



**St Aloysius College (Autonomous)**

**Mangaluru**

**Re-accredited by NAAC “A” Grade**

**Course structure and syllabus of**

**B.Sc.**

**BOTANY**

**CHOICE BASED CREDIT SYSTEM**

**(2019 – 20 ONWARDS)**

ST ALOYSIUS COLLEGE  
(Autonomous)  
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Re-accredited by NAAC with 'A' Grade - CGPA 3.62

Recognised by UGC as "College with Potential for Excellence"

College with 'STAR STATUS' conferred by DBT, Government of India

3<sup>rd</sup> Rank in "Swacch Campus" Scheme, by MHRD, Govt of India

No: SAC 40/Syllabus 2019-20

Date: 18-07-2019

## NOTIFICATION

Sub: Syllabus of **B.Sc. Botany** under Choice Based Credit System.

Ref: 1. Decision of the Academic Council meeting held on 02-05-2019 vide  
Agenda No: 26(2019-20)  
2. Office Notification dated 18-07-2019

Pursuant to the above, the Syllabus of **B.Sc. Botany** under Choice Based Credit System which was approved by the Academic Council at its meeting held on 02-05-2019 is hereby notified for implementation with effect from the academic year **2019-20**.

  
PRINCIPAL



  
REGISTRAR

To:

1. The Chairman/Dean/HOD.
2. The Registrar Office
3. Library

## **PREAMBLE**

St. Aloysius College is named after St. Aloysius Gonzaga. It is a Jesuit premier institute in Mangaluru, Karnataka, known for its rich heritage and quality education with a history of 140 years. The institution over the years has trained thousands of young men and women preparing them for life and presenting them to the nation. The institution has been able to redefine and reinforce the purpose of various innovations that have been initiated every year. Therefore the St Aloysius brand of education is very unique in this area which is very successful in developing the talents of all students to their fullest potential. The College has set high expectations and goal for all its learners and then tries in every possible way to help them to reach those goals. The college affiliated to Mangaluru University, was granted autonomous status in the year 2007-2008.

In the field of Biological sciences, at the undergraduate level, the optional Botany has carved a niche from times immemorial. Many subjects like Biotechnology, Pharmacognocny, Microbiology, and Biochemistry have got their contributions and share from the traditional subject Botany. Botany with its strong fundamentals can only make the allied combinations more meaningful, fruitful and complete. In this context St. Aloysius College has designed the course content of Botany to meet the needs of the present day students and enable them to join jobs, higher studies and research.

### **Objectives:**

- ❖ To provide the opportunities and environment for teaching, learning and research in various areas of plant sciences.
- ❖ To create an understanding of the scope, importance and the need of Botany as a discipline through undergraduate education
- ❖ To enhance the scope of employability of the learners by giving them all-round knowledge in the allied subjects along with Botany.
- ❖ To promote and popularize the study of Botany for its importance and its social relevance
- ❖ To inculcate a love for nature and the need to preserve the nature by maintaining fern house, herbal gardens in the Department and in the campus
- ❖ To develop an awareness and sensitize the young generation towards the environment, biodiversity, their destruction, conservation and their implications.
- ❖ To impart hands on training to the students in the field of life sciences to handle laboratory equipments, and experimentation
- ❖ To promote the students for higher education leading to research

**COURSE STRUCTURE**  
**Scheme of Choice Based Credit System for B.Sc. Botany**

Subjects	Paper	Instruction hours /week	Duration of Exam in hours	Marks			Credits
				IA	Exam	Total	
First Semester	<b>G507.1</b> Biodiversity – I	4	3	20	80	100	2
Theory							
Elective	<b>G507.1 E</b> <b>Organic farming</b>	2	2	10	40	50	1
Practical	<b>G507.1P</b>	3	3	10	40	50	1
Second Semester	<b>G507.2</b> Biodiversity –II, Cell biology , Histology and Anatomy	4	3	20	80	100	2
Theory							
Elective	<b>G507.2 E</b> <b>Plant</b> <b>Nutraceuticals</b>	2	2	10	40	50	1
Practical	<b>G507.2P</b>	3	3	10	40	50	1
Third Semester	<b>G507.3</b> Biodiversity –III, Morphology and Embryology of Angiosperms	4	3	20	80	100	2
Theory							
Elective	<b>G507.3E</b> <b>Medicinal</b> <b>Botany</b>	2	2	10	40	50	1
Practical	<b>G507.3P</b>	3	3	10	40	50	1
Fourth Semester	<b>G507.4</b> Plant Systematics and Commercial Botany	4	3	20	80	100	2
Theory							
Elective	<b>G507.4E</b> <b>Nursery and</b> <b>Gardening</b>	2	2	10	40	50	1
Practical	<b>G507.4P</b>	3	3	10	40	50	1

Subjects	Paper	Instruction hours /week	Duration of Exam	Marks			Credits
				IA	Exam	Total	
Fifth Semester	<b>G507.5a</b> Environmental Science	3	3	20	80	100	2
Theory							
Theory	<b>G507.5b</b> Molecular Biology I and Genetics	3	3	20	80	100	2
Practical	<b>G507.5P</b>	4	4	20	80	100	2
Sixth Semester	<b>G507.6a</b> Plant Physiology	3	3	20	80	100	2
Theory							
Theory	<b>G507.6b</b> Molecular Biology II, Biotechnology, Plant propagation and Pharmacognosy	3	3	20	80	100	2
Practical Components							
A	Practical <b>G507.6P</b>	2	2	10	40	50	1
B	Project- <b>G507.6 PR</b>			10	40	50	1
C	Independent Practical Skill Development (IPSD)- <b>G507.6P</b>	2	2	10	40	50	1

