabolites Occurrence, Distribution and Phytochemical analysis of Alkaloids, Phenolics, Flavonoids, Glycosides, Volatile oils and Tannins Pharmacognosy Introduction; Classification of crude drugs; (Morphological, Taxonomical, Chemical, and Pharmacological) Collection and post-harvest management of various categories of medicinal produce Adulteration and deterioration; Types of adulteration or substitution of herbal drugs, Causes and measures for adulteration, deterioration of herbal drugs
<u>Module</u>	Seed Technology
<u>111:</u>	Learning Objectives –
	i. To recognize classes of seeds.
	ii. To identify features of seed quality, steps in maize
	seed production.
	iii. To recognize varieties.
	Learning Outcomes – The student will be able to;
	i. Classify seeds.
	ii. Assess the seed quality.
	iii. Distinguish between different varieties.
	iv. Design strategies for better seed storage.
	 Classes of seed (breeder, foundation, registered, certified) Seed quality (physical, genetic and physiological seed
	health)
	3 Seed storage; Seed bank
	4 Seed drying – Stages of moisture elimination, Methods
	of drying- natural and artificial
	Seed processing: Requirement and techniques
	6 Seed Act and rules; Seed policy 2002





	<u>JEIVIEJTEK VI, PKAUTIUAL</u>	
	<u>Ш</u>	
Code		Credits
		01
20US6BOFBP		No. of
		Practicals
1	Measurement of CO ₂ in aerobic respiration by conical flask	01
	method.	
2	Qualitative analysis of respiration (evolution of CO ₂)	01
	germinating seeds.	
3	Qualitative analysis of respiratory enzymes; Oxidase,	01
	Peroxidase and Dehydrogenase in plant tissues.	
4	Determination of rate of respiration in germinating seeds	01
	using	
	Ganong's Respirometer.	
5	Demonstration of fermentation using Kuhne's Tube.	01
6	Phytochemical screening of Alkaloids, Phenolics,	01
	Flavonoids,	
	Glycosides, Volatile oils and Tannins.	
7	Adulteration tests for different plant materials;	01
	Turmeric powder, Black pepper, Cinnamon powder	
8	Effect of temperature and moisture of storage on seed	01
	viability	
9	Study of seed treatment and seed processing instruments	01
	using	
10	photomicrograph.	01
10	study of physical characteristics of different crop seeds	01
11	and their shapes.	01
11	noests /	01
	fungi using specimen / photomicrograph	
12	To carry out the germination testing (paper sand and soil	01
	method).	0.





- 1. Noggle and Fritz, 1999. Introductory Plant physiology. Prentice hall, London.
- 2. Salisbury, F.B. and Ross. C. 2000, Plant physiology. John Wiley & Sons, New Delhi.
- 3. Strafford, G.A. 1979 Essentials of Plant Physiology. Heinemann Publishing Co. New York.
- Wilkins, M.B. (Ed) 1984. Advanced Plant Physiology, Pitman Publishing Co. New York. William G. Hopkins, 2002. Introduction to Plant Physiology. John Wiley & Sons. Inc. New York.
- 5. Hames, B.D. et al., 1999. Instant notes in Biochemistry. Viva books Pvt. Ltd. New Delhi.
- 6. Jain, J.L. 2000. Fundamentals of Biochemistry. S. Chand & Co. New Delhi.
- 7. Plummer, D.T. 1996. An Introduction to practical Biochemistry. McGraw Hill
- 8. Satyanarayana, U. 1999. Biochemistry. Books and Allied (P) Ltd. Calcutta
- 9. Modern Methods of Plant Analysis Paech and Tracey
- 10. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.
- 11. Textbook of Pharmacognosy- Mohammed Ali
- 12. Trease, G.E. and Evans, W.C. (1983). Pharmacognosy. Bailliere, Tindall, London
- 13. Noggle and Fritz, 1999. Introductory Plant physiology. Prentice hall, London.
- 14. Salisbury, F.B. and Ross. C. 2000, Plant physiology. John Wiley & Sons, New Delhi.
- 15. AgrawalR.L(2018) Seed technology .Oxford & IBH Publishing Co., New Delhi





	<u>SEMESTER VI, CORE COURSE IV</u>	Hours /
		course
		30
Code	Forestry	Credits
	<u>i orestry</u>	
<u>20036B0F4</u>		02
Module I:	Forest Mensuration	
	Learning Objectives –	
	i. To acquire information about forest mensuration.	
	Learning Outcome – The student will be able to;	
	i. Characterize a specific forest's features.	
	1. Definition, Objectives, Scope	
	2. Measurement of individual tree parameters; Tree	
	diameter and girth, Instruments used	
	3. Measurement of Height - Direct and Indirect methods,	
	Height	
	measuring instruments	
Module II:	Forest Protection	
	Learning Objectives –	
	i. To state the concepts of forest protection.	
	ii. To locate different mangrove forests in India.	
	Learning Outcome – The student will be able to	
	i. Protect the forests.	
	ii. Appreciate and conserve mangrove forests of India.	
	1. Forest protection; Introduction, Importance, Rights,	
	2 Forest recourse monitoring: Forest source	
	2. Forest resource monitoring; Forest cover, Piodivorsity accossment Forest vegetation manning	
	Application of romoto sonsing in forestry:	
	Application of remote sensing in forestry, Mangrove forests in India	
	4. Ividingi ove foi ests in mula	
	5. Role of people blodiversity register (PBR)	





Module III:		Forest Economics	
	Lea	rning Objectives –	
	i.	To view concepts of forest economics.	
	Lea	rning Outcome –	
	The	student will be able to;	
	i.	Manage timber production, forest land in a	
		sustainable manner.	
	1.	Introduction	
	2.	Economics of Timber production; Objectives	
		and Management, Role and Nature of interest	
	3.	Economics of Forest Land; Characters of Land, Forest	
		land a productive factor	
	4.	Land economic and rent value	

