POORNAPRAJNA COLLEGE (AUTONOMOUS), UDUPI

NAAC Re-Accredited "A+" (3.27 CGPA)

(Promoted and Managed by Udupi Shree Adamaru Matha Education Council, Bengaluru)

SYLLABUS FOR

B.Sc. UNDER GRADUATE (UG)PROGRAMME OF BOTANY CURRICULUM FRAMEWORK

Course pattern and scheme of examination for UG Courses

FRAMED ACCORDING TO THE STATE EDUCATION POLICY (SEP 2024)

BOTANY
I & II SEMESTERS

TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2025-26

Board of Studies in Botany
Poornaprajna college (Autonomous),
Udupi – 576101

Botany

Programme Outcome:

- **Students will be proficient to comprehend classification, morphology, anatomy, and physiology of various groups of plants.**

- **Students will be able to understand the contribution of botany for human welfare with potential uses of plants along with their conservation and sustainable development.**

- **Students will be enriched by various skills related to Gardening and Floriculture, preparation of biofertilizers, mushroom cultivation and ethnobotanical knowledge.**

- **Students will be able to understand and relate physical features of the environment to the structure of population, community, ecosystem, and sustainable conservation strategies.**

COURSES AND CREDITS: B.Sc. with Botany as an Optional Subject

	Semester-wise Course Topics	Teaching hrs/ week	Exam duration (hrs)	Marks			No. of Credits
				I.A	Exam	Total	
SEMESTER – I							
Group I	BSBOCS 101: Diversity of Microbes, Algae and Fungi**(T)**	4	3	20	80	100	03
	BSBOPS 101: Diversity of Microbes, Algae and Fungi **(P)**	4	3	10	40	50	02
SEMESTER – II							
Group I	BSBOCS 201: Diversity of non-flowering plants and Plant anatomy **(T)**	4	3	20	80	100	03
	BSBOPS 201: Diversity of non-flowering plants and Plant anatomy **(P)**	4	3	10	40	50	02
	T= Theory, P=Practical				**Total Credits**		**10**

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BOTANY SYLLABUS FOR UG PROGRAMS
w. e. f. 2025-26

DISCIPLINE CORE PAPERS (DSC)

Sl. No.	Semester Details	Subject
1	Semester I	Diversity of Microbes, Algae and Fungi
2	Semester II	Diversity of non-flowering plants and Plant Anatomy

BSBOCS101 SEMESTER – I

Diversity of Microbes, Algae and Fungi – Theory

- To explore and identify microbes, lower plants and to gain adequate knowledge on comparative account of these organisms
- To impart knowledge about the occurrence, distribution, structure and life history of microbes, lower plants such as algae, fungi and lichens,
- To acquaint students with a wide spectrum of plant diseases, cause, symptoms, and control measures

Course Outcome: **After completion of the course, the students will be able to;**

- Understand the diversity of microbes in nature.
- Know the diversity of algae, fungi, lichens and their uses.
- Identify and classify algae and fungi.
- Develop practical skills in staining techniques and slide preparation.
- Identify plant disease symptoms and management techniques.

Unit	Topics	Teaching Hours

I	**Introduction to Botany:** Branches and scope, Major historical developments in Botany including contributions of Indian Botanists (Sir J. C. Bose, P. Maheshwari, B.G.L. Swamy, E.K. Janaki Ammal and M. S. Swaminathan) Career opportunities in Botany. Five kingdom and Three domain systems of classification of organisms with examples **Viruses:**Classification based on hosts and nature of genetic material. Ultra structure and multiplication of TMV and T4 Phage. A brief account of Viroid's and Prions. **Bacteria:** Types based on cellular morphology, flagellation and modeof nutrition. Ultra structure of a Bacterial cell. Reproduction: binary fission and endospore formation. Genetic recombination in bacteria - conjugation, transformation and transduction. (generalized type), Economic importance of Bacteria.	12
II	**Algae -1:** Occurrence, thallus organization and general methods of reproduction with examples. Pigmentation in algae, Fritsch'sclassification of algae up to the level of classes with examples. **Myxophyceae/Cyanophyceae:** Ultra structure of cyanobacterial cell and heterocyst. Structure and reproduction of *Nostoc.* **Chlorophyceae:** Thallus structure and reproduction of *Oedogonium* **Bacillariophyceae:** Types of diatoms with examples- Pennales and Centrales. Thallus structure and reproduction of a Pennate diatom (*Pinnularia)*	12

