

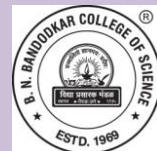
**Academic Council Meeting No. and Date : 2 / April 30, 2021**

**Agenda Number : 4**

**Resolution Number : 4.2 and 4.18**



**Vidya Prasarak Mandal's  
B. N. Bandodkar College of  
Science (Autonomous), Thane**



**Syllabus for**

**Programme : Bachelor of Science**

**Specific Programme : Botany**

**[ F.Y.B.Sc. (Botany) ]**

**Revised under Autonomy**

**From academic year 2021 - 2022**

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## **Preamble**

Botany is a subject that traverses a path from the Vedas to the present. In this journey, Botany as a subject has amalgamated traditional knowledge of medicinal plants from Vedas with modern subjects like molecular biology, biotechnology, biochemistry etc. The students of B.Sc. Botany walk the path for three years to study every aspect of plant science. It facilitates a study that enhances student's sensibility to nature.

Botanists acquire specialized knowledge about plants. The B.Sc. Botany programme trains students to understand the nature of life. Students get an insight into the presence of a variety of plant species on earth. The subject explores deep into the various plant forms, their morphology, anatomy, growth, life-cycle and their economic importance. Students study the smallest algae or fungi to the largest species of trees. Botany as a subject also deals with the various aspects of agricultural, horticulture, forestry and environment-related issues. Students study about the plant species that are endangered or are extinct now. Students study about the environmental factors that threaten the plant kingdom and are sensitized towards protection of plant species. They play a major role in conservation of the ecosystem.

Botany is the subject that takes the classroom to nature and also brings nature into the classroom. Several field trips are organized to study plants in their natural habitat and these nature trails and field visits bring students to nature. They visit various formal and informal gardens as well as National Parks. Industrial visits are mostly to Cosmetic Industry, Food Companies, Seed and Nursery Companies, Drug Companies, Paper Industry, Other small scale industries and cottage industries. Similarly visits are arranged to Biotechnology Firms, Plant Tissue Culture Labs, Plant Resources Laboratory, and Educational Institutes to see Herbarium collection. Plant product based industrial exposure helps the students to get hands-on experience. They learn by group activities, outdoor exploration and innovative learning methodology. Their leadership quality, event management skill, organization abilities, disaster management abilities are nurtured for their holistic growth. In three years, students receive an in depth subject knowledge; they are job ready and can venture into the field of their choice.

**Eligibility:** Passed 12<sup>th</sup> standard (HSC) of Maharashtra State Board / CBSE / ICSE board or any other equivalent board with Biology as one of the subjects

**Duration:** 3 years

**Mode of Conduct:** Laboratory practical / Offline lectures / Online lectures

### **Program Specific Outcome:**

- To build an interest in botanical science.
- To create awareness of different avenues in botanical sciences
- To explore the morphological, anatomical details as well as economic importance of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms.
- To understand physiological processes and adaptations of plants.
- To provide knowledge about environmental factors and natural resources and their importance in sustainable development.
- To explain how current medicinal practices are often based on indigenous plant knowledge and to get introduced to different perspectives on treating ailments according to ethnomedicinal principles.
- To be able to apply statistical tools to gain insights into significantly different data from different sources.
- Students can recall details of the unique ecological and evolutionary features of the local and Indian flora.