**I B. Sc SEMESTER – I**  
**G507.1 BIODIVERSITY-I 4 HR per week/ 48 HR**

<b>UNIT-I</b>	<b>12HR</b>
<b>BIODIVERSITY:</b>	<b>3HR</b>
INTRODUCTION TO THE CONCEPT, VALUE, THREATS AND CONSERVATION OF BIODIVERSITY, <b>CLASSIFICATION</b> -INTRODUCTION OF TERMS -PROKARYOTES AND EUKARYOTES WITH EXAMPLES, 5 - KINGDOM CLASSIFICATION OF LIVING ORGANISMS - SALIENT FEATURES WITH EXAMPLES,3 KINGDOM CLASSIFICATION IN EUKARYOTA	
GENERAL CLASSIFICATION OF PLANTS AND INTRODUCTION OF THE FOLLOWING TERMS - CRYPTOGAMS-THALLOPHYTA, BRYOPHYTA, PTERIDOPHYTA, TRACHEOPHYTA AND PHANEROGAMS (SPERMATOPHYTA) - GYMNOSPERMS, ANGIOSPERMS WITH EXAMPLES	
<b>VIRUSES:</b>	<b>7 HR</b>
INTRODUCTION ,HISTORY, DEFINITION, CHARACTERISTIC FEATURES, CLASSIFICATION OF VIRUSES BASED ON HOST, LGH CLASSIFICATION (CRYPTOGRAM),BALTIMORE CLASSIFICATION (BASED ON GENETIC MATERIAL),STRUCTURE –PLANT VIRUS-TMV , PHAGES –T <sub>4</sub>	
MODE OF TRANSMISSION OF VIRUSES	
<b>MULTIPLICATION</b> –STEPS INVOLVED IN REPLICATION OF RNA VIRUS-TMV (INCLUDING FLOW CHART OF REPLICATION OF GENETIC MATERIAL )	
DNA VIRUS-T <sub>4</sub> -LYTIC AND LYSOGENIC CYCLE(INCLUDING FLOW CHART OF REPLICATION OF GENETIC MATERIAL )	
GENERAL ACCOUNT ON SYMPTOMS OF VIRAL DISEASES IN PLANTS ,ANIMALS AND HUMAN BEINGS ,CONTROL MEASURES	
<b>VIRAL PLANT DISEASES</b> -TOBACCO MOSAIC DISEASES IN BEAN/CUCUMBER OR ON ANY HOST , VEIN CLEARING DISEASES ,BUNCY TOP OF BANANA AND KATTE DISEASES OF CARDAMOM( <b>TO BE COVERED IN PRACTICALS</b> )	
<b>PRIONS AND VIRIIDS</b> – A BRIEF NOTE WITH EXAMPLES AND SIGNIFICANCE	
<b>UNIT II</b>	<b>12HR</b>
<b>BACTERIA</b>	<b>10 HR</b>
OCCURRENCE,A BRIEF NOTE ON BERGY’S CLASSIFICATION , MORPHOLOGY, FLAGELLATION, ULTRA STRUCTURE OF BACTERIAL CELL, ENDOSPORE FORMATION AND NOTE ON GERMINATION	
<b>NUTRITION IN BACTERIA:</b> AUTOTROPHIC BACTERIA (TYPES OF PHOTO AND CHEMOAUTOTROPHS), HETEROTROPHIC BACTERIA, REPRODUCTION- BINARY FISSION	
<b>GENETIC RECOMBINATION IN BACTERIA-</b> CONJUGATION, TRANSFORMATION AND TRANSDUCTION	
<b>ACTINOMYCETES</b> -GENERAL CHARACTERS WITH EXAMPLES AND SIGNIFICANCE	

<p>ARCHAEBACTERIA- GENERAL CHARACTERS WITH EXAMPLES AND SIGNIFICANCE  <b>ECONOMIC IMPORTANCE:</b> BENEFICIAL ASPECTS AND HARMFUL ASPECTS  DISEASES IN PLANTS, ANIMALS AND HUMAN BEINGS (FIVE EXAMPLES OF EACH, MENTION ONLY), EXPLANATION OF DISEASES IN PLANTS: CITRUS CANKER AND SOFT ROT OF VEGETABLES-CARROT (<b>TO BE COVERED IN PRACTICALS</b>) AND WILT OF PEPPER (CHILLY) ,CROWN GALL DISEASE</p>	<b>2HR</b>
<p><b>MYCOPLASMA</b>  GENERAL CHARACTERS, STRUCTURE, REPRODUCTION AND IMPORTANCE- MENTION OF MYCOPLASMAL DISEASES IN PLANTS AND HUMAN BEINGS MENTION OF THREE DISEASES EACH - EXPLANATION OF DISEASES IN PLANTS- LITTLE LEAF OF BRINJAL AND GRASSY SHOOT DISEASE OF SUGARCANE (<b>TO BE COVERED IN PRACTICALS</b>) SANDAL SPIKE AND YELLOW DISEASE OF COCONUT</p>	<b>12HR</b>
<p><b>UNIT III:</b></p>	<b>12HR</b>
<p><b>CYANOBACTERIA</b> INTRODUCTION ,GENERAL ACCOUNT ON -HABIT AND HABITAT , RANGE OF THALLUS STRUCTURE  REPRODCUTION - VEGETATIVE- FISSION, FRAGMENTATION AND HORMOGONES  ASEXUAL REPRODUCTION- ENDOSPORES, EXOSPORES, NANNOSPORES, AKINETES  THALLUS STRUCTURE- <i>GLOEOCAPSA, SPIRULINA, OSCILLATORIA, NOSTOC, RIVULARIA, GLOEOTRICHIA, SCYTONEMA AND STIGONEMA</i>  <b>ECONOMIC IMPORTANCE-</b> BENEFICIAL ASPECTS AND HARMFUL ASPECTS</p>	<b>6HR</b>
<p><b>DIVERSITY OF CRYPTOGAMS- ALGAE</b>  HABIT AND HABITAT, RANGE OF THALLUS ORGANISATION, CLASSIFICATIONS (SMITH AND FRITSCH) UP TO CLASSES  <b>CHLOROPHYCEAE:</b> SALIENT FEATURES  <i>CHLAMYDOMONAS- CELL STRUCTURE</i>  ASEXUAL REPRODUCTION- ZOOSPORE, APLANOSPORES AND PALMELLA STAGE  SEXUAL REPRODUCTION- ISO, ANISO AND OOGAMOUS TYPES  <i>PANDORINA AND EUDORINA-</i> THALLUS CONSTRUCTION  <i>VOLVOX</i> –THALLUS ORGANISATION, REPRODUCTION-VEGETATIVE ,ASEXUAL AND SEXUAL TYPES  <i>HYDRODICTYON-</i> THALLUS ORGANISATION</p>	<b>6HR</b>
<p><b>UNIT IV</b></p>	<b>12HR</b>
<p><b>DIVERSITY OF CRYPTOGAMS- ALGAE (CONTINUED)</b>  <i>OEDOGONIUM-</i> THALLUS ORGANISATION  ASEXUAL REPRODUCTION- ZOOSPORES, AKINETES  SEXUAL REPRODUCTION- MACRANDROUS TYPES AND NANNANDROUS TYPE  <i>SPIROGYRA-</i>THALLUS ORGANISATION ,  SEXUAL REPRODUCTION- SCALARIFORM, LATERAL CONJUGATION  <i>CLADOPHORA-</i>THALLUS ORGANISATION,</p>	<b>7HR</b>