SEMESTER VI , PRACTICAL IV		
Code		Credits
20US6BOFP		01
1	Study of Instruments required for measurement of individual tree	1
	using photomicrograph / specimen	
2	Measurement of girth, diameter and volume of the plant	1
3	Tree measurement by shadow method	1
4	Study of common mangrove plants	1
5	Study of anatomical features of wood.	1
6	Moisture content of wood proximate analysis.	1
7	Defects in wood due to natural forces: Knots- dead and live knots,	1
	Twist, Shakes-star, cup/ring, heart, Rind galls, Upsets	
	Defects due to insects: Beetles, Termites, Marine Boars	
	Defects due to fungi: stain, decay	
	Defects due to defective seasoning: Bow, Cup, Check, Split,	
	Honey, combing	
	Defects due to defective conversion: Boxed heart, Machine burnt,	
	Machine notches, Miscut, Imperfect grain	

- 1. Sagwal S. S. (2016) Introductory Forestry. Kalyani Publisher, New Delhi.
- 2. Negi S.S. (2008) Handbook of Forestry.
- 3. Chaturvedi and Khanna. (1982) Forest Mensuration. International Book distributer, New Delhi.







	SEMESTER VI, Discipline Specific Elective Course-	Hours /
		course
		30
Code	<u>Ayurvedic Botany</u>	Credits
<u>20US6BOAB5</u>		02
<u>Module I:</u>	Alternate Medicine	
	Learning Objectives –	
	i. To develop understanding traditional systems of medicine and Avuryedic concept of putrition	
	Learning Outcome. The student will be able to:	
	Learning Outcome – The student will be able to;	
	11. Suggest best food habits for healthy life.	
	1 Ayurveda- Definition, History.	
	2 Traditional systems of medicine: Siddha and Unani.	
	3 Basic principle of Ayurveda- Tridosh concept and their	
	relation with five cosmic elements (panchmahabhutas),	
	prakruti, vikruti, saptadhatu, agni and mala.	
	4 Ayurvedic concept of nutrition (viruddha ahar) in relation	
	to time and season, incompatibility of nutrients, six tastes.	
	0	
Module II:	Medicine	
	Learning Objectives –	
	i. To recognise medicinal properties of different herbs	
	from	
	'Grandm's Pouch.	
	Learning Outcome – The student will be able;	
	i. To use herbs from Grandma's pouch for simple health	
	ailments.	





	1	History and use of traditional	
	2	medicine Grandma's pouch-	
	_	Harda, Beheda, Amla, Soonthi, Vekhand, Jvashtamadh,	
		Asafoetida, Murudsheng, Tulsi, Ashoka bark, Pimpli,	
		Dikemali Akkalkara Turmeric	
		Novel medicine [.] Wheat germ grass Ginseng	
	3	Awareness control and legislation on use of traditional	
	4	medicine.	
Module		Ethnobotany	
<u>III:</u>	Le	arning Objectives –	
		i. To recognise medicinal herbs from ethnic point of view	
	Le	arning Outcome – The student will be able to;	
		i. Correlate use of medicinal herbs in different diseases.	
	i	i. Protect traditional knowledge	
	1	Introduction of Ethnobotany as interdisciplinary science,	
		History and use of medicinal herbs	
	2	Role of ethnomedicobotanical survey in progress	
		of Ayurveda.	
	3	Applications of plants used by tribals for certain diseases	
		like. Jaundice, skin diseases, diarrhoea and dysentery.	
	4	Legal aspects to protect traditional knowledge	

Code	DSEC-I, Practical I	Credits
		01
20US6B0		No. of
TAMP		Practicals
1	Prakruti nidaan chart	1
2	Determining your constitution with the help of chart.	1
3	Preparation of Ayurvedic formulations- Sitopaladi churna,	3
	Pachakvati.	
4	Identification of plant parts from Grandma's pouch and mention	1
	their source, constituents and uses.	
5	To detect the presence of secondary metabolites in some herbal	
	drugs from Grandma's pouch.	
6	Preparation of Asav, Arishta, Kadha, Avaleha	3
7	Germination of wheat and preparation of its juice.	1
8	Identification of Ginseng using photomicrograph / specimen.	





9	Identification of plants commonly used by tribals in treatment of	1
	jaundice, skin diseases, diarrhoea and dysentery.	

- 1. S.K. Jain.1955.Manual of Ethnobotany, Scientific Publishers, Jodhpur.
- 2. Glimpses of Indian.1981 Ethnobotany, Oxford and I B H, New Delhi.
- 3. S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
- 4. S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.
- Colton C.M. 1997. Ethnobotany Principles and applications. John Wiley and sons – Chichester Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India.Botanical Survey of India. Howrah.
- 6. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
- 7. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.
- 8. Pal, D.C. & Jain, S.K., 1998. Tribal Medicine. Naya Prakash Publishers, Calcutta
- 9. Raychudhuri, S.P., 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops. Vol.1, Today& Tomorrow's printers and publishers, New Delhi