## F.Y.B.Sc. (Botany)

### Structure of Programme

#### Semester – I

Course Code	Course Title		No. of lectures	Credits
<b>BNBUSBO1T1</b>	Botany Paper – I : Plant Diversity I		<b>45</b>	<b>2</b>
<b>BNBUSBO1T2</b>	Botany Paper – II : Forms and Function I		<b>45</b>	<b>2</b>
<b>BNBUSBO1P1</b>	Botany Practical – I	Plant Diversity I Practical	<b>30</b>	<b>2</b>
		Forms and Function I Practical	<b>30</b>	
<b><i>Total</i></b>			<b>150</b>	<b>06</b>

#### Semester - II

Course Code	Course Title		No. of lectures	Credits
<b>BNBUSBO1T1</b>	Botany Paper – I : Plant Diversity II		<b>45</b>	<b>2</b>
<b>BNBUSBO1T2</b>	Botany Paper – II : Forms and Function II		<b>45</b>	<b>2</b>
<b>BNBUSBO1P1</b>	Botany Practical – II	Plant Diversity II Practical	<b>30</b>	<b>2</b>
		Forms and Function II Practical	<b>30</b>	
<b><i>Total</i></b>			<b>150</b>	<b>06</b>

# Semester I

Course Code	Course Title	Credits	No. of lectures
<b>BNBUSBO1T1</b>	<b>Plant Diversity I</b>	<b>2</b>	
<b>Course Outcomes:</b> On completion of the course, student will be able to describe, recognize, evaluate and <ul style="list-style-type: none"> <li>Gain an insight on traditional knowledge of plants used in Vedas: Past and present</li> <li>Understand the systematic position, life cycle and economic importance of algae and fungi.</li> <li>Understand the life cycle of <i>Riccia</i>, economic importance of Bryophytes and use of moss in indoor gardening</li> </ul>			
<b>Unit I :</b>	<b>HISTORY OF SCIENCE</b> 1.1 General history of Science 1.2 History of botanical science - Vedas to Present 1.3 Indian Pioneers in plant sciences – <ol style="list-style-type: none"> <li>Jagdish Chandra Bose - Physiology</li> <li>M. S. Swaminathan - Father of green revolution</li> </ol>	<b>15</b>	
<b>Unit II :</b>	<b>THALLOPHYTA – PIONEERS</b> 2.1 Structure, life cycle and systematic position of <i>Nostoc</i> 2.2 Structure, life cycle and systematic position of <i>Rhizopus</i> 2.3 Economic importance of algae - [ <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Nutraceutical), <i>Gelidium</i> (Agar)] & fungi [Edible mushroom, Yeast, wood rotting fungi ( <i>Ganoderma</i> )]	<b>15</b>	
<b>Unit III :</b>	<b>BRYOPHYTA</b> 3.1 Structure, life cycle and systematic position of <i>Riccia</i> . 3.2 Economic importance of Bryophytes ( <i>Marchantia</i> , Peat moss) 3.3 Moss in indoor gardening- Kokedama (moss ball) for hanging plants, use of moss in Hanging baskets, Moss Sticks for climbers, use of Moss for Bottle garden	<b>15</b>	

Course Code	Course Title	Credits	No. of lectures
<b>BNBUSBO1T2</b>	<b>Forms and Function I</b>	<b>2</b>	
<b>Course Outcomes:</b> On completion of the course, student will be able to describe, recognize, evaluate and <ol style="list-style-type: none"> <li>Understand the general structure of prokaryotic and eukaryotic cells, the plant cell wall, plasma membrane and Chloroplast.</li> <li>Learn about ecosystem, biotic and abiotic components and energy pyramids</li> <li>Comprehend classical Mendelian genetics- monohybrid, dihybrid; test cross; back cross ratio</li> <li>Understand elementary biostatistics and the role of model organism in genetics</li> </ol>			
<b>Unit I :</b>	<b>CELL BIOLOGY</b> 1.1 General structure of Prokaryotic and Eukaryotic cell 1.2 <b>General structure of plant cell :</b> Cell wall, Plasma membrane (bilayer lipid structure, fluid mosaic model) 1.3 <b>Types of Plastids:</b> Chromoplasts (Chloroplast) and types of Leucoplast Ultra structure and functions of the following cell organelle: Chloroplast	<b>15</b>	
<b>Unit II :</b>	<b>ECOLOGY</b> 2.1 Concept of Ecosystem, Biotic and abiotic components and Energy pyramids 2.2 <b>Types of ecosystems:</b> aquatic (Fresh water, Marine, Estuarine ecosystem) and terrestrial (Forest, Grasslands, Desert ecosystem). 2.3 <b>Case study</b> - Lonar Crater, Buldhana District, Maharashtra	<b>15</b>	
<b>Unit III :</b>	<b>GENETICS &amp; BIOSTATISTICS</b> 3.1 Phenotype/Genotype, Mendelian Genetics- monohybrid, dihybrid; test cross; back cross ratios 3.2 <b>Biostatistics:</b> Mean, Median and Mode, Standard deviation 3.3 <b>Plant model organism</b> – <i>Arabidopsis</i>	<b>15</b>	



Course Code BNBUSBO1P1	Course Title Botany Practical - I	Credits 2	No. of lectures
	<b>Plant Diversity I</b>		
<b>Practical 1</b>	<b>History of Science:</b>		<b>10</b>
<b>a.</b>	<b>Indian history of science</b> Some plants mentioned in Vedas (5 plants)		
<b>b.</b>	Contribution by - 1. <b>Jagdish Chandra Bose</b> – Physiology 2. <b>M. S. Swaminathan</b> - Father of green revolution		
<b>Practical 2</b>	<b>Thallophyta – Pioneers</b>		<b>10</b>
<b>a.</b>	Study of stages in the life cycle of <i>Nostoc</i> & <i>Spirogyra</i> from fresh/ preserved material and permanent slides		
<b>b.</b>	<b>Economic importance of algae:</b> <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Nutraceutical), <i>Gelidium</i> (Agar)		
<b>c.</b>	Study of stages in the life cycle of <i>Rhizopus</i> & <i>Aspergillus</i> from fresh/ preserved material and permanent slides.		
<b>d.</b>	<b>Economic importance of Fungi:</b> Mushroom, Yeast, wood rotting fungi ( <i>Ganoderma</i> ).		<b>10</b>
<b>Practical 3</b>	<b>Bryophyta</b>		
<b>a.</b>	Study of stages in the life cycle of <i>Riccia</i> from fresh/ preserved material.		
<b>b.</b>	<b>Economic importance of Bryophytes:</b> Medicinal ( <i>Marchantia</i> sp., etc), Peat moss		
	<b>Forms and Function I</b>		
<b>Practical 4</b>	<b>Cell Biology:</b>		<b>10</b>
<b>a.</b>	Identification of Prokaryotic and Eukaryotic cell with the help of photomicrograph		
<b>b.</b>	Identification of plant cell - Cell wall, Plasma membrane (bilayer lipid structure, fluid mosaic model) with the help of photomicrograph		
<b>c.</b>	Identification of cell organelles with the help of photomicrograph: Plastids: Chromoplasts (Chloroplast) and types of Leucoplast		
<b>d.</b>	Examining various stages of mitosis in root tip cells ( <i>Allium cepa</i> )		<b>10</b>
<b>Practical 5</b>	<b>Ecology:</b>		
<b>a.</b>	Starch grains of Potato and rice		
<b>b.</b>	Identification of plants adapted to different environmental conditions: <b>Hydrophytes:</b> Floating: Free floating ( <i>Pistia/Eichhornia</i> ); Rooted floating ( <i>Nymphaea</i> ); Submerged ( <i>Hydrilla</i> )		

<b>c.</b>	<b>Mesophytes</b> (Sunflower); <b>Hygrophytes</b> ( <i>Typha</i> )	
<b>d.</b>	<b>Xerophytes:</b> Succulent ( <i>Opuntia</i> ); Woody Xerophyte ( <i>Nerium</i> ); <b>Halophyte</b> ( <i>Avicennia</i> ) No sections in ecology, only identification, description and morphological adaptation of specimens.	
<b>Practical 6</b>	<b>Genetics &amp; Biostatistics:</b>	<b>10</b>
<b>a.</b>	Calculation of mean, median and mode	
<b>b.</b>	Calculation of standard deviation.	
<b>c.</b>	<b>Study of Karyotypes:</b> 1. <i>Aloe vera</i> 2. <i>Allium cepa</i>	