HAPLOID AND DIPLOID LIFE CYCLES- GRAPHICAL REPRESENTATION

**CHARA**- THALLUS ORGANISATION AND SEX ORGANS

**CAULERPA**- TYPES OF THALLUS ORGANISATION( TYPES OF PHOTOSYNTHETIC ASSIMILATORS )

**BACILLARIOPHYCEAE**- SALIENT FEATURES

STRUCTURE OF PENNATE AND CENTRIC DIATOMS

**PHAEOPHYCEAE**- SALIENT FEATURES

**5HR**

**SARGASSUM**- THALLUS ORGANISATION, SEXUAL REPRODUCTION: RECEPTACLES- MALE CONCEPTACLES AND FEMALE CONCEPTACLES

**RHODOPHYCEAE**- SALIENT FEATURES

**POLYSIPHONIA**--THALLUS ORGANISATION AND REPRODUCTION- SPERMATANGIA, CARPOGONIA, CYSTOCARPS AND TETRASPOROPHYTE ALONG WITH GRAPHICAL REPRESENTATION OF LIFE CYCLE

**ECONOMIC IMPORTANCE OF ALGAE**

BENEFICIAL ASPECTS AND HARMFUL ASPECTS

## REFERENCES

1. CHAND S. 2009 BOTANY FOR DEGREE STUDENTS S. CHAND AND COMPANY LTD
2. DEY S. N. & P. S. TRIVEDI. 1977. **A TEXT BOOK OF BOTANY VOL I** VIKAS.
3. GANGULEE, DAS & DATTA 2002, **COLLEGE BOTANY VOL II** NCBA (P) LTD
4. KUMAR H. D. & H.N. SINGH. 1996. **A TEXT BOOK OF ALGAE**, EAST WEST PRESS. NEW DELHI.
5. LURIA S. E ET AL 1978. **GENERAL VIROLOGY** 3 EDITION JOHN WILEY & SONS.
6. PADOLEY AND MISTRY P.B.1982A MANUAL OF PLANT PATHOLOGYS CHAND AND COMPANY LTD.
7. PANDEY S. N. & P. S. TRIVEDI. 1977. **A TEXT BOOK OF BOTANY VOL I** VIKAS.
8. PELCZAR M. J., E.C.S CHAN & N. R. KRIEG. 2008. **MICROBIOLOGY** 5<sup>TH</sup> EDITION. MC GRAW HILL.
9. PRESCOTT G. W. 1969, **THE ALGAE: A REVIEW** THOMAS NELSON & SONS LTD.
10. PUROHIT S. S 1989, **VIRUSES, BACTERIA & MYCOPLASMAS**, AGROBOTANICAL PUBL.
11. RANGASWAMI G. 1972. **DISEASES OF CROP PLANTS IN INDIA**. PRENTICE HALL OF INDIA PVT LTD NEW DELHI.
12. SHARMA K.,2007MANUAL OF MICROBIOLOGYTOOLS & TECHNIQUES ,ANE,S STUDENT EDITIONS
13. SINGH R. S. 1963 **PLANT DISEASES** 2<sup>ND</sup> EDITION. OXFORD & IBH.
14. SMITH G. M. 1955. **CRYPTOGAMIC BOTANY VOL I. ALGAE & FUNGI**. MCGRAW HILL BOOK CO. INC. 2<sup>ND</sup> EDITION.
15. SMITH K. M 1990. **PLANT VIRUSES** 6<sup>TH</sup> EDITION UNIVERSAL BOOK STALL NEW DELHI.
16. SRIVASTAVA H.N.-A TEXT BOOK OF BOTANY ,ALGAE .PRADEEP PUBLICATIONS ,MEERUT
17. VASHISTA,B.R. (1988) : BOTANY FOR DEGREE STUDENTS-ALGAE. S. CHAND & CO., (P) LTD., NEW DELHI – 567PP
18. VASHISTHA B.R., SINHA A. K. & SINGH V.P. 2004. **BOTANY FOR DEGREE STUDENTS, ALGAE**