III	**Algae-2:** **Phaeophyceae:** Thallus structure and reproduction of *Sargassum* **Rhodophyceae:** Thallus structure and reproduction of *Polysiphonia.* **Economic importance of algae**: Useful aspects- food, SCP, industrial products, medicine, sewage treatment, bio-fertilizers, pollution indicators and energy source. Harmful aspects- algal blooms, algal toxins, and parasitic algae. **Fungi**: Salient features, occurrence, mycelial organization- prosenchyma, pseudo parenchyma, rhizomorph and sclerotium. Alexopoulos system of classification up to the level of classes with examples. Thallus structure and reproduction of *Rhizopus* (Zygomycetes), *Penicillium*(Ascomycetes) and *Agaricus (*Basidiomycetes). **Economic importance of Fungi**: food value, industrial products, medicinal products, biocontrol agents and Fungal toxins.	12
VI	***Plant Pathology:*** *Introduction, ca*uses and disease management of Sandle spike disease phytoplasma, Katte diseaseof Cardamom(virus), Bacterial blight of paddy (bacteria) and Stem bleeding disease ofcoconut (fungi). **Mycorrhizae:** definition, types – ecto, endo (VAM) and ectendomycorrhizae, Ecological and economic significance of mycorrhizae. **Lichens:** Classification- asco and basidiolichens. Morphological types with examples- crustose, foliose and fruticose. Internal structure of thallus – homeomerous and heteromerous types. Structure of fruiting bodies - soredium, isidium, apothecium and perithecium, Economic importance of lichens.	12
	Total	48 hrs

REFERENCE BOOKS:

1. SURESH NARAYAN AND PULLAIAH, 2010, **EMINENT INDIAN BOTANISTS** – PAST AND PRESENT, REGENCY PUBLICATIONS, NEW DELHI.
2. DUBEY, R. C., AND MAHESHWARI, D. K., 2009, **A TEXT BOOK OF MICROBIOLOGY**, S CHAND PUBLISHERS.
3. SINGH, PANDE AND JAIN, 2015, **A TEXT BOOK OF BOTANY**, RASOGIPUBLICATIONS
4. DEY S. N. AND P. S. TRIVEDI. 1977. **A TEXT BOOK OF BOTANY** VOL IVIKAS.
5. GANGULEE, DAS AND DATTA 2002, **COLLEGE BOTANY VOL II** NCBA (P)LTD
6. SUNDARA RAJAN S.,2009, COLLEGE BOTANY VOLUME 1, HIMALAYAPUBLICATIONS
7. KUMAR H. D. AND H.N. SINGH. 1996. **A TEXT BOOK OF ALGAE**, EAST WESTPRESS.NEW DELHI.
8. PELCZAR M. J., E.C.S CHAN AND N. R. KRIEG. 2008. **MICROBIOLOGY** 5TH EDITION. MC GRAWHILL.
9. PUROHIT S. S 1989, **VIRUSES, BACTERIA AND MYCOPLASMAS**, AGROBOTANICALPUBL.
10. SMITH G. M. 1955. **CRYPTOGAMIC BOTANY VOL I.** ALGAE AND FUNGI. MCGRAW HILL BOOK CO. INC. 2NDEDITION.
11. SMITH K. M 1990. **PLANT VIRUSES** 6TH EDITION UNIVERSAL BOOK STALL NEWDELHI.
12. VASHISTHA B.R., SINHA A. K. AND SINGH V.P. 2004**. BOTANY FOR DEGREE STUDENTS**

BSBOPS101 SEMESTER – I

Diversity of Microbes, Algae and Fungi –Practical

Practical No.	Title of practical exercise/experiment
1	Microscopy technique: Study of compound and Dissection microscopes – parts, working principle, handling and preparation of temporary mountings
2	Microscopic observation of Bacterial cells by simple staining (Positive-Crystal violet, Negative- Nigrosine or Indian Ink) Differential staining of Bacteria - Gram's staining.
3	Study of thallus structure of *Nostoc, Oscillatoria* and *Scytonema*
4	Study of thallus structure of *Volvox, Oedogonium* and *Cladophora*
5	Study of thallus and reproductive structures of *Chara* and structures of *pennate Diatoms*
6	Study of thallus and reproductive structures of *Sargassum* and *Polysiphonia*
7	Study of vegetative and reproductive structures of Penicillium, *Rhizopus* and *Puccinia*
8	Study of symptoms, causative organism and control measures of banana bunchy top disease, citrus canker and Root Knot of brinjal, with the help of specimens/photograph.
9	Study of symptoms, causative organism and control measures of Koleroga of areca nut, Blast disease of rice and Rust of coffee
10	Study of Lichens- morphological types, internal structure and reproductive structures
11	Study of local diversity of algae/fungi and preparation of an inventory with photographs/microphotographs (any five not mentioned in practical syllabus)
12	Listing and Study of common fungal/bacterial/viral diseases of local crop plants/plantation crops (any five not mentioned in practical syllabus)