	<u>SEMESTER VI, Discipline Specific Elective</u> Course- I	Hours /
	<u></u>	30
Code		Credits
OUS6BOGHT5	<u>Green House Technology</u>	02
Module I:	Green House Construction and Economics	
	Learning Objectives –	
	i. To illustrate structural features of green house.	
	Learning Outcome – The student will be able to;	
	 Design layout of a greenhouse and propose an estimated cost. 	
	1. Layout and construction	
	 Types of protected structures; Green house, Polyhouse, 	
	Shade-Net House, Low Tunnel House, Glass House	
	3. Estimated construction cost for green house, Variable	
	cost, Capital cost, Fixed cost, Labour requirement	
	Economical green house and Automated green house	
Module II:	Green House Management	
	Learning Objective –	
	i. To develop management techniques for green	
	house	
	Learning Outcome – The student will be able;	
	i. To manage a green house.	
	1. Land Preparation; Site Selection, Land and Seed bed	
	preparation, Sowing, Planting seedlings	
	2. Irrigation Techniques; Micro-irrigation, Micro- Sprinkler,	
	Irrigation and Fertigation	
	3. Microclimate Control; Heating, Cooling, Insulation, Humidity control, Ventilation	





Module III:	Crop protection and Marketing]
	Learning Objectives –	
	i. To recognise different pests and diseases in Poly-	
	house.	
	ii. To develop methods of cultivation of carnation,	
	capsicum, tomato.	
	Learning Outcome – The student will be able to;	
	i. Detect chances of infections in poly-house plants.	
	ii. Start-up for production of carnation, capsicum, and	
	tomato.	
	1. Cultivation of Green House Crops; Capsicum and	1
	2. Tomato Pest and Diseases of Green House Plants	
	3. Post-harvest management practices	

	SEMESTER VI , Discipline Specific Elective Course- I	
Code	• •	Credits
20US6BO		01
GHTP		
1	Study of various types of green houses with the help of	1
	photomicrograph.	
2	Study of core material and covering materials with the help of	1
	photomicrograph.	
3	Application of computers in green house	1
4	Study of green house plants; Soil requirement, temperature,	1
	irrigation, fertilizer requirements and propagation methods	
	for Capsicum, Tomato, Zucchini	
5	Preparation of seed beds	1
6	Identification of major pests and diseases with the help of	1
	photomicrograph	
7	Market survey of vegetables	1
8	Contract farming- format of group marketing	1
9	Field visits and Report	

References:

1. Tiwari G.N. (2009) Green house technology for controlled environment. Narosa publication.







	<u>SEMESTER VI</u> ,	Hours /
	Discipline Specific Elective Course II	course
		30
<u>Code</u>		<u>Credits</u>
20US6BOPBT6	Plant Biotechnology	<u>02</u>
Module I	Plant Tissue Culture	
	Learning Objectives –	
	i. To identify organization of PTC laboratory.	
	ii. To develop techniques of media preparation and callus induction.	
	Learning Outcome – The student will be able to;	
	ii Design experiments for callus induction	
	1 Introduction: History Current status and Scope of PTC	
	2 Organization and Requirements of PTC Laboratory	
	3 Culture media and types	
	4 Callus induction and its applications. Totinotency	
Module II	Micropropagation	
	Learning Objectives –	
	i. To develop different tissue culture techniques.	
	Learning Outcome – The student will be able;	
	i. To practice different techniques in a PTC laboratory.	
	1. Organ Culture; Meristem, Root, Leaf, Anther, Pollen,	
	Ovule, Embryo	
	2. Organogenesis	
	3. Somatic embryogenesis and Synthetic Seeds	
	4. Plant Regeneration and Hardening	
<u>Module III</u>	<u>Biotechnology</u>	
	Learning Objectives –	
	i. To review techniques of recombinant DNA technology.	
	Learning Outcome – The student will be able;	
	i. To apply the techniques of recombinant DNA	
	technology.	





 1.	Recombinant DNA Technology for plants; Ti Plasmid	
2.	Various methods of Gene Transfer into plant cells;	
	Protoplast Fusion, Electroporation, Particle Gun method, Microinjection	
3.	Commercial application of PTC in enhancement of secondary metabolites in flowering plants and nutritional values in agricultural crops.	

Code	SEMESTER VI, Discipline Specific Elective Course- II	Credits
20US6BOPBTP	<u>Practical</u>	01
1	Designing and Layout of PTC Laboratory	1
2	Preparation of MS media	1
3	Study of various sterilization techniques using	1
	photomicrograph	
4	Demonstration of callus induction using suitable explant	1
5	Demonstration of hardening of tissue culture plants	1
6	Study of Ti plasmid using photomicrograph	1
7	To perform surface sterilization and seed inoculation	1
8	Encapsulation of axillary bud	1
9	Role of PTC in improvement of flowering plant quality; Case	1
	Study	
10	Role of PTC in importance of quality of agricultural crops; Case	1
	Study	

- 1. Razdan M.K. (2002) Introduction to Plant Tissue Culture. Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi.
- 2. De K.K. (2004) Plant Tissue Culture. New Central Book Agency (P) Ltd, Calcutta.







	SEMESTER VI, Discipline Specific Elective Course- II	Hours / course 30
Code		<u>Credits</u>
20US6B0F16	<u>Floriculture</u>	<u>02</u>
Module I	Commercial Floriculture	
	Learning Objectives –	
	i. To develop techniques of cultivation of commercial	
	flowers.	
	Learning Outcome – The student will be able to;	
	i. Design a floriculture set up.	
	1 Floriculture: Definition, Scope, Present status, Future	
	prospects, Area, Production and Exports	
	2 Cultivation (Climate and soil requirements, Irrigation,	
	Propagation, Manures and fertilizers, Pest and diseases,	
	Pruning and pinching, Species and varieties) of Rose,	
	Chrysanthemum, and Jasmine	
	3 Export quality management	
ļ	4 Opportunities and Challenges in marketing	
Module II	Breeding of Flower Crops	
<u>10000.00</u>	Learning Objectives –	
	i To develop techniques of breeding flower crops	
	Learning Outcome – The student will be able to:	
	i Create a hybrid flower variety	
	1 Reeding method: Introduction selection Domestication	
	2 Production of hybrids Incompatibility problems Seed	
	production of flower crons	
	2 Prooding constraints and Achievements (Chrysanthemum)	
	Directing constraints and Achievements (on ysanthonon) Elower brooding for global market	
Module III	Cut Flowers and Dry Flowers	
	Learning Objectives –	
	i. To develop techniques of cultivation of commercial	
	flowers.	