**B.Sc SEMESTER – I**  
**G507.1P BIODIVERSITY-I PRACTICALS**  
**(PRACTICALS OF 3 HRS EACH , 1 PRACTICAL PER WEEK)**

- 1 STUDY OF COMPOUND MICROSCOPE/ DISSECTION MICROSCOPE- INSTRUCTIONS WITH REGARD TO HANDLING, USING, CARE, CLEANING, MOUNTING AND PRECAUTIONS
- 2 STUDY OF DIFFERENT TYPES OF VIRAL PLANT DISEASES -TOBACCO MOSAIC DISEASES IN BEAN/CUCUMBER OR ANY HOST , VEIN CLEARING DISEASE ,BUNCY TOP OF BANANA AND KATTE DISESES OF CARDAMOM (NATURAL SPECIMENS OR PHOTOGRAPHS)
- 3 **CULTURE OF BACTERIA:** PREPATATION OF CULTURE MEDIA -NUTRIENT AGAR MEDIA, STERILIZATION TECHNIQUES-ALCOHOL,OVEN,INCUBATER ,AUTOCLAVE LAMINAR FLOW
- 4 ISOLATION TECHNIQUES OF BACTERIA -STREAK PLATE TECHNIQUE ,GRAM STAINING,STUDY OF BACTERIA IN CURDS AND ROOT NODULES
- 5 STUDY OF BACTERIAL DISEASES IN PLANTS ; CITRUS CANKER, SOFT ROT OF VEGETABLES-CARROT  
MYCOPLASMAL DISEASES IN PLANTS - LITTLE LEAF OF BRINJAL AND GRASSY SHOOT DISEASE OF SUGARCANE
- 6 STUDY OF CYANOPHYCEACE - *NOSTOC*, *OSCILLATORIA* .*RIVULARIA*, *GLOEOTRICHIA* AND *SCYTONEMA*  
STUDY OF PROTISTA –DIATOMS (PENNATE AND CENTRIC) AND DESMIDS
- 7 STUDY OF ALGAE - *CHLAMYDOMONAS*, *VOLVOX*- DAUGHTER COLONIES, COLNY WITH ANTHERIDIA, OOGONIA AND ZYGOTES
- 8 STUDY OF ALGAE - *SPIROGYRA*, *CLADOPHORA* (ONLY MORPHOLOGY) *OEDOGONIUM* - MORPHOLOGY - HOLD FAST, CAP CELLS AND & MACRANDROUS AND NANNANDROUS TYPE OF REPRODUCTION
- 9 STUDY OF ALGAE – *CAULERPA* -SPECIES VARIATIONS , (ONLY MORPHOLOGY), *CHARA* MORPHOLOGY AND SEX ORGANS
- 10 *SARGASSUM*- MORPHOLOGY AND V. S OF MALE AND FEMALE CONCEPTACLES
- 11 *POLYSIPHONIA* MORPHOLOGY AND SPERMATANGIA, CARPOGONIA, CYSTOCARP AND TETRASPOROPHYTE STAGES OF LIFE CYCLE
- 12 COLLECTION OF SPECIMENS/VISIT TO INDUSTRIES /WORKSHOP
- 13 PRACTICAL TEST

**QUESTION PAPER PATTERN: [THEORY]**

**[SAME SCHEME TO BE FOLLOWED FOR ALL SEMESTERS FROM 2013 ONWARDS]**

**TIME: 3HR**

**MAX MARKS: 100**

**PART - A**

- 1) ANSWER ANY TEN OF THE FOLLOWING 10X2 = 20  
(TEN TO BE ANSWERED OUT OF TWELVE)

**PART - B**

- 2) ANSWER ANY SIX OF THE FOLLOWING 5X6=30  
[SIX TO BE ANSWERED OUT OF EIGHT (I-IV SEMESTER) OR NINE (V AND VI SEMESTER)]

**PART-C**

- 3) ANSWER ANY FIVE OF THE FOLLOWING 10 X 5 =50  
[FIVE TO BE ANSWERED OUT OF EIGHT (I-IV SEMESTER) OR NINE (V AND VI SEMESTER)]  
QUESTION PAPER WILL HAVE THREE PARTS -A, B, C

**PART A-** TWELVE QUESTIONS FROM ALL THE UNITS WITH EQUAL WEIGHTAGE

**PART B-** EIGHT /NINE QUESTIONS FROM ALL THE UNITS WITH EQUAL WEIGHTAGE

**PART C-** EIGHT /NINE QUESTIONS FROM ALL THE UNITS WITH EQUAL WEIGHTAGE

**ST ALOYSIUS COLLEGE (AUTONOMOUS)  
I B.SC I SEMESTER PRACTICAL EXAMINATION  
G507.1 P BIODIVERSITY I**

**TIME: 3HRS**

**MAX MARKS: 40**

1. PREPARE A TEMPORARY SLIDE OF SPECIMEN A. SKETCH, LABEL AND IDENTIFY. LEAVE THE PREPARATION FOR INSPECTION. 5X1=5  
(PREPARATION= 2, LABELED SKETCH= 1, IDENTIFICATION= ½ CLASSIFICATION=½, IDENTIFYING FEATURES-1)
2. IDENTIFY **B AND C** WITH LABELED SKETCH AND REASONS 3+3=6  
(LABELED SKETCH = 1 CLASSIFICATION ½- IDENTIFYING FEATURES REASONS = 1½)
3. WRITE CRITICAL NOTES ON **D AND E** 3+3=6  
(IDENTIFICATION WITH CLASSIFICATION=1, CRITICAL NOTES=2)
4. SKETCH LABEL AND IDENTIFY WITH REASONS **F,G,H, I AND J** 3X5=15  
(LABELED SKETCH= 1, IDENTIFICATION= ½, REASONS=1 ½)
5. SUBMISSION OF FOUR SPECIMENS 3
6. RECORD 5

1. SPECIMEN A FROM ALGAE (MICROSCOPIC FORMS)
2. SPECIMEN B AND C – ONE FROM CYANOPHYCEACE AND ONE FROM ALGAE
3. CRITICAL NOTES D AND E – MACROSCOPIC SPECIMENS FROM ALGAE/VIRAL DISEASES/ BACTERIAL DISEASES/MYCOPLASMAL DISEASES
4. PERMANENT SLIDES F, G, H I AND J – BACTERIA/ CYANOPHYCEACE / ALGAE

**BSc. - I SEMESTER**  
**G 507.1E ORGANIC FARMING**

Choice based credit system – **Intradisciplinary** -An elective Course which is supportive to the discipline of study **30 Hours (2 hrs/week)**

**Course outcome:**

On completion of this course student will be able to:

- To understand the concept and importance of organic farming
- To maintain and improve soil health condition
- To sustain natural resources

**Unit I**

**15 hrs**

Introduction, scope of organic farming, Advantages and limitations of Organic farming.

A brief note on Biofertilizers– Mycorrhiza, Cyanobacteria, *Azolla*, *Rhizobium*.

Segregation of biodegradable and non biodegradable wastes

Biocompost- Preparation techniques of each of the following : Organic compost, mulching, wet and dry method, slurry, nutrient solution, cow dung, neem cake, kitchen waste management, vermicompost , biogas

Demonstration of Vermicompost and biogas

**Unit II**

**15 hrs**

Mineral nutrition- Role of macronutrients and micronutrients with examples

A brief note on sewage treatment plants (STP) , role of STP in recycling water

Cultivation practices- crop rotation (Paddy and legume), monoculture (Rubber, cashew, Tapioca), mixed farming, integrated farming

Integrated pest management- Biopesticides- *Trichoderma*, Role of *Trichoderma* in controlling the Pepper wilt disease and other soil borne pathogens, role of *Strychnusnuxvomica* , *Calotropisgigantea*, *Azadirachtaindica* leaves in the control of pest and fungal pathogens, Concept of weed and its management- *Parthenium* , *Eichhornia*, *Chromolaena*

**References**

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4. Mukherjee A, Dutta S, Goyal T.M , Kapoor A and Mendiratta D. 2017
5. Organic Farming in India Status, Issues and Way Forward. Academic foundation, New Delhi.