Mangalore University
B.Sc. I Semester -Practical Examination
Diversity of Microbes, Algae and Fungi
Question paper and Scheme of evaluation
BSBOPS101

Time: 3hrs. Batch…….. Date…… Time: ……..am/pm Max. Marks: 40

1. Prepare a stained slide of specimen **A**. Sketch, label and identify with reasons. Leave the preparation for inspection 06
2. Identify **B** & **C** giving reasons 3+3 =06
3. Identify **D** & **E** with reasons and labeled sketches 3+3 =06
4. Prepare a stained slide of the given bacterial sample **F**. Show the preparation to the examiner and write the procedure 03
5. Sketch, label and identify the slides **G, H** & **I** with reasons 3+3+3 = 09
6. Record Submission and Field Notes 7+3 = 10

1	A		Prep. Sk Id Cl Reasons 2 1½ ½ ½ 1½ = 6	Reg. No. of Candidates Assigned
2	B		Id. Reasons 1 2 = 3 each	
	C			Reg. No. of Absentees:
3	D		Id Sk. Reasons. ½ 1 1½ = 3 each	
	E			Total examined:
4	F		Prep - 1 Procedure – 2	Name and Signature of Examiners:
5	G		SkId 1 ½ Reasons ~~B~~ 1½ = 3each	1. Internal
	H			
	I			
6		Record with Field report	10 (7+3)	2. External

Instruction to Examiners:
A - Any algal specimen
B and **C**- One algal and one fungal specimen
D and **E**- Any Pathological specimen/Morphological types of lichens
F - Bacterial culture/curd sample/root nodule suspension
G, H and **I**- Slides (Lichen/Algae/Fungi (one each)

BSBOCS201 SEMESTER – II

Diversity of non-flowering plants and Plant anatomy

Course objectives:

- To study the structure and function of various tissues and their location in the plant body
- To provide relevant information about Pteridophytes and Gymnosperms along with their evolutionary history, their phylogenetic relationships and fossil wealth of the world and economic importance of selected forms.
- To ascertain the importance of fossilization to relate life forms of earlier era

Course Outcome:

On completion of this course, the students will develop the following skills:

- To identify and classify non-flowering plants.
- Will gain basic knowledge of GTS and plant fossils.
- Observation of variations that exist in the internal structure of various parts of a plant and among different plant groups in support of the evolutionary concept.
- Skill development for the proper description of internal structure using botanical terms, their identification and further classification.
- Induction of the enthusiasm towards the internal structure of locally available plants.

Unit	Topics	Teaching Hours
I	**Plant Histology and Anatomy:** Introduction to tissues, general classification of tissues. Meristematic tissues: definition, classification based on origin, function, and position. Theory of shoot organization – tunica corpus theory, Theory of root organization - histogen theory. Permanent Tissues: simple permanent tissues - structure, types and functions of parenchyma, sclerenchyma, and collenchyma. Complex permanent tissues - structure, composition and functions of xylem and phloem. Secretory tissues: Glandular trichomes, nectars, glands, laticifers and resin ducts. Primary anatomy of dicot and monocot root, stem, and leaf. Normal secondary growth in dicot stem.	12
II	**Bryophytes:** Occurrence, General characteristics, Rothmaler's classification up to the level of classes with examples. Thallus morphology, anatomy, and reproduction of *Riccia, Anthoceros* and *Funaria.* Evolution of sporophytes and gametophytes in bryophytes – theories of progressive sterilization and simplification. Importance of bryophytes.	12

III	**Pteridophytes:** Occurrence, General characteristics, G. M. Smith's classification up to the levelof classes with examples. Morphology, anatomy and reproduction in *Psilotum*, *Equisetum* and *Pteris* Stelar variations in pteridophytes, Heterospory and seed habit. Economic importance of pteridophytes.	12
IV	**Gymnosperms:** Occurrence, Salient features, Sporne's system of classification up to the level of classes with examples. Morphology, anatomy, and reproduction in *Cycas* and *Gnetum.* Economic importance of Gymnosperms. **Palaeobotany:** Introduction, significance of fossils, Geological time scale and Evolution of plant groups, Types of plant fossils – compressions, impressions, incrustations, petrification with examples. Fossil dating- direct and indirect. Fossil Pteridophytes- *Rhynia* – Morphology of sporophyte. Fossil Gymnosperms- *Cycadeoidea*- Morphology.	12
	Total	48 hrs

REFERENCE BOOKS

1. B.P. Pandey, 2000: Simplified course in Botany. S. Chand Publications
2. Sundara Rajan, S, 2011. College Botany Vol. 3. Himalaya Publishing House.
3. Kumaresan and A. Reginald, 2013. Pteridophytes, Gymnosperms and Paleobotany, Saras Publications.
4. P. C. Vashishta, 2013. Text Book of Gymnosperms. S. Chand Publishers
5. Johri B. M. 2015. Embryology of Angiosperms. Springer Publications.
6. Sambamurthy, AVSS., 2005. Text Book of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany. JK International Publishers.

BSBOPS201 SEMESTER – II

Diversity of Non-Flowering Plants and Plant Anatomy – Practical

Practical No.	Title of exercise /experiments
1	Study of structure and reproduction of *Riccia, Anthoceros* and any moss
2	Study the morphology, anatomy, and reproductive structure of *Selaginella* and *Equisetum*
3	Study the morphology, anatomy, and reproductive structure of *Pteris* and *Marselia*
4	Study the morphology, anatomy, and reproductive structure of *Cycas*
5	Study the morphology, anatomy, and reproductive structure of *Pinus*
6	Study the morphology, anatomy, and reproductive structure of *Gnetum* Study of plant fossils, and examples of Pteridophyte and Gymnosperm fossils included in the syllabus, with the help of slides / photographs.
7	Study of simple and complex permanent tissues
8	Study of dicot and monocot stem (T. S)
9	Study of dicot and monocot root (T. S)
10	Study of Normal secondary growth in dicot stem (T. S)
11	Study of dicot and monocot leaf (T. S)
12	Study of local diversity of Bryophytes / Pteridophytes/Gymnosperms and preparation of an inventory with photographs to be recorded in Record book.

Mangalore University
B.Sc. II Semester - Practical Examination
Diversity of Non-Flowering Plants and Plant Anatomy
Question paper and Scheme of evaluation BSBOPS201

Time: 3 hrs. Batch…….. Date…… Time… am/pm Max.Marks:40

Prepare a temporary stained section of the material **A**. sketch, label and identifywith reasons. Leave the preparation for inspection 06
Identify **B** and **C** ~~giving~~ with reasons 3+3=06
Write critical notes on **D** and **E** with labelled sketches 3+3=06
Identify, sketch and label the slides **F, G, H** &**I** with reason 3+3+3+3=12
Record with field report 7+3= 10

1	A		Prep. Sk Id Reasons 2 1½ ½ 2 = 6	Reg. No. of Candidates Assigned
2	B		Id Rea 1 2 = 3 each	
	C			
3	D		Id Sk Crt.Nts. ½ 1 1½ = 3 each	Reg. No. of Absentees:
	E			Total examined:
4	F		Sk Id Reasons 1 ½ 1 ½= 3each	Name and Signature of Examiners:
	G			1. Internal
	H			
	I			
5		Record with Field report	10	2. External

Instruction to Examiners:

A from dicot or monocot stem/root

B and **C** one specimen each from Bryophyta and Gymnosperms

D and **E** from Pteridophyta

F, G, H and **I** - one slide each from Histology, Bryophyta, Pteridophyta and Gymnosperms

SEMESTER – I
Diversity of Microbes, Algae and Fungi – Theory
and
SEMESTER – II
Diversity of non-flowering plants and Plant anatomy

Question paper pattern

Time:3 Hours **Max.marks:80**

Instructions: 1) Answer Part-A and Part-B
2) Answer any four full questions from Part-B choosing one full question from each unit
3) All questions from Part-B carry equal marks
4) Draw diagrams wherever necessary

Part-A
Answer any Ten of the following
10X2=20M
(1---------12)

PART-B
UNIT-1
13a) 3M
b) 5 M
c) 7M
Or
14a)4M
b) 4M
c) 7M

UNIT-2
15a) 3M
b) 5 M
c) 7M
Or
16a)4M
b) 4M
c) 7M

UNIT-3
17a) 3M
b) 5 M
c) 7M
Or
18a)4M
b) 4M
c) 7M

UNIT - 4
19a) 3M
b) 5 M
c) 7M
Or
20a)4M
b) 4M
c) 7M