 Le	arning Outcome – The student will be able;
	i. To cultivate flowers that are sold in cut flower market.
1.	Cut Flowers: Scope, Global Scenario, Cut Flower Standards,
	Grades, Harvest indices
2.	Production of Dry Flowers: Tools, Materials and Basic
	Technique, Drying methods, Maintenance of Flower shape,
	Procedure for embedding Pot-Pourri
3.	Dry Flowers; Principle and Techniques in dry flower
	making; Drying, Bleaching, Dyeing, Embedding, Pressing,
	Accessories Designer arrangements; Dry flower buckets,
	Bouquets, Wall hangings, Greeting cards

Code	<u>SEMESTER VI</u>	Credits 01
20US6BOFIP	Discipline Specific Elective	
	Course- II Practical	
1	Demonstration of cultivation of Orchid, Carnation, Anthurium,	1
	Gerbera	
2	Training and Pruning of commercial flowers	1
3	Demonstration of time of harvest of some plants- Jasmine	1
	spp., Chrysanthemum, Rose.	
4	Propagation of Rose	1
5	Flower arrangements	1
6	Visit to local florist	1
7	Survey of floral market, Report	1
8	Dry flower arrangement	1

- 1. Roy A. L. (1992) Introduction to floriculture, 2nd Edition.
- 2. Benzakin E, Chai J., Baite M. (2017) Cut flower garden.





	SEMESTER VI, Skill Enhancing Course VII	
Code		Credits
20US6BOSP7	Sustainable Practices	02
	<u>(Subhash Palekar Natural</u>	
	<u>Farming)</u>	
<u>Module I:</u>	Spiritual Farming	
	Learning Objectives –	
	i. To illustrate the aspects of spiritual farming.	
	Learning Outcome – The student will be able;	
	i. To implement technique of spiritual farming.	
	1 Spiritual farming; Philosophy, Principle, Technique	
	2 Green revolution, Four wheels of SPNF	
	3 Application of SPNF, Importance of Desi cow in SPNF	
	4 Preparation of Beejamrita, Jeevamrita	
	5 Benefits of Jeevamrita	
	6 Mulching, Waaphasa	
<u>Module II:</u>	<u>Soil Health</u>	
	Learning Objectives –	
	i. To develop awareness of eco-friendly methods	
	such as natural pesticides, crop rotation etc.	
	Learning Outcome – The student will be able;	
	I. TO use natural pesticides in an eco-friendly, sustainable manner	
	1. Natural pesticides- Insects and pests	
	management, Dashparni Arka, Neemastra, Brahmastra,	
	Agniastra	
	2. Root rot, Root knot	
	3. Plant tonic	
	4. Crop rotation, Beej Sanskar	
	5. Case study	
<u>Module III:</u>	Precision Farming	
	Learning Objectives –	
	i. To demonstrate methods of precision farming.	
	Learning Outcome – The student will be able;	
	i. To implement methods of precision farming.	





1.	Objectives, Scope, Advantages and Disadvantages	
2.	Subhash Palekar 5 layer model	
	Cultivation and management of vine vegetables-	
	Cucumber, Bottle guard, Pumpkin, Water melon,	
	Karela, Ridge guard. Natural Cultivation of Onion,	
3.	Ginger, Turmeric.	
	Set up of kitchen garden	
4.	Case study; Indo-Israel Agriculture project	
5.	Role of NABARD	

	<u>SEMESTER VI</u> Skill Enhancing Course <u>VII Practical</u>	Hours / course 30
Code		Credits
20US6B		
OSPP		
1	Projects	01

References:

1. Scribed.com/doc/141781151/subhash-palekar-book-list







	SEMESTER VI, Skill Enhancing Course VII	
Code		Credits
20US6B0E7	Entrepreneurship	02
<u>Module I:</u>	<u>Entrepreneur</u>	
	Learning Objectives –	
	i. To develop the concepts of entrepreneurship.	
	Learning Outcome – The student will be able;	
	i. To initiate a start-up.	
	Concept of entrepreneur, entrepreneurship, Characteristics of an entrepreneur, functions of entrepreneur.	
	 Entrepreneurial Behaviour – Concept, Factors affecting the 	
	entrepreneurial behaviour of the farmers, Factors affecting entrepreneurship. Characteristic Agri-entrepreneurship- Concept, need and scope	
	 Classification (business, Trading, Industrial, Corporate, Agriculture) Marketing Research- Business Environment; Micro- environment and Macro-environment 	
	 Marketing and Advertising of Product – Concept of Marketing, Market assessment, Elements of the marketing mix. 	
<u>iviodulė II:</u>	BUSINESS POLICIES	
	Learning Objectives –	
	Learning Outcome - The student will be able:	
	i To design a business strategy for a project	
	1 Developing first generation entrepreneurs, Woman	
	2 Entrepreneurship in globalised economy, Role of Consultancy	





3	Venture feasibility; Financial feasibility, Institutional,
	Organisation, Managerial aspects
4	Business development strategy – Concept, Long term and short term strategy at different levels of business organisation
5	Entrepreneurial business practices and policies

Module		Sources of Finance	
<u>III:</u>	Lea	arning Objectives –	
	i.	To identify sources of finance	
	ii.	To develop skills to procure funds	
	Lea	arning Outcome – The student will be able;	
	i.	To secure funding for a particular project	
	1.	Project management and Problems of Entrepreneur	
	2.	Government assistance and policies	
	3.	Entrepreneurial failures; Causes and Cures	
	4.	Sickness and Survival of Entrepreneurs	
	5.	Types of Financial assistance; Debt-loan, Equity, Tax,	
		Incentives, Grants, Short term financing	
	6.	Venture Capital Financing - Concept, Purposes,	
		Schemes, Venture capital, Institution guidelines for	
		venture capital, Fund Companies, Capital expenditure,	
		sources	

	<u>SEMESTER VI , Skill Enhancing Course VII – b</u> <u>Practical</u>	
Code		Credits
		01
1	Projects/ Case Study/ Business plan	

- 1. Khandka S. S. (2006) Entrepreneurial development.
- 2. Khan (8th Edition) Financial Management





K. J. Somaiya College of Science and Commerce, Vidyavihar, Mumbai-400077 Autonomous – Affiliated to University of Mumbai (Reaccredited by NAAC with Grade A)

T.Y.B.Sc. Botany Semester V

Practical I – Microbiology and Phycology

(Environmental microbiology, Applied microbiology and Algae)

Skeleton Question Paper

Duration: 03 Hrs.

N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Perform the given microbiology experiment A .		12 M
Q 2.	a) Identify, classify, sketch and describe the specimen B . Show the slide to the examiner		10 M
	b) Chromatographic separation of algal pigments C .		06 M
Q 3.	Identify and describe slides / specimen D , E , F .		15 M
Q 4.	Journal		7 M

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T.Y.B.Sc. Botany Semester V

Practical I – Microbiology and Phycology

(Environmental microbiology, Applied microbiology and Algae)

Кеу

Q.1 A	As per the slip
Q.2 B	Chara, Cosmerium, Ectocarpus, Polysiphonia.
С	Chromatographic separation of algal pigments
Q.3 D	Air sampler
Ε	Algal herbarium
F	Cultivation of algae
Q.4	Journal





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T.Y.B.Sc. Botany Semester V Practical II –Cryptogams (Fungi, Phytopathology, Bryophytes)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

	Max Marks	50 M
Q 1.	Identify, classify, sketch and describe the specimen ${f A}, {f B}$ and ${f C}.$	24 M
Q 2.	Perform given experiment D .	10 M
Q 3.	Identify and describe specimen E and F	10 M
Q 4.	Viva-voce	6 M

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T.Y.B.Sc. Botany Semester V Practical II –Cryptogams (Fungi, Phytopathology, Bryophytes)

Key

Q.4		Viva-voce
Q.3	E and F	Study of plant diseases, Slide / specimen of Bryophyta.
Q.2	D	Invertase activity / Isolation and Identification of fungus from fruit.
	С	Marchantia and Sphagnum
Q.1	A and B	Saprolegnia, Penicillium, Puccinia, Fusarium







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T.Y.B.Sc. Botany Semester V Practical III – Cytogenetics and Computational Biology (Cytogenetics, Molecular Biology, Data analysis and Validation)

Skeleton Question Paper

Duration : 03 Hrs.

N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Solve the problem A from given set of information		6 M
Q 2.	Solve the problem based on given data.		12 M
Q 3.	Perform given analysis B using computer software.		6 M
Q 4.	Identify and Describe the specimen C and D .		10 M
Q 5.	Submission of problems based on topics related to theory.		10 M
Q 6.	Viva-voce		6 M







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T.Y.B.Sc. Botany

Semester V

Practical III – Cytogenetics and Computational Biology (Cytogenetics, Molecular Biology, Data analysis and Validation)

		Кеу	
Q.1	Α	Tetrad analysis	
Q.2		Regression/ Student's t-test / Chi-square test	
Q.3	В	BLAST: N-BLAST, P-BLAST	
Q.4	C and D	Study of transposable elements in Maize using photomicrograph, Study of following disorders using karyograms: Philadelphia chromosome (14-9 translocation), Cri-Do-Chat (Deletion 5p), Patau (Trisomy 13) and Edwards (Trisomy 18).	
Q.5		Submission of Problems	

Q.6 Viva-voce





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T.Y.B.Sc. Botany

Semester V

Practical IV – Environmental Botany (Global environmental issues, Environmental health, Environmental management system and audit)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Perform major Ecology experiment (Major)		20 M
Q 2.	Perform minor ecology experiment (Minor)		10 M
Q 3. a	Journal		7 M
Q 3. b	Viva-voce		5 M
Q 4.	Report and Case Study on ERA / EIA		8 M







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T.Y.B.Sc. Botany

Semester V

Practical IV – Environmental Botany (Global environmental issues, Environmental health, Environmental management system and audit)

Key

- Q.1 As per slip (Major)
- Q.2 As per slip (Minor)
- Q.3 a Journal
- Q.3 b Viva-voce
- **Q.4** Report or Case study on ERA / EIA.

Slip ContentMajor

1. Determination of organic matter content of polluted and unpolluted soil sample.

- 2. Determination of nitrates in water sample collected from different sources.
- 3. Determination of sulphates in water sample collected from different sources.
- 4. Determination of Dissolved oxygen from given water sample.
- 5. Determination of Biological Oxygen Demand from given water sample.

Minor

- 6. Detection of Heavy metals from waste water.
- 7. Demonstrate the effect of heavy metals on seed germination.
- 8. Determination of Acidity and Alkalinity of given water sample.
- 9. Determination of Hardness of given water sample.





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T.Y.B.Sc. Botany

Semester V DSEC Practical I – Industrial Botany (Small scale industry, Role of plants in industry, Nanotechnology and IPR)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

Max Marks50 MQ1.Perform given experiment A12 MQ2.Extraction and identification of edible pigments from given plant
material B using paper chromatography.8 MQ3.Identify the ingredients and comment on its uses C,D,E and F20 MQ4.Viva-voce5 MQ5.Journal5 M

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T.Y.B.Sc. Botany

Semester V

DSEC Practical I – Industrial Botany (Small scale industry, Role of plants in industry, Nanotechnology and IPR)

Key

- **Q.1 A** Enzyme assay- Proteinase, and Lipase
- **Q.2 B** Edible pigments from Beetroot, Red cabbage, Broccoli, Carrot
- **Q.3 C** Nutraceutical product
 - **D** Cosmaceutical product
 - **E** Pharmaceutical product
 - **F** Plants used in homeopathic medicine- *Calendulla* skin infection, *Argemon* rheumatism, *Atropa* fever and headache, *Centella* wound healing, *Cinchona* malaria
- Q.4 Viva-voce
- Q.5 Journal





T.Y.B.Sc. Botany Semester V DSEC Practical I – Economic Botany (Agronomy, Plants products, Crops and super food)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

	Max Marks	50 M
Q 1.	Perform the given experiment A	12 M
Q 2.	Identification of sugars present in given sample B using paper chromatography.	8 M
	OR	
Q 2.	Estimate the phenol content from given tea sample B .	8 M
Q 3.	Identify and describe the specimen / slide ${\bf C}, {\bf D}, {\bf E}$ and ${\bf F}$	20 M
Q 4.	Viva-voce	5 M
Q 5.	Journal	5 M





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T.Y.B.Sc. Botany Semester V DSEC Practical I – Economic Botany (Agronomy, Plants products, Crops and super food)

Key

- Q.1 A As per slip
- **Q.2 B** Paper chromatography for sugars/ phenol estimation from tea sample
- **Q.3 C** Identification of sources and processing of rubber with the help of photomicrograph
 - **D** Identification of plants used in manufacture of paper
 - **E** Identification of Sources of latex
 - **F** Nutritional value of super food
- Q.4 Viva-voce
- Q.5 Journal

Slip

Determination of Ca²⁺ from Ragi extract. Determination of Iodine number and Rancidity of edible oil. Estimation of saponification value of given oil sample. Identification of free fatty acids in given oil sample using Thin layer chromatography.





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T.Y.B.Sc. Botany

Semester V DSEC Practical II – Medicinal Botany (Monograph of drug, Plants as traditional medicine and Biodiversity)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

	Max Marks	50 M
Q 1.	Describe macroscopical / microscopical characters with the help of neat and labelled sketches of specimen A , and B . perform the chemical tests to identify the active constituents.	16 M
Q 2.	Identify and Describe the specimen C, D, E, F	20 M
Q 3.	Report on Biodiversity of Western Ghats	10 M
Q 4.	Journal	4 M





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T.Y.B.Sc. Botany

Semester V

DSEC Practical II – Medicinal Botany (Monograph of drug, Plants as traditional medicine and Biodiversity)

Key

- Q.1 A and B Monographs of drugs with respect to biological sources, macroscopic and microscopic characteristics, chemical constituents, of the following plants / drug: Datura (leaf), Flaxseed (Fruit and seed), Arjuna (bark), Shatavari (root), Turmeric (rhizome), Gaduchi (stem)
- Q.2CPlants as medicine for the treatment of- Anaemia,
Diabetes, Hypertension, Jaundice, Asthama,
 - **D** Therapeutic value of Indian plant food-Cereals- Oats, Pulses-Soyabean, Gram, Pea, Fruits- Amla, Guava
 - **E** Identification of rare and endangered medicinal plants of India.
 - **F** Identification of some important medicinal and aromatic plants of India
- **Q.3** Kasturirangan Committee Report
- Q.4 Journal







T.Y.B.Sc. Botany Semester V DSEC Practical II – Plant Propagation (Propagation practices, Propagation environment and Plant problems)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

	Max Marks	50 M
Q 1.	Demonstrate the propagation practices using given specimen A , B , and C	18 M
Q 2.	Identify and describe the given weed D and E	12 M
Q 3.	Identify and describe the given specimen ${f F}$, ${f G}$ and ${f H}$	15 M
Q 3.	Journal	5 M







T.Y.B.Sc. Botany

Semester V

DSEC Practical II – Plant Propagation (Propagation practices, Propagation environment and Plant problems)

Key

- **Q.1 A** Propagation practices by Seed
 - **B** Propagation practices by specialized vegetative structure
 - **C** Propagation practices by cutting, layering, budding, grafting
- Q.2 D and Types of weed

Ε

- **Q.3 F** Garden implements
 - **G** Identification of types of containers for potting : fiber, paper, polyethylene, plant roll and wood / hydro culture
 - H Study of following diseases-Powdery mildew, White blisters, Downy mildew / Pests- slugs and snails, millipedes, caterpillars, Aphids, mealybugs

Q.4 Journal

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T.Y.B.Sc. Botany Semester VI Practical I – Vascular plant Diversity (Pteridophytes, Gymnosperms, Taxonomy)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Ide	ntify, Classify and Describe specimen A and B		14
a)	Classify specimen C upto its family giving reasons. Write formula, sketch and label L.S. of flower and T.S. of the ova	the floral ary.	07
b)	Identify the genus and species of specimen D using flora.		06
Ide	ntify and Describe slide and / or specimen E , F , G .		15
Fie	ld Report		08
	Ide a) b) Ide Fiel	 Identify, Classify and Describe specimen A and B a) Classify specimen C upto its family giving reasons. Write formula, sketch and label L.S. of flower and T.S. of the ova b) Identify the genus and species of specimen D using flora. Identify and Describe slide and / or specimen E, F, G. Field Report 	Max Marks Identify, Classify and Describe specimen A and B a) Classify specimen C upto its family giving reasons. Write the floral formula, sketch and label L.S. of flower and T.S. of the ovary. b) Identify the genus and species of specimen D using flora. Identify and Describe slide and / or specimen E , F , G . Field Report

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T.Y.B.Sc. Botany Semester VI Practical I – Vascular plant Diversity (Pteridophytes, Gymnosperms, Taxonomy)

- Key
- Q.1 A Pteridophytes : Lycopodium, Adiantum, Marsilea
 - B Gymnosperms: Gnetum, Ephedra
- Q.2 C Families: Magnoliaceae, Myrtaceae, Capparidaceae, Umbelliferae, Apocynaceae, Asclepiadaceae, Lamiaceae, Convolvulaceae, Cucurbitaceae, Amaranthaceae, Palmaceae
 - **D** Cooke's Flora: Families from F.Y. and S.Y. Classses
- **Q.3 E** Soral arrangement: *Ophioglossum*, *Osmunda*, *Lygodium*, *Pleopeltis*, *Pteris*, *Asplenium*, *Nephrolepis*
 - **F** Fossils: Calamites, Lepidodendron, Lyginopteris, Pentoxylon
 - **G** Economic Importance: From families taught in T.Y.
- **Q.4** Field Report





> T.Y.B.Sc. Botany Semester VI Practical II – Forms and Function (Anatomy, Palynology, Embryology)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Make a double stained preparation of T.S. of specimen A and comment on the type of anomalous secondary growth.		10
Q 2.	Perform the given experiment B allotted to you.		08
Q 3.	Identify and Describe slide or specimen C, D, E, F.		20
Q 4.	Viva-Voce		05
Q 5.	Journal		07





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T.Y.B.Sc. Botany

Semester VI Practical II – Forms and Function (Anatomy, Palynology, Embryology)

Key

 Q.1 A Secondary growth : Dicot stem; Bignonia, Aristolochia, Achyranthes Monocot stem; Draceana Dicot root; Storage root (Beet, Raphanus)

Q.2 B Palynology:

- i. Determination of pollen viability
- ii. To study the germination of pollen grains and growth of pollen tube in varying concentration of sucrose.
- iii. Study of airborne pollen grains using gravity slide sampler.
- iv. Pollen analysis of honey sample.
- v. NPC: Hibiscus, Datura, Oscimum, Crinum, Pancratium, Canna, Bougainvillea

Q.3 C Cambium:

- D Stomata: Anemocytic, Anisocytic, Diacytic, Paracytic
- **E** *In vivo* growth of pollen tube in *Portulaca*
- **F** Embryology:
 - i. Microsporogenesis
 - ii. Megasporogenesis
 - iii. Embryo of Citrus, Cucurbita, Scoparia and Maize
- Q.4 Journal
- Q.5 Viva-Voce





T.Y.B.Sc. Botany

Semester VI Practical III – Functional Botany (Plant Physiology, Phyto-Chemistry & Pharmacognosy, Seed Technology)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M	
Q 1.	Perform physiology experiment A allotted to you.		12 M	
Q 2.	a) Perform the test for secondary metabolite B		08 M	
	b) Perform Adulteration Test C		08 M	
Q 3.	Identify and describe equipment D		10 M	
	Identify and describe specimen /photomicrograph E			
Q 4.	Journal		07 M	
Q 5.	Viva-Voce		05 M	







T.Y.B.Sc. Botany

Semester VI

Practical III – Functional Botany (Plant Physiology, Phyto-Chemistry & Pharmacognosy, Seed Technology)

Key

Q.1 A Physiology

- i. Measurement of CO₂ in aerobic respiration
- ii. Determination of rate of respiration in germinating seeds using Ganong's Respirometer
- iii. Qualitative analysis of respiratory enzymes.
- **Q.2 B** Tests for Alkaloids, Phenolics, Flavonoids, Glycosides, Volatile oils and Tannins
 - **C** Test for Adulteration in;
 - i. Turmeric powder
 - ii. Cinnamon
 - iii. Black pepper
- Q.3 D Equipment
 - **E** i. Seed viability; Temperature, Moisture
 - ii. Germination of seed
 - iii. Isolation of fungi
 - iv. Physical characterization of seed
 - (Expert will prepare the specimen and keep for identification)

- Q.4 Journal
- Q.5 Viva-Voce

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T.Y.B.Sc. Botany Semester VI Practical IV – Forestry (Forest Mensuration, Forest Protection, Forest Economics)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Determine the moisture content of wood A		10 M
	Or		
	Study of anatomical features of wood by maceration A .		
Q 2.	Measurement of Girth / Diameter / Volume of the plant B .		08 M
Q 3.	Identify and Describe slide / specimen C, D, E, F		20 M
Q 4.	Viva-Voce		05 M
Q 5.	Journal		07 M







T.Y.B.Sc. Botany

Semester VI Practical IV – Forestry (Forest Mensuration, Forest Protection, Forest Economics)

Key

- **Q.1 A** Moisture content / Anatomy of Wood
- Q.2 B Measurement of Diameter / Girth / Volume
- Q.3 C Instruments for measurement
 - **D** Mangrove plants
 - **E** Defects due to natural forces
 - **F** Defects due to insects
- Q.4 Journal
- Q.5 Viva-Voce





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T.Y.B.Sc. Botany Semester VI DSEC Practical I – Ayurvedic Botany (Alternate Medicine, Conventional Medicine, Ethnobotany)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

Max Marks 50 M

- **Q1.** (i) Perform chemical test to confirm presence of the key secondary **O8 M** metabolite from given herb **A**.
 - (ii) Describe the composition and method of preparation for a given **08 M** ayurvedic formulation **B**.
- Q 2.Determine the Prakruti of the given person C.O7 M
- Q 3. Identify and Describe slide / specimen / photomicrograph D, E, F and G. 20 M
- **Q 4**. Journal **07 M**







T.Y.B.Sc. Botany

Semester VI

DSEC Practical I – Ayurvedic Botany (Alternate Medicine, Conventional Medicine, Ethnobotany)

Key

- Q.1 A Herbs from Grandma's Pouch: Harda, Beheda, Amla, Soonthi, Vekhand, Jyashtamadh, Asafoetida, Murudsheng, Tulsi, Ashoka bark, Pimpli, Dikemali, Akkalkara, Turmeric
 - B Asava, Arishta, Avaleha, Vati
- **Q.2 C** Problems based on Prakruti nidan
- **Q.3 D** Grandma's pouch herbs other than given above
- Q.4 E Wheat germ grass, Ginseng
 - **F** Plants for treating Jaundice, skin diseases
 - **G** Plants for treating diarrhoea and dysentery
- Q.5 Journal





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T.Y.B.Sc. Botany

Semester VI

DSEC Practical I – Green House Technology (Green House construction and Economics, Green House Management, Crop protection and Marketing)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Identify and Describe Slide / Specimen / Photomicrograph E, F, G	n A, B, C, D,	35 M
Q 2.	Field Report		10 M
Q 3.	Viva-Voce		05 M







T.Y.B.Sc. Botany

Semester VI

DSEC Practical I – Green House Technology (Green House construction and Economics, Green House Management, Crop protection and Marketing)

Key

- **Q.1 A** Types of Green Houses
 - **B** Material used in green house
 - **C** Green house plants
 - **D** Green house pests
 - **E** Green house diseases
 - **F** Green house automation
 - G Irrigation Method
- Q.2 Field Report
- Q.3 Viva-Voce





T.Y.B.Sc. Botany Semester VI DSEC Practical II – Plant Biotechnology (Plant Tissue Culture, Micro-propagation, Biotechnology)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

		Max Marks	50 M
Q 1.	Perform the given experiment A .		10 M
Q 2.	Prepare structural layout of given laboratory B .		08 M
Q 3.	Identify and Describe Slide / Specimen / Photomicrograph	C, D, E, F.	20 M
Q 4.	Journal		07 M
Q 5.	Viva-Voce		05 M







T.Y.B.Sc. Botany

Semester VI DSEC Practical II – Plant Biotechnology (Plant Tissue Culture, Micro-propagation, Biotechnology)

Key

.

- **Q.1 A** i. Preparation for MS media
 - ii. Encapsulation of axillary bud
 - iii. Surface sterilization of seeds
- **Q.2 B** i. Small scale tissue culture lab
 - ii. Large scale tissue culture lab
 - iii. Tissue culture lab for quality control
- **Q.3 C** Sterilizing equipment
 - D Callus
 - E Hardening
 - F Ti plasmid

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T.Y.B.Sc. Botany

Semester VI DSEC Practical II – Floriculture (Commercial Floriculture, Edible Flowers, Cut Flowers and Dry Flowers)

Skeleton Question Paper

Duration : 03 Hrs. N.B.

1. Candidates should show their slides/ preparations/ results for all questions to the examiner.

	Max Marks	50 M
Q 1.	Demonstrate cultivation of given plant material A .	06 M
Q 2.	Perform the dry flower arrangement of style B .	10 M
Q 3.	Identify and Describe Slide / Specimen / Photomicrograph C, D, E.	15 M
Q 4.	Report of Market Survey	10 M
Q 5.	Report of visits to local florist	04 M
Q 6.	Viva-Voce	05 M

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T.Y.B.Sc. Botany

Semester VI

DSEC Practical II – Floriculture (Commercial Floriculture, Edible Flowers, Cut Flowers and Dry Flowers)

Key

- **Q.1 A** Rose, Chrysanthemum, Jasmine
- **Q.2 B** Flower Buckets, Bouquets, Wall Hanging, Greeting Cards
- Q.3 C Pot-Pourri
 - **D** Photomicrograph of technic in dry flower making; Dyeing, Pressing, Embedding
 - E Indian style dry flower arrangements; Wood shaving garland,
- Q.4 Report of Market Survey
- Q.5 Report of visits to local florist
- Q.6 Viva-Voce





Scheme of examination – Theory

Students will be assessed based on 60 : 40 pattern. External examination will be of 60 marks and internal examination of 40 marks.

Internal Assessment:

Students will be evaluated for internal assessment based on Assignment and written tests. Written test of 15 marks each will be conducted thrice and best two test will be considered for evaluation. Test will be conducted online using software's like Testmoz in each semester.

Assignment of 10 marks will be given for each course in each semester.

External Assessment:

External examination will be of 60 marks conducted for each course in each semester.

Q.1.	A)	Answer any two of the following;	12 M
	i.		
	ii.		
	iii.		
	B)	Write a note on following;	3 M
	i .		
	ii.		
Q.2.	A)	Answer any two of the following;	12 M
	i.		
	ii.		
	iii.		
	B)	Write a note on following;	8 M
	i .		
	ii.		
		· · · · · ·	
Q.3.	A)	Answer any two of the following;	12 M
	I.		
	II. 		
	B)	write a note on following;	3M
	İ.		
	II.		

Question Paper Pattern





Q.4.	A)	Answer any two of the following;	12 M
	i.		
	ii.		
	iii.		
	B)	Write a note on following;	3M
	i.		
	ii.		

Question Paper Pattern-Practicals (If applicable)

Practical examination of 50 marks for each course will be conducted in each semester. Practical question paper pattern is attached with the syllabus before the assessment pattern.