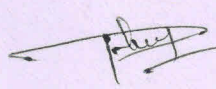
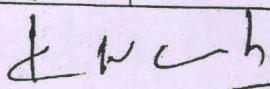


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Part A Introduction			
Program: Certificate	Class: B.Sc. 1 <sup>st</sup> year	Year : 2021	Session: 2021-22
Subject: Botany			
1	Course Code	S1-BOTA1T	
2	Course Title	Applied Botany (Paper 1)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject Biology/ Life Sciences/ Agriculture in class/12th	
5	Course Learning outcomes (CLO)	By the end of this course the student should have: <ul style="list-style-type: none"> <li>• Understood the significance and role of botany.</li> <li>• Learnt the basic aspects of applied botany.</li> <li>• Gained knowledge about employment opportunities in field of botany</li> <li>• Gained knowledge about start-up opportunities in the field of botany</li> <li>• Learnt about opportunities of social services</li> <li>• Gain knowledge about best health practices</li> </ul>	
6	Credit Value	04 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks: 33
Part B- Content of the Course			
Total No. of Lectures- 60 Hours Tutorials- 00 Practical -00 ( 04 hours per week):			
L-T-P:			
Unit	Topics	No. of Lectures	
✓ I	1.1 Introduction, objectives and importance of Applied botany 1.2 History and evolution of botany 1.3 Relation of plants to man and relation with other services 1.4 Various disciplines of botany and their applications to human welfare	12	
✓ II	1.1 Definition and types of pollution and pollutants 1.2 Phytoremediation: Air, water, soil, noise and thermal pollutants (Any 5 plants with botanical name, family) and their role in pollution control. 1.3 Bioremediation: definition and types	12	
III	1.1 Ancient agricultural practices. 1.2 Modern agriculture practices: Polyhouse, Drip irrigation, hydroponics, computer-based agriculture,	12	

  
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	terrace farming, <b>1.3 Organic farming:</b> Introduction, objective and brief technique <b>1.4 Horticulture:</b> Definition and role in human welfare <b>1.5 Forestry:</b> Definition, branches and role in human welfare <b>1.6 Silviculture:</b> Definition and management practices	
IV	1.1 Role of Botany in Rural development 1.2 Ethnobotany: Introduction and importance 1.3 Ethnomedicine: Definition and examples. (Local name, Botanical name, family and importance of Neem, Aloe, Clove, Ginger, Tulsi, Turmeric, Giloy, Emblica, Ashwagandha, Arandi) 1.4 Ethno-fibres: Definition and examples (Local name, Botanical name, family and importance of Ankara, Coconut, elephant grass, cotton) 1.5 Ethno-food crops: Definition and examples (Local name, Botanical name, family and importance of Garadu, Singada, Kutaki, Sama, Kodo, Bathua, Sehjan, Jowar, Makka, Bajra, Jau)	12
V	1.1 Plant tissue culture: Definition, types and Importance. 1.2 DNA Recombinant technique: Introduction, tools and importance 1.3 Role of recombination in present era 1.4 Bioinformatics: Definition, concept and tools 1.5 Introduction of bioinformatics software: Basic idea of BLAST and FASTA Importance of bioinformatics	12

**Keywords/Tags:** Applied Botany, History of Botany, Evolution of Botany, Botany in human welfare, : Pollution, Pollutants, Phytoremediation, Bioremediation, Hydroponics, polyhouse, Terrace farming, Organic farming, Horticulture, Silviculture, Ethnobotany, Ethnomedicine, Ethno-fibers, Ethno-food crops, Bioinformatics, BLAST, FASTA, Recombinant DNA, Plant tissue culture

### Part C-Learning Resources

#### Text Books, Reference Books, Other resources

#### Suggested Readings:

1. Levetin E. and Memahon K. "Plants and Society" McGraw Hill Education. 2007
2. Maiti R., Rodriguez H. G. and Thakur A. S. "Applied Botany" American Academic Press. 2017
3. Negi S. S. "Forest Botany" M/s Bishen Singh Mafendra Pal Singh. 2012.
4. Agrahari R. P. "Environmental Ecology, Biodiversity, Climate Change and Disaster Management" McGraw Hill Education. 2020
5. Sharma D. K. "Biodiversity Conservation: Current Status and Future Strategies" Write and Print Publication. 2017
6. Singh J. "Biodiversity Environment and Sustainability" MD Publications Pvt Ltd/ 2008
7. Gupta P. K. "Molecular Biology and Genetic Engineering" Rastogi Publications. 2005
8. Sharma V., Munjal A. and Shankar A. "Bioinformatics" Rastogi Publications. 2008

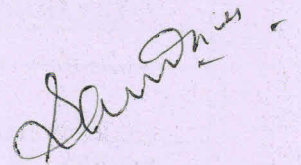
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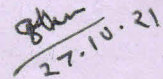
2. Suggestive digital platforms web links		
Suggested equivalent online courses:		
<b>Part D-Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
Maximum Marks : 100		
Continuous Comprehensive Evaluation (CCE) : 25marks University Exam (UE) 75 marks		
Internal Assessment : Continuous Comprehensive Evaluation (CCE):25	Class Test Assignment/Presentation	15 10 Total =25
External Assessment : University Exam Section: 75 Time : 02.00 Hours	Section(A) : Three Very Short Questions (50 Words Each) Section (B) : Four Short Questions (200 Words Each) Section (C) : Two Long Questions (500 Words Each)	03 x 03 = 09  04 x 09 = 36 02 x 15 = 30 Total 75
Any remarks/ suggestions:		

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Part A Introduction			
Program: Certificate	Class: B.Sc. 1 <sup>st</sup> year	Year: 2021	Session: 2021-22
Subject: Botany			
1	Course Code	S1-BOTA1P	
2	Course Title	Applied Botany Practical (paper 1.)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject Botany, Biology, Life Science in class/12th/.	
5	Course Learning outcomes (CLO)	On completion of this course, learners will be able to: By the end of this course the student should have knowledge of practical skill related with ethnobotany, tissue culture, application of bioinformatics software and tools of recombinant DNA technology.	
6	Credit Value	2 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:			
Unit	Topics	No. of Lectures	
I	<ol style="list-style-type: none"> <li>1. Identification of ethnomedicinal plants</li> <li>2. Preparation of soil health card of any agricultural field</li> <li>3. Study of vermicompost and composting of kitchen waste</li> <li>4. Use of BLAST and FASTA</li> <li>5. Prepare the list of important air, water and soil pollutants of local areas</li> <li>6. Plant tissue culture technique: sterilization, inoculation, culture media, acclimatization and hardening,</li> <li>7. Preparation of list of ethnomedicinal, food, fibre plant locally available</li> <li>8. Tools of recombinant DNA technology: Restriction, enzymes, plasmid vectors, other enzymes</li> <li>9. Study of global warming, acid rain and water</li> </ol>	30	

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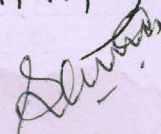
	<p>quality (pH and Conductivity),</p> <p>10. Study of local plants grown around agricultural field</p> <p>11. * Practical can be decided on theory basis according to availability.</p> <p>12. * Case and field study can be designed accordingly.</p>	
<b>Keywords/Tags:</b>		
<b>Part C-Learning Resources</b>		
<b>Text Books, Reference Books, Other resources</b>		
<b>Suggested Readings:</b>		
<ol style="list-style-type: none"> <li>1. Levetin E. and Memahon K. "Plants and Society" Mc Graw Hill Education. 2007</li> <li>2. Maiti R., Rodríguez H. G. and Thakur A. S. "Applied Botany" American Academic Press. 2017</li> <li>3. Negi S. S. "Forest Botany" M/s Bishen Singh Mafendra Pal Singh. 2012.</li> <li>4. Agrahari R. P. "Environmental Ecology, Biodiversity, Climate Change and Disaster Management" Mc Graw Hill Education. 2020</li> <li>5. Sharma D. K. "Biodiversity Conservation: Current Status and Future Strategies" Write and Print Publication. 2017</li> <li>6. Singh J. "Biodiversity Environment and Sustainability" MD Publications Pvt Ltd/ 2008</li> <li>7. Gupta P. K. "Molecular Biology and Genetic Engineering" Rastogi Publications. 2005</li> </ol> <p>Sharma V., Munjal A. and Shankar A. "Bioinformatics" Rastogi Publications. 2008.</p>		
<b>Suggestive digital platforms web links</b>		
<b>Suggested equivalent online courses:</b>		
<b>Part D-Assessment and Evaluation</b>		

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Suggested Continuous Evaluation Methods:			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
TOTAL	25		75
Any remarks/ suggestions:			

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Part A Introduction			
Program: Certificate	Class: BSc-I	Year:2021	Session:2021-22
Subject: Botany			
1	Course Code	S1-BOTA2T	
2	Course Title	Basic Botany (paper 2)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject botany in class/12th/ certificate/diploma.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> <li>This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms.</li> <li>It gives an accounts of plant adaptations from aquatic condition to colonize terrestrial habitat.</li> <li>The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated.</li> <li>The economic importance and significance of plants in nature will be understood.</li> <li>They will be acquainted with locally prevalent microbial diseases of plants and humans</li> </ul>	
6	Credit Value	4 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
Total No. of Lectures- 60Tutorials- 0 Practical =0 ( theory 4 hours per week):			
L-T-P:			
Unit	Topics	No. of Lectures	
I	1.1 History of Botany and Indian Contributions. 1.2 Morphological Characteristics of lower and higher plants(Angiosperms). 1.3 Types of leaves, Inflorescence, Flowers and Fruits. 1.4 Structure of Plant cell and cell organelles, Prokaryotic and Eukaryotic Cells, types of Cell division. 1.5 Microscope structure and function of light microscope (magnification and resolving power), 1.6 Various types of Microscopes: Bright field, Phase Contrast, SEM and TEM.	12	
✓ II	1. Algae 1.1 General characteristics 1.2 Range of thallus organization, reproduction. 1.3 Types of life-cycles in algae 1.4 Role of algae in nature and its economic importance.	12	

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	<b>2Bryophytes :</b> 2.1 General characteristics, Ecology. 2.2 Range of thallus organization, morphology, anatomy (internal and external features) and reproduction of any one Bryophyte. 2.3 Economic importance of Bryophytes	
III	<b>1Pteridophytes</b> 1.1 General characteristics and morphology. 1.2 Stelar organization and reproduction. 1.3 Heterospory and seed habit. 1.4 Economical importance <b>2.Gymnosperms</b> 2.1 General description and their distribution. 2.2 Economical importance of Gymnosperms. <b>3.Paleobotany</b> 3.1 Indian contribution in Paleobotany. 3.2 Brief knowledge of Fossils and Geological time scale.	12
IV	<b>1Fungi</b> 1.1 General characteristics and cell wall composition. 1.2 Mode of nutrition 1.3 Types of reproduction 1.4 Economic importance 1.5 Parasexuality and Mycorrhiza <b>2.Lichens: Brief knowledge and their significance.</b>	12
V	<b>1Microbes</b> 1.1 Brief outline of various types of Microbes 1.2 Archaeobacteria, Eubacteria, Cyanobacteria, Mycoplasma. Actinomycetes and Virus. 1.3 Beneficial and harmful roles.	12

**Keywords/Tags:** History of Botany, Paleobotany, Prokaryotes, Eukaryotes, Algae, Bryophyta, Pteridophyta, Gymnosperms, Fungi, Mycorrhiza, Lichens, Bacteria, Virus

**Part C-Learning Resources**

**Text Books, Reference Books, Other resources**

**Suggested Readings:**

1. Oladele Ogonseitan, Microbial Diversity: Form and Function in Prokaryotes, Wiley Blackwell, 2008.
2. Pelezar, M.J et al., Microbiology, Tata McGraw-Hill Co, New Delhi, 5th edition, 2001.
3. Prescott, L. Harley, J. and Klein, D., Microbiology, Tata McGraw-Hill Co. New Delhi, 6th edn., 2005.
4. Fritsch F.E., The Structure & Reproduction of Algae, Vol. I & Vol. II., Cambridge University

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- Press, Cambridge, U.K. 1945.
5. Smith, G.M., Cryptogamic Botany, Vol. I: Algae, Fungi, & Lichens, McGraw-Hill Book Co., New York, 1955.
  6. Ian Morris. An Introduction to the Algae, Hutchinson, London, 1967.
  7. Alexopoulos, C.J., Mims, C.W. and Blackwell, M., Introductory Mycology, John Wiley and Sons, 1996.
  8. Webster, J., Introduction to Fungi, Cambridge University Press 2nd edn., 1999.
  9. Cavers F., The inter-relationships of the Bryophyta, The New Phytologist, Indian Reprint, Vol.10, issue 1-2, p. 1-21, 1911.
  10. Parihar, N.S., An Introduction to Embryophyta: Bryophyte, Vol.I, Central Book Depot, Allahabad, 1965.
  11. Watson, E.V., British Mosses and Liverworts, Cambridge University Press, U.K., 1968.
  12. Eames, A.J., Morphology of Vascular Plants: Lower Groups, McGraw Hill, N.Y., 1936.
  13. Parihar, N.S., An Introduction to Embryophyta: Pteridophyte, Vol.II, Central Book Depot, Allahabad, 1965.
  14. Sporne, K.R., The Morphology of Pteridophytes: The Structure of Ferns and Allied Plants, Hutchinson University Library, London, 1970.
  15. Bierhorst, D.W., Morphology of Vascular Plants, The MacMillan Co., N.Y. and Collier-MacMillan Ltd., London, 1971.
  16. Coulter, J.M. and C.J. Chamberlain, Morphology of Gymnosperms, Central Book Depot, Allahabad, 1964.
  17. Sporne, K.R., The Morphology of Gymnosperms: The Structure and Evolution of Primitive seed Plants, Hutchinson University Library, London, 1971.
  18. Dutta, S.C., An introduction to Gymnosperms, Kalyani Publishers, New Delhi, 1984.
  19. Sharma, O.P and Shivani Dixit, Gymnosperms, Pragati Prakashan, Meerut, 2015.
  20. Vasishtha, P.C., Botany for Degree students: Gymnosperms, revised edn., S. Chand and Comp. Ltd., N. Delhi, 2018.
  21. Bhatnagar, S.P. and Alok Moitra, Gymnosperms, New age International (P.) Ltd., New Delhi, 2000.

Suggested equivalent online courses:

### Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 25 marks University Exam (UE) 75 marks

<b>Internal Assessment :</b>	Class Test	15
Continuous Comprehensive Evaluation (CCE):25	Assignment/Presentation	10
	Total	25
<b>External Assessment :</b> University Exam Section: 75 Time : 02.00 Hours	<b>Section (A) :</b> Three Very Short Questions (50 Words Each)	03 x 03 = 09
	<b>Section (B) :</b> Four Short Questions (200 Words Each)	04 x 09 = 36
	<b>Section (C) :</b> Two Long Questions (500 Words Each)	02 x 15 = 30
	Total	75

Any remarks/ suggestions:

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Part A Introduction			
Program: Certificate	Class: 1 <sup>st</sup> year	Year: 2021	Session: 2021-22
Subject : Botany Practical			
1	Course Code	S1-BOTA2P	
2	Course Title	Basic Botany Practical (Paper 2)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/.....)	Core Course	
4	Pre-requisite (if any)	To study this course, a student must have had the subject of Biology/ Life science/Agriculture in class 12th.	
5	Course Learning outcomes (CLO)	<ul style="list-style-type: none"> <li>• Students will learn to carry out practical work in the laboratory.</li> <li>• Interpreting plant morphology and anatomy of various groups of lower and higher plants.</li> <li>• Students will be able to identify the major groups of microorganisms.</li> </ul>	
6	Credit Value	2 Credits	
7	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33
Part B- Content of the Course			
OTotal No. of Practical- 30 HoursTutorials- 00 -Practical ( 2 hours per week):			
L-T-P:			
Unit	Topics	No. of Practical	
I to V	<ol style="list-style-type: none"> <li>1. Study of various types of leaves , inflorescence, Flowers and fruits.</li> <li>2. Understanding various parts of Microscope(simple and compound microscope)</li> <li>3. Study of plant cells (e.g. Onion etc.)</li> <li>4. Study of permanent slides of Mitosis and meiosis</li> <li>5. Study of Electron Micrographs of Cell and organelles from Internet, You -Tube.</li> <li>6. Identification of various algae from specimens, slides and temporary mounts of water from nearby areas like, <i>Nostoc</i>, <i>Oscillatoria</i>, <i>Volvox</i>, <i>Spirogyra</i>, <i>Oedogonium</i>, <i>Chara</i>, and specimens and pictographs of marine algae like <i>Ectocarpus</i>, <i>Sargassum</i>, <i>Polysiphonia</i>.</li> <li>7. Study and identification of some Bryophytes like <i>Riccia</i>, <i>Marchantia</i>, <i>Anthoceros</i>, <i>Funaria</i> and Field visit.</li> <li>8. Study of some fossils (specimens and slides )</li> <li>9. Study of some Pteridophytes like <i>Lycopodium</i>, <i>Sellaginella</i>, <i>Equisetum</i>, <i>Marselia</i> and study of any one fern</li> </ol>	30	

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	10. Section cutting of Pteridophytes and Gymnosperms: Stem, root and leaves 11. Specimen study of Pteridophytes and Gymnosperms Cones 12. Study of fungal structures and preparation of temporary mounts of <i>Mucor</i> , <i>Rhizopus</i> , <i>Asperigillus</i> , <i>Yeast</i> , <i>Pencillium</i> , <i>Alternaria</i> , <i>Albugo</i> , <i>Helimenthosporium</i> . 13. Permanent slides of Puccinia on host. 14. Study of various fungal plant diseases 15. Observation of symptoms of virus and bacteria on plants. 16. Gram staining techniques	
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**Keywords/Tags:** Microscope, Algae, Bryophyta, Pteridophyta, Gymnosperm, Fungi

**Part C-Learning Resources**

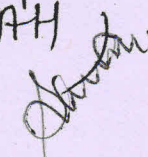
**Text Books, Reference Books, Other resources**

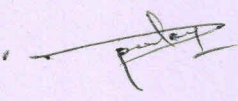
**Suggested Readings:**

1. Bendre Ashok and Ashok Kumar , A Textbook of Practical Botany, , vol. 1, Rastogi Pub., Meerut, 1984.
2. Pandey B.P Modern Practical Botany... vol. 1, S. Chand and Co. Ltd., N. Delhi, 17th edn., 1999.
3. Singh M.P., Chaudhary S.B. and Sahu H. BA Textbook of Practical Botany, Daya Pub. House, N. Delhi, 2005.
4. Shahezad, Akil Mohd., Practical Botany, Shanti Prakashan, Gwalior, 2016.
5. Elizabeth Margaret and Angela G Practical manual of Botany, vol.1, New Age (Pub.) Ltd., Delhi, 2007.

**Suggestive digital platforms web links --**

**Suggested equivalent online courses: ---**

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### Part D-Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	15
Attendance	5	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of / Lab Visits/ Survey / Industrial visit)	10	Table work / Experiments	50
<b>TOTAL</b>	<b>25</b>		<b>75</b>

Any remarks/ suggestions: Practical may be adjusted accordingly by the teachers.

*Dr. K. W. SHAM*  
29/5/21  
*P. Kulkarni*  
27.10.21