# **Semester II**

Course Code BNBUSBO2T1	Course Title Plant Diversity II	Credits 2	No. of lectures
<b>Course Outcome:</b> On completion of the course, student will be able to describe, recognize, evaluate and practice key elements in <ul style="list-style-type: none"> <li>Understanding the life cycle, systematic position of <i>Nephrolepis</i> and <i>Equisetum</i></li> <li>Understanding the life cycle, systematic position of <i>Cycas</i> and economic importance of <i>Pinus</i></li> <li>Understanding the morphology and modifications of leaf; Families - Malvaceae, Apocynaceae and Amaryllidaceae</li> <li>The concept of landscape gardening with respect to ornamental Pteridophytes and Gymnosperms</li> <li>The plants that attracts butterflies and thus suitable for a butterfly garden</li> </ul>			
<b>Unit I :</b>	<b>PTERIDOPHYTES</b> 1.1 Structure life cycle, systematic position and alternation of generations in <i>Nephrolepis</i> 1.2 Before and after Jurassic period pteridophyte - Living fossil horsetails ( <i>Equisetum</i> ) 1.3 <b>Ornamental Gardening:</b> Ornamental Pteridophytes [ <i>Adiantum</i> (Maidenhair fern), <i>Platycerium</i> (Staghorn fern), <i>Asplenium</i> (Bird's nest fern)]	<b>15</b>	
<b>Unit II :</b>	<b>GYMNOSPERMS</b> 2.1 Structure life cycle systematic position and alternation of generations in <i>Cycas</i> 2.2 Economic importance of Gymnosperms - <i>Pinus</i> wood, turpentine oil and seeds 2.3 <b>Ornamental Gardening:</b> Ornamental Gymnosperms [ <i>Araucaria</i> (Christmas tree), <i>Zamia</i> (Cardboard palm), <i>Thuja</i> (Morpankhi)]	<b>15</b>	
<b>Unit III :</b>	<b>ANGIOSPERMS</b> 2.1 <b>Leaf:</b> simple leaf, pinnately compound leaf, palmately compound leaf, reticulate venation, parallel venation, opposite and alternate phyllotaxy, free lateral and adnate stipule, entire and serrate margin, ovate and lanceolate leaf. <b>Modifications of leaf:</b> spine, thorns and prickles 2.2 <b>Study of following families:</b> Malvaceae, Apocynaceae, Amaryllidaceae 2.3 <b>Important plants in butterfly garden :</b> [ <i>Lantana</i> (Ghaneri), <i>Hamelia</i> (Firebush), <i>Stachytarpheta</i> (Jamaican spike), <i>Calotropis</i> (Rui)]	<b>15</b>	

Course Code	Course Title	Credits	No. of lectures
BNBUSBO2T2	Forms and Function II	2	
<b>Course Outcomes:</b> On completion of the course, student will be able to describe, recognize, evaluate and <ol style="list-style-type: none"> <li>1. Learn about simple, complex and sensory plant tissues</li> <li>2. Understand pigment system and photosynthesis i.e. the light reactions and dark reactions</li> <li>3. Get familiar with the concept of primary and secondary metabolites.</li> <li>4. Get Traditional knowledge of medicines from Grandma's pouch and Ayurveda</li> </ol>			
<b>Unit I :</b>	<b>ANATOMY</b> 1.1 Simple tissues, complex tissues. Primary structure of dicot and monocot root, stem and leaf. 1.2 <b>Epidermal tissue system:</b> Unicellular, multicellular, stellate, peltate, T shaped leaf hair, monocot and dicot stomata. 1.3 <b>Sensory tissue</b> - with respect to insectivorous plants [ <i>Drosera</i> (Dew drop), <i>Dionaea</i> (Venus fly-trap), <i>Utricularia</i> (Bladderwort)] and <i>Mimosa</i> (Touch me not)	<b>15</b>	
<b>Unit II :</b>	<b>PHYSIOLOGY</b> <b>Photosynthesis:</b> 2.1 <b>Light reactions</b> - photophosphorylation (cyclic and non cyclic), 2.2 <b>Dark reactions</b> - carbon fixation phase (C3, C4 and CAM pathways) 2.3 <b>Floral pigments:</b> Anthocyanin, Carotenoids	<b>15</b>	
<b>Unit III :</b>	<b>MEDICINAL BOTANY</b> 3.1 Concept of primary and secondary metabolites. 3.2 <b>Grandma's pouch:</b> Following plants have to be studied with respect to botanical source, part of the plant used, active constituents present and medicinal uses: Tulsi, Adulsa, Sunth, Haldi, Chandan, Lavang. 3.3 <b>Ayurveda:</b> Formulations in Ayurvedas (Swarna Bhasma, Triphala Churna, Chyawanprash (Avaleh), Bhrungadi-Vati)	<b>15</b>	

Course Code BNBUSBO2P1	Course Title Botany Practical - II	Credits 2	No. of lectures
	<b>Plant Diversity I</b>		
<b>Practical 1</b>	<b>Pteridophytes:</b>		<b>10</b>
a.	Study of stages in the life cycle of <i>Nephrolepis</i> : Mounting of ramentum, hydathode		
b.	T.S. of pinna of <i>Nephrolepis</i> passing through sorus.		
c.	Identification of living fossil pteridophyte – Horsetails ( <i>Equisetum</i> )		
D	<b>Ornamental Gardening:</b> Identification of Ornamental Pteridophytes [ <i>Adiantum</i> (Maidenhair fern), <i>Platycerium</i> (Staghorn fern), <i>Asplenium</i> (Bird's nest fern)]		
<b>Practical 2</b>	<b>Gymnosperms:</b>		<b>10</b>
a.	<i>Cycas</i> : T.S of leaflet ( <i>Cycas</i> pinna)		
b.	Identification of coralloid root, megasporophyll & microsporophyll. Slide preparation of microspores of <i>Cycas</i>		
c.	Identification of photomicrographs of <i>Pinus</i> wood and seed. Identification of turpentine oil.		
d.	Identification of Ornamental Gymnosperm [ <i>Araucaria</i> (Christmas tree), <i>Zamia</i> (Cardboard palm), <i>Thuja</i> (Morpankhi)]		
<b>Practical 3</b>	<b>Angiosperms:</b>		<b>10</b>
a.	Leaf morphology : as per theory		
b.	Malvaceae		
c.	Apocynaceae		
d.	Amaryllidaceae		
e.	Identification of plants used in butterfly garden [ <i>Lantana</i> (Ghaneri), <i>Hamelia</i> (Firebush), <i>Stachytarpheta</i> (Jamaican spike), <i>Calotropis</i> (Rui)]		
	<b>Forms and Function I</b>		
<b>Practical 4</b>	<b>Anatomy :</b>		<b>10</b>
a.	Primary structure of dicot and monocot root.		
b.	Primary structure of dicot and monocot stem.		
c.	Study of dicot and monocot stomata.		
d.	Epidermal outgrowths: with the help of mountings: As in theory		
e.	Study of sensory tissue in <i>Drosera</i> (Dew drop), <i>Dionaea</i> (Venus fly-trap), <i>Utricularia</i> (Bladderwort)] and <i>Mimosa</i> (Touch me not)		
<b>Practical 5</b>	<b>Physiology :</b>		<b>10</b>
a.	Separation of chlorophyll pigments by strip paper chromatography.		
b.	Study of absorption maxima of chlorophyll and carotenoid pigment by		

	colorimetric method	
c.	Change in colour because of change in pH: Anthocyanin: black grapes/Purple cabbage	
<b>Practical 6</b>	<b>Medicinal Botany:</b>	<b>10</b>
a.	Test for tannins: tea powder/catechu. Test for flavonoid: Shinoda test Test for alkaloids: Dragendorff Test	
b.	Identification of plants or plant parts for grandma's pouch as in theory.	
c.	Preparation of Ayurvedic formulation – Triphala churna	

## References

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	College Botany Volume I and II	Gangulee, Das and Dutta	Central Education enterprises 2		1989
2.	A Text Book of Botany – Algae	Sharma O. P.	S. Chand & Co. (P) Ltd, New Delhi.		1992
3.	Botany for Degree students	Dutta, A.C.	India: Oxford University Press	2 <sup>nd</sup>	1988
4.	Introduction to Mycology	Mehrotra R. S. and Aneja K.R	New Age International (P) Limited, Publishers	1 <sup>st</sup>	1990
5.	Introduction to Mycology	Alexopoulos C. Y.	Wiley India Pvt. Ltd.	1 <sup>st</sup>	1989
6.	Algae, Bryophyta, Pteridophyta and Gymnosperms.	Annie Regland,			2010
7.	The Ayurvedic Pharmacopoeia of India. Part 1 Vol IX	Government of India, Ministry of AYUSH,	Pharmacopoeia Commission For Indian Medicine & Homoeopathy Ghaziabad		2016
8.	Ayurvedic pharmacology and Therapeutic uses of medicinal plants	Gogte, V. M.	India: Bharatiya Vidya Bhavan		2000
9.	Fundamentals of Biostatistics	Rastogi, V.B	Ane Book India	2 <sup>nd</sup>	2009
10.	Cell biology	Rastogi, S.C.	TATA McGraw Hill publishing Co, New Delhi		2005
11.	Fundamentals of Ecology	E P Odum and G W Barrett	United States: Saunders		1967
12.	Cell and Molecular Biology : Concept and Experiments Vol. 2	Karp, G.	John Wiley and Sons, Inc., USA.		1999

13.	Genetics	Singh B.D	Kalyani Publication, Ludhiana		2004
14.	Molecular Biology of the Cell	Albert B. Bray, D Lewis, J Raff, M. Robert, K. and Walter	Garland Publishing Inc, New York.	2 <sup>nd</sup>	1989
15.	Genetics	Russel	Wesley Longman inc publishers	5 <sup>th</sup>	2000
16.	Practical Volume 1 and 2	Bendre and Kumar	Rastogi Publication, Meerut	1 <sup>st</sup>	2008
17.	Botany for Degree Students: Gymnosperms	Sinha, A. K., Kumar, A. and Vashishta, P.C	S. Chand & Company Pvt.	3 <sup>rd</sup>	2006
18.	Cryptogamic Botany Volume I and II	G M Smith	Tata McGraw Hill		
19.	Pteridophyta, Gymnosperm and Paleobotany	Singh, Panday and Jain,	Rastogi publication, Meerut	1 <sup>st</sup>	2017
20.	College Botany Volume I and II	Gangulee, Das and Dutta	Central Education enterprises 2		1989
21.	Botany for Degree students	Dutta, A. C.	India: Oxford University Press	2 <sup>nd</sup>	1988
22.	A Text Book of Bryophyta, Pteridophyta and Gymnosperms.	Sambamurty, A. V. S . S.	I.K. International Publishing House Pvt. Limited.	1 <sup>st</sup>	2006
23.	Anatomy	Prasad, R. N.			2002
24.	A Text Book of Plant Physiology	Verma, V.	Ane Books India	4 <sup>th</sup>	2007
25.	Plant Physiology	Zeiger, E., Taiz, L.	United Kingdom: Sinauer Associates.		2010
26.	Medicinal Plants: Ethnobotanical approach	Trivedi P.C.	Agrobios India		2006
27.	Medicinal Plants Volume 2	Manisha Tiwari, Vibha Tondon	Isha Book, Delhi		2004
28.	Practical Volume 1 and 2	Bendre and Kumar	Rastogi Publication, Meerut	1 <sup>st</sup>	2008



## Evaluation Scheme

### Internal Assessment:

**The internal assessment of 40 Marks for each course will be as follows:**

Continuous Internal Assessment (I. A.) will be conducted by Department of Botany independently (30 M for curriculum and Extra-curriculum & 10 M for Active Participation & Leadership qualities)

Curriculum and Extra-curriculum	Active Participation & Leadership qualities	Total
30	10	40

### Internal Assessment may include:

Curriculum and Extra-curriculum (30M)
<b>Research</b> – Presentation/ Paper review/ Book review/ Project/ Publication of Research Paper <b>OR</b> <b>Writing skills</b> - Essay writing/ Report on - Campus visit/ Industry Visit/ Field Trip/ Visit to a garden/ Report on Conference – Workshop – Seminar – Webinar attended/ Intercollegiate competition participation/ Science movies review/ Assignment/ Case studies on topics assigned <b>OR</b> <b>Skill development</b> – Flip the class/ Open Viva/ Debate/Group Discussion/ Quiz/ e-herbarium/ Photogallery- Nature Photography, Flora & Fauna/ Botanical illustrations/ Model making/ Survey of topic assigned <b>OR</b> <b>Green Campus efforts</b> - Raising and maintaining plant/ maintenance of departmental garden <b>OR</b> <b>Active participation in Departmental Club (Botany Club/ Movie &amp; Journal Club)</b> <b>OR</b> <b>Class test</b> <b>OR</b> <b>Certification from Swayam / NPTEL (Courses in Biosciences)</b> <b>OR</b> <b>Introduction to Basic MS-Excel</b>
*Note – If candidate failed to submit assigned work in time due to genuine reason, then it can be compensated by assigning new task for benefit of the candidate.

**Theory Examination: Suggested Format of Question paper****Duration : 2 Hours****Total Marks : 60**

- All questions are compulsory

<b>Q. 1</b>	Answer <i>any two</i> of the following		<b>16</b>
	a	Based on Unit I	
	b	Based on Unit I	
	c	Based on Unit I	
	d	Based on Unit I	
<b>Q. 2</b>	Answer <i>any two</i> of the following		<b>16</b>
	a	Based on Unit II	
	b	Based on Unit II	
	c	Based on Unit II	
	d	Based on Unit II	
<b>Q. 3</b>	Answer <i>any two</i> of the following		<b>16</b>
	a	Based on Unit III	
	b	Based on Unit III	
	c	Based on Unit III	
	d	Based on Unit III	
<b>Q. 4</b>	Choose and write the correct option for the following questions (Attempt all MCQs)		<b>12</b>
	a - d	Based on Unit I	
	e - h	Based on Unit II	
	i - l	Based on Unit III	

\*\* ( 4 questions of 8 marks each / 8 questions of 4 marks can be asked)

**Skeleton Paper for Practical Examination in Botany**  
**F. Y. BSc.**  
**Semester I Paper I (Skeleton Paper)**

**Time: 2 hrs**

**Total Marks: 50**

<b>Q. 1</b>	Identify, classify and describe specimen A, B and C. Draw labelled sketches to support your observations.	<b>25</b>
<b>Q. 2</b>	Identify and describe specimen/slide D, E & F	<b>15</b>
<b>Q. 3</b>	Journal	<b>5</b>
<b>Q. 4</b>	Viva	<b>5</b>

**A: *Spirogyra/Nostoc* - Vegetative/Reproductive**

**B: *Rhizopus/Aspergillus* – Asexual**

**C: *Riccia* – Vegetative/ Reproductive**

**D, E and F: Indian History of science/Contribution by Indian Scientist/ economic importance of algae/ fungi /Bryophytes**

**F. Y. BSc.**

**Semester I Paper II (Skeleton Paper)**

**Total Marks: 50**

**Time: 2 hrs15 min**

Q.1 Perform the Biometry experiment ‘A’ allotted to you. Record your observations and results.  
 (10)

Q.2 Prepare a squash of the given root tip ‘B’ to show various stages of Mitosis. Draw neat labelled diagrams.  
 (10)

Q.3 Prepare a karyotype of given chromosomes ‘C’ and Identify and describe it. (10)

Q. 4 (a)Identify and describe the specimens D, E and F (06)

(b) Mount & comment on the cell inclusions in specimen G. Draw a neat labelled sketch.  
 (04)

Q.4 Field report (05)

Q.5 Viva (05)

**A: Mean/Median/Mode/ Std. deviation**

**B: Onion root tip**

**C : Karyotype of *Allium cepa*/ *Aloe vera***

**D to F Photomicrograph of Prokaryotic /Eukaryotic Cell/ Cell organelles/ Hydrophyte/ Xerophyte/ Mesophyte/ Halophyte/ Hygrophytes**

**G: Starch grains**

## **Skeleton Paper for Practical Examination in Botany**

**F. Y. BSc.**

### **Semester II Paper I (Skeleton Paper)**

**Total Marks: 50**

**Time: 2 hrs15 min**

Q.1 Identify, classify and describe specimen A and B. Draw labelled sketches to support your observations. (18)

Q.2 Classify specimen C up to its family giving reasons. Give the floral formula. Draw L.S of flower and T.S of ovary. (10)

specimen D, E, F & G (12)

Q.4 Field Report (05)

Q.5 Viva (05)

**A: *Nephrolepis* : Ramenta/Hydathode/Sporangia**

**B: *Cycas*: Pinna/Microsporangia**

**C Any one family of Angiosperms**

**D to G: Morphology of Angiosperms/Fossil Pteridophyte/Ornamental pteridophytes & Gymnosperm/ economic importance of gymnosperms/plants used in butterfly garden**

**F. Y. BSc**

### **Semester II Paper II (Skeleton Paper)**

**Total Marks: 50**

**Time: 2 hrs15 min**

Q.1 a) Perform the physiology experiment 'A' allotted to you. Write the Requirements and Principle and record your observations and results. (10)

Q.1 b) Perform qualitative test (05)

Q.2 Make a temporary stained preparation of T.S of specimen B. Draw a neat labelled sketch. (12)

Q.3 Mount the epidermal outgrowth/ stomata from specimen C. Draw a neat labelled sketch. (05)

Q.4. Identify the given specimens D and E and comment on its uses. (08)

Q.5 Journal (05)

**A: Any one physiology experiment/ Test for tannins, flavonoids & alkaloids/ Preparation of Ayurvedic formulation**

**B: Dicot / Monocot Stem/ root**

**C: Stomata/ epidermal outgrowths**

**D & E: Grandma's Pouch/Sensory tissues**

### Marks Distribution and Passing Criterion for Each Semester

Theory					Practical		
Course Code	Internal	Min marks for passing	Theory Examination	Min marks for passing	Course Code	Practical Examination	Min marks for passing
BNBUSBO1T1	<b>40</b>	<b>16</b>	<b>60</b>	24	BNBUSBO1P1	<b>100</b>	<b>40</b>
BNBUSBO1T2	<b>40</b>	<b>16</b>	<b>60</b>	24			

Theory					Practical		
Course Code	Internal	Min marks for passing	Theory Examination	Min marks for passing	Course Code	Practical Examination	Min marks for passing
BNBUSBO2T1	<b>40</b>	<b>16</b>	<b>60</b>	24	BNBUSBO2P1	<b>100</b>	<b>40</b>
BNBUSBO2T2	<b>40</b>	<b>16</b>	<b>60</b>	24			

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