## I B.Sc SEMESTER II

### G 507.2 BIODIVERSITY-II,CELL BIOLOGY, HISTOLOGY AND ANATOMY

4 HR per week/ 48 HR

**UNIT 1:** **12 HR**

**DIVERSITY OF CRYPTOGAMES- FUNGI** **4HR**

INTRODUCTION AND ORIGIN ,DIFFERENCES BETWEEN ALGAE AND FUNGI

GENERAL ACCOUNT ON -HABIT AND HABITAT,

**CLASSIFICATION** –BY C.J. ALEXOPOLUS UPTO CLASSES WITH SALIENT FEATURES AND EXAMPLES FOR EACH CLASS

ECOLOGICAL GROUPS OF FUNGI- SOIL,FOLICOLOUS, LIGNICOLOUS,

ENTAMOGENOUS, COPROHYLLOUS, AQUATIC, CELLULOSE DECOMPOSERS AND DERMATOPHYTES

VEGETATIVE ORGANISATION

REPRODUCTIVE STRUCTURES- ASEXUAL AND SEXUAL TYPES

TYPES OF NUTRITION- SAPROPHYTES, PARASITES, SYMBIONTS AND PREDACIOUS FUNGI

**PHYTOPHTHORA** –STRUCTURE AND ASEXAL REPRODUCTION **4HR**

**RHIZOPUS** –STRUCTURE ,REPRODUCTION -ASEXUAL AND SEXUAL TYPES,HETEROTHALLISM

YEAST:STRUCTURE AND TYPES OF LIFE CYCLES

**PENICILLIUM** – STRUCTURE AND REPRODUCTION -ASEXUAL TYPE

**PEZIZA** –STRUCTURE OF FRUITING BODY -APOTHECIUM

**XYLARIA** –STRUCTURE OF STROMA **4HR**

**PUCINIA**-LIFE CYCLE IN PRIMARY AND SECONDARY HOSTS -UREDOSPORES, TELEUTOSPORES ,BASIDIOSPORES,- PYCNOSPORES AND AECIOSPORES)

**AGARICUS**- LIFE CYCLE AND EXPLANATION OF VEGETATIVE AND FRUITING BODY,DEVELOPMENT OF BASIDIOSPORES

**MUSHROOM CULTURE**- (OYSTER MUSHROOM) –COMPOST PREPARATION, FILLING, SPAWNING, CASING, CROPPING AND HARVESTING AND NUTRIENT VALUE

**ECONOMIC IMPORTANCE OF FUNGI**

BENEFICIAL ASPECTS AND HARMFUL ASPECTS

**UNIT II** **12HR**

**PLANT MICROBIAL INTERACTIONS: INTRODUCTION ,TYPES** **4HR**

**POSITIVE INTERACTIONS** **3HR**

**SYMBIOSIS- LICHENS: TYPES, VEGETATIVE PROPAGATION AND SEXUAL REPRODUCTION**

ECONOMIC IMPORTANCE OF LICHENS

**MYCORRHIZAE: INTRODUCTION ,TYPES, GENERAL ACCOUNT ON ECTO AND ENDOMYCORRHIZAE AND SIGNIFICANCE**

<b>NEGATIVE INTERACTIONS :MYCOPATHOLOGY</b>	<b>4HR</b>	
PATHOGENESIS, CAUSATIVE ORGANISMS, TYPES OF SYMPTOMS, ETIOLOGY AND CONTROL MEASURES		
<b>STUDY OF DISEASES OF SOME IMPORTANT CROPS :</b>		
BLAST DISEASE OF RICE, STEM BLEEDING AND BUD ROT OF COCONUT , TIKKA DISEASE OF GROUND NUT, SMUT DISEASE OF SORGHUM, RUST DISEASE OF WHEAT AND RED ROT OF SUGARCANE <b>(TO BE TAUGHT IN PRACTICALS)</b> ABNORMAL LEAF FALL OF RUBBER , POWDERY MILDEW OF CEREALS ,COFFEE RUST AND WILT OF COTTON		
<b>FRUITS AND VEGETABLES-</b> WHITE RUST OF CRUCIFERAE, LATE BLIGHT OF POTATO AND POWDERY MILDEW OF GRAPES <b>(TO BE TAUGHT IN PRACTICALS)</b> BLACK MOLD ,GREEN MOLD OF FRITS AND VEGETABLES, AND POWDERY MILDEW OF GRAPES		
<b>NEMATOPATHOLOGY :ROOT KNOT OF TOMATO</b>	<b>1HR</b>	
AN ACCOUNT OF BIOPESTICIDES AND BIOCONTROL		<b>2HR</b>
<b>UNIT III</b>	<b>12HR</b>	
<b>DIVERSITY OF CRYPTOGAMS- BRYOPHYTA</b>	<b>3HR</b>	
GENERAL ACCOUNT ON-HABIT,HABITAT ,PLANT BODY –GAMETOPHYTE, REPRODUCTION , ALTERNATION OF GENERATIONS, RESEMBLANCES AND DIFFERENCES OF BRYOPHYTES WITH ALGAE AND PTERIDOPHYTES, CLASSIFICATION- SALIENT FEATURES OF CLASSES WITH EXAMPLES FOR EACH CLASS AND ECONOMIC IMPORTANCE		
<b><i>RICCIA</i> : MORPHOLOGY OF GAMETOPHYTE,ANATOMY OF THALLUS, SEXUAL REPRODUCTION –STRUCTURE OF SEX ORGAS AND SPOROPHYTE</b>	<b>2HR</b>	
<b><i>PORELLA</i>: MORPHOLOGY OF GAMETOPHYTE</b>	<b>1HR</b>	
<b><i>ANTHOCEROS</i>: MORPHOLOGY OF GAMETOPHYTE, ANATOMY OF THALLUS,SEXUAL REPRODUCTION –STRUCTURE OF SEX ORGAS AND SPOROPHYTE AND EVOLUTIONARY SIGNIFICANCE</b>	<b>3HR</b>	
<b>MOSS: MORPHOLOGY OF GAMETOPHYTE, ANATOMY OF THALLUS,SEXUAL REPRODUCTION –STRUCTURE OF ANTHERDIAL AND ARCHEGONIAL CLUSTERS, SPOROPHYTE AND SPORE DISPERSAL MECHANISM</b>	<b>3HR</b>	
<b>UNIT IV</b>	<b>12HR</b>	
<b>CELL BIOLOGY ,PLANT HISTOLOGY AND ANATOMY</b>		
<b>CELL BIOLOGY: INTRODUCTION,CHROMATIN ORGANISATION- NUCLEOSOMES,SOLENOIDS AND METAPHASE FIBRE , PARTS OF THE TYPICAL METAPHASE CHROMOSOME, CELL DIVISION, CELL CYCLE, STAGES OF MITOSIS, MEIOSIS</b>	<b>5HR</b>	

## **HISTOLOGY**

**4HR**

**MERISTEMATIC TISSUES** APICAL, INTERCALARY- LATERAL MERISTEMS -  
THEORIES OF MERISTEMS- SHOOT APEX THEORY- TUNICA CORPUS THEORY,  
ROOT APEX THEORY – HISTOGEN THEORY

**PERMANENT TISSUES:** SIMPLE PERMANENT TISSUES - PARENCHYMA,  
COLLENCHYMA, SCLERENCHYMA **(TO BE COVERED IN PRACTICALS)**  
COMPLEX PERMANENT TISSUES- XYLEM AND PHLOEM- STRUCTURE  
DISTRIBUTION, TYPES AND FUNCTIONS

## **ANATOMY**

**3HR**

DIFFERENTIATION OF CELLS/TISSUES, A NOTE ON NODAL ANATOMY  
PRIMARY STRUCTURE OF DICOT STEM, MONOCOT STEM, DICOT ROOT, MONOCOT  
ROOT, **(TO BE COVERED IN PRACTICALS)**

**ANATOMY OF DICOT LEAF AND MONOCOT LEAF**

SECONDARY GROWTH IN DICOT STEM AND DICOT ROOT

A NOTE ON ANAMOULOUS SECONDARY GROWTH IN MONOCOT STEM

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## I BSc SEMESTER II

### G 507.2P BIODIVERSITY-II, CELL BIOLOGY, HISTOLOGY AND ANATOMY [PRACTICALS OF 3 HRS / WEEK]

1. **TECHNIQUE OF TEMPORARY SLIDE PREPARATION.**-TRAINING IN PREPARING FREE HAND SECTIONS (T.S), STAINING, WASHING OR DE-STAINING AND MOUNTING IN DILUTE GLYCERIN/WATER
2. STUDY OF THE *PHYTOPHTHORA*, *RHIZOPUS*, *PENICILLIUM*- ASEXUAL STAGES
3. STUDY OF MORPHOLOGY AND ANATOMY OF *XYLARIA* STROMA AND *PEZIZA* APOTHECIUM
4. STUDY OF UREDOSTAGE, TELEUTOSTAGE, PYCNIOSTAGE AND AECIOSTAGE IN *PUCCINIA*.
5. STUDY OF PATHOLOGICAL SPECIMENS – **STUDY OF DISEASES OF SOME IMPORTANT CROPS** : BLAST DISEASE OF RICE, STEM BLEEDING AND BUD ROT OF COCONUT , TIKKA DISEASE OF GROUND NUT, SMUT DISEASE OF SORGHUM, RUST DISEASE OF WHEAT AND RED ROT OF SUGARCANE  
**FRUITS AND VEGETABLES**-WHITE RUST OF CRUCIFERAE, LATE BLIGHT OF POTATO AND POWDERY MILDEW OF GRAPES  
**NEMATOPATHOLOGY** :ROOT KNOT OF TOMATO  
**BIOCONTROL AGENT** :*TRICHODERMA*
6. STUDY OF LICHENS – TYPES, ANATOMY AND APOTHECIUM V.S
7. STUDY OF BRYOPHYTES- MORPHOLOGY ,ANATOMY OF THALLUS AND SPOROPHYTE OF *RICCIA*
8. MORPHOLOGY OF GAMETOPHYTES,ANATOMY OF THALUS AND SPOROPHYTE OF *ANTHOCEROS*, MORPHOLOGY OF GAMETOPHYTES AND SPOROPHYTE OF MOSS
9. CELL DIVISIONS: SQUASH PREPARATION: STUDY OF **MITOSIS**-ONION ROOT TIP, **MEIOSIS**-ONION FLOWER BUDS/RHEO BUDS
10. STUDY OF DIFFERENT TYPES OF TISSUES- APICAL MERISTEM, PARENCHYMA, COLLENGHYMA, SCLERENCHYMA, XYLEM AND PHLOEM,
11. STUDY OF ANATOMY OF ROOT- T.S YOUNG DICOT ROOT AND MONOCOT ROOT
12. STUDY OF ANATOMY OF STEM- T.S OF YOUNG DICOT STEM AND MONOCOT STEM.
13. FIELD VISIT /WORKSHOP
14. PRACTICAL TEST

**I BSC II SEM**

**G507.2P BIODIVERSITY-II, CELL BIOLOGY, HISTOLOGY AND ANATOMY**

**MAX MARKS: 40**

**TIMES: 3 HR**

- 1. PREPARE A SQUASH PREPARATION OF THE MATERIAL A** **06**  
(PREPARATION-5, IDENTIFICATION OF STAGE-1)
  
- 2. PREPARE A TEMPORARY STAINED SLIDE OF MATERIAL B.** **05**  
LEAVE THE PREPARATION FOR INSPECTION.  
(PREPARATION-2, IDENTIFICATION-1, LABELLED SKETCH-2)
  
- 3. PREPARE A TEMPORARY STAINED SLIDE OF MATERIAL C. LEAVE THE PREPARATION FOR** **04**  
**INSPECTION.**  
(PREPARATION-2, IDENTIFICATION-1, LABELLED SKETCH-1)
  
- 4. CRITICAL COMMENT ON D ,E AND F** **3X3=09**  
(IDENTIFICATION= 0½, REASONS=2½)
  
- 5. IDENTIFY THE GIVEN SLIDES G, H AND I** **3X3=9**  
(IDENTIFICATION=½, LAB.SKETCH=1½, REASONS=1)
  
- 6. RECORD** **07**

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**SPECIMEN A – ONION ROOT TIP**

**SPECIMEN B – DICOT/ MONOCOT ROOT/ DICOT/ MONOCOT STEM**

**SPECIMEN C - FUNGI/ THALLUS OF BRYOPHYTE**

**D, E, F –LICHENS/ PLANT DISEASES/ BRYOPHYTE/ FUNGI**

**SPECIMENS/PHOTOGRAPHS)**

**PERMANENT SLIDES -G, H AND I – SLIDE FROM EACH GROUP (ONE**

**FROM HISTOLOGY,ONE FROM FUNGI/LICHEN AND ONE FROM BRYOPHYTES)**



**BSc. II SEMESTER**  
**G 507.2E PLANT NUTRACEUTICALS**

Choice based credit system – **Intradisciplinary** -An elective course which expands the scope of the discipline of study **30 Hours (2 hrs/week)**

**Course outcome**

On completion of this course student will be able to:

- Understand the benefits of foods and nutraceuticals
- Understand the effects on human health and potential applications in risk reduction of diseases.

**Unit I**

**15 hrs**

Introduction, importance, classification of nutraceuticals, dietary supplements, fortified foods, functional foods and phytonutraceuticals.

Carbohydrates, Protein, amino acids, Fat, vitamins and minerals - Excess and deficiency symptoms, prevention and management

Concept of prebiotics and probiotics

Prebiotics- Use of prebiotics in maintaining the useful microflora , extraction from plant sources - Plant fibres, *Asparagus*, Banana, Chicory root, Onion, garlic .

Probiotics- examples of bacteria used as probiotics, *Bifidobacterium*, *Lactobacillus*, *Saccharomyces*

Basic principle and mode of action of prebiotics and probiotics.

Biofortification and nutritional enhancement.

Single Cell proteins- *Spirulina* and Mushroom

**Unit II**

**15 hrs**

Health benefits- Nutritional and antinutritional factors, food as remedies for infants, adult and late adulthood stages. Role of nutraceuticals with special reference to diabetes mellitus, hypertension, hypercholesterolemia, osteoporosis, rheumatism, prevention and treatment.

Concept of antioxidants - use of antioxidants as dietary supplements in prevention and treatment of cancer, obesity and stress. Role of nutraceuticals and functional foods in pediatrics, geriatrics, sports, pregnancy and lactation.

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2. Tripathi A.D. 2017. Nutraceuticals Food Processing Technology. Bharti Publications, India
3. Pathak Y.V. 2009. Handbook of Nutraceuticals Volume I: Ingredients, Formulations, and Applications. CRC Press.
4. Muredzi P. 2013. Food is Medicine - An introduction to Nutraceuticals. LAP publishers

## II B.Sc. III SEMESTER

### G507.3 BIODIVERSITY III, MORPHOLOGY AND EMBRYOLOGY OF ANGIOSPERMS

4 HR per week/ 48 HR

<b>UNIT I</b>	<b>12HR</b>
<b>DIVERSITY OF CRYPTOGAMS- PTERIDOPHYTA</b>	<b>2 HR</b>
ORIGIN ,GENERAL ACCOUNT - HABIT AND HABITAT , EXTERNAL FEATURES OF SPOROPHYTE ANATOMY WITH STELAR VARIATIONS WITH EXAMPLES REPRODUCTION:VEGETATIVE, ASEUAL AND SEXUAL REPRODUCTION, TYPES OF EMBRYOS, ALTERNATION OF GENERATION ,APOGAMY AND AOSPORY WITH EXAMPLES CLASSIFICATION- - SALIENT FEATURES OF CLASSES WITH EXAMPLES FOR EACH CLASS	
<b>RHYNIA- MORPHOLOGY</b>	<b>1 HR</b>
<b>PSILOTUM</b> : MORPHOLOGY OF SPOROPHYTE, ASEXAL REPRODUCTION :EXTERNAL, INTERNAL STRUTURE AND MORPHOLOGICAL VIEWS OF SYNANGIUM	<b>2 HR</b>
<b>SELAGINELLA</b> : MORPHOLOGY OF SPOROPHYTE, RHIZOPHORE- MORPHOLOGICAL VIEWS AND ANATOMY ,STEM ANATOMY ( <b>TO BE COVERED IN PRACTICALS</b> ), REPRODUCTION- MORPHOLOGY AND ANATOMY OF MALE CONE AND FEMALE CONE, HETEROSPORY AND ITS SIGNIFICANCE, GRAPHICAL REPRESENTATION OF LIFE CYCLE (HETEOROSPOROUS LIFE CYCLE FORM)	<b>3HR</b>
<b>PTERIS</b> :MORPHOLOGY OF SPOROPHYTE, ANATOMY OF RHIZOME ( <b>TO BE COVERED IN PRACTICALS</b> ), REPRODUCTION - MORPHOLOGY AND ANATOMY OF SPOROPHYLL , SPORE DISPERSAL MECHANISM, STRUCTURE OF GAMETOPHYTE AND SEX ORGANS, GRAPHICAL REPRESENTATION OF LIFE CYCLE (HOMOSPOROUS LIFE CYCLE FORM)	<b>4HR</b>
<b>MARSILEA</b> -MORPHOLOGY OF SPOROPHYTE, ANATOMY OF RHIZOME ( <b>TO BE COVERED IN PRACTICALS</b> ), REPRODUCTION- MORPHOLOGY OF SPOROCARP, ANATOMY ( <b>H.L.S TO BE COVERED IN PRACTICALS</b> ), MORPHOLOGICAL VIEWS IN BRIEF	
<b>UNIT II:</b>	<b>12 hrs</b>
<b>PHANEROGAMS - GYMNOSPERMS</b>	
ORIGIN ,GENERAL ACCOUNT-HABIT AND HABITAT , EXTERNAL FEATURES OF SPOROPHYTE , ANATOMY ,REPRODUCTION :VEGETATIVE , ASEXUAL AND SEXUAL REPRODUCTION, ALTERNATION OF GENERATION CLASSIFICATION- - SALIENT FEATURES OF CLASSES WITH EXAMPLES FOR EACH CLASS COMPARATIVE STUDY OF GYMNOSPERMS WITH PTERIDOPHYTES AND ANGIOSPERMS <b>CYCAS</b> MORPHOLOGY OF SPOROPHYTE, ANATOMY OF LEAFLET( <b>TO BE COVERED IN PRACTICALS</b> ),CORALLOID ROOTS- MORPHOLOGY AND ANATOMY( <b>TO BE COVERED IN PRACTICALS</b> ), REPRODUCTION - MORPHOLOGY AND ANATOMY OF MALE CONE AND MEGASPOROPHYLLS	<b>3HR</b>         <b>3HR</b>

<b>PINUS : MORPHOLOGY OF SPOROPHYTE,</b> ANATOMY OF PINUS NEEDLE( <b>T.S. TO BE COVERED IN PRACTICALS</b> ) REPRODUCTION- MORPHOLOGY and ANATOMY OF MALE CONE AND FEMALE CONE, MORPHOLOGICAL NATURE OF OVULIFEROUS SCALE AND STRUCTURE OF OVULE (V.S.)	<b>3HR</b>
<b>GNETUM :MORPHOLOGY OF SPOROPHYTE,</b> <b>ANATOMY- ANATOMY OF STEM (PRIMARY STRUCTURE- (TO BE COVERED IN PRACTICALS),ANAMOLOUS SECONDARY GROWTH(EXCENTRIC TYPE),</b> REPRODUCTION –MORPHOLOGY AND ANATOMY OF MALE CONE AND FEMALE CONE BRIEF NOTE ON POLYEMBRYONY, APOMIXIS AND AOSPORY WITH EXAMPLES	<b>3HR</b>
<b>UNIT III</b>	
<b>MORPHOLOGY OF ANGIOSPERMS</b>	<b>12HR</b>
<b>DESCRIPTION OF A FLOWERING PLANT: TYPICAL MONOCOT AND DICOT PLANT</b>	<b>1HR</b>
<b>ROOT</b>	<b>2HR</b>
<b>TAP ROOT MODIFICATIONS - CONICAL, FUSIFORM, NAPIFORM, TUBEROUS ROOTS</b> <b>UNDERGROUND ADVENTITIOUS ROOT MODIFICATIONS – FOR STORAGE: TUBEROUS, FASCICULATED, MONILIFORM,NODULOSE ROOTS (MODIFICATIONS CAN BE COVERED IN PRACTICALS)</b> <b>AERIAL ROOT MODIFICATIONS: PROP, STILT, CLIMBING, RESPIRATORY, HAUSTORIA EPIPHYTIC AND ASSIMILATORY ROOTS (MODIFICATIONS CAN BE COVERED IN PRACTICALS)</b>	
<b>STEM</b>	<b>2HR</b>
<b>UNDERGROUND STEM MODIFICATIONS: RHIZOME, TUBER, BULB AND CORM</b> <b>SUB AERIAL STEM MODIFICATIONS: RUNNER, STOLON, OFFSET AND SUCKER</b> <b>AERIAL STEM MODIFICATIONS: STEM TENDRIL, THORN, PHYLLOCLADE, CLADODE AND BULBIL</b>	
<b>LEAF: PARTS OF THE LEAF -TYPICAL MONOCOT AND DICOT LEAF</b>	<b>2HR</b>
<b>PHYLLOTAXY: ALTERNATE, OPPOSITE (DECUSSATE AND SUPERPOSED), WHORLED TYPES-SIMPLE AND COMPOUND LEAVES WITH TYPES</b> <b>VENATION:-TYPES OF RETICULATE AND PARALLEL VINATION</b> <b>LEAF STIPULES- FREE LATERAL, ADNATE, INTERPETIOLAR, INTRAPETIOLAR FOLIACEOUS, OCHREATE AND BUD SCALES</b> <b>LEAF MODIFICATIONS: LEAF TENDRILS, LEAF SPINES, SCALY LEAF, PHYLLODE, AND LEAFY BUDS, INSECTIVOROUS PLANTS: PITCHER, BLADDER AND DROSER</b>	
<b>INFLORESCENCE: RACEMOSE: SIMPLE RACEME, PANICLE, SPIKE, SPADIX, CORYMB, UMBEL,CATKIN, , HEAD, GLOBOSE ANDHEAD</b> <b>CYMOSE: SIMPLE CYME, MONOCHASIAL CYMES ( SCORPOID CYME, HELICOID CYME), DICHASIAL AND POLYCHASIAL CYMES)</b> <b>SPECIAL TYPES: CYATHIUM, VERTICILLASTER, THYRSUS,AND HYPANTHODIUM ( CAN BE COVERED IN PRACTICALS)</b>	<b>2HR</b>

## **FLOWER MORPHOLOGY**

**THALAMUS:** EPIGYNY, HYPOGYNY AND PERIGYNY CONDITIONS **3HR**

**BRACTS:** LEAFY, SCALY, SPATHE, PETALIOD, INVOLUCURE, EPICALYX AND GLUMES

**CALYX:** PERSISTENT, DECIDUOUS AND CADUCOUS TYPES

**COROLLA AND THEIR VARIATIONS:** CRUCIFORM, , ROSACEOUS,

PAPILIONACEOUS ,CAMPANULATE, TUBULAR, SALVER SHAPED, INFUNDIBULIFORM, ROTATE, , BILABATE AND PERSONATE TYPES

**AESTIVATION:** VALVATE, TWISTED, IMBRICATE TYPES (ASCENDINGLY IMBRICATE, QUINCUNTIAL, VEXILLARY) TYPES

**ANDROECIUM-** PARTS OF A STAMEN, STAMINODE , COHESION, ADHESION, ,DIDYNAMOUS AND TETRADYNAMOUS TYPES

TYPES OF FIXATION OF ANTHER

**GYNOECIUM/ PISTIL**– PARTS OF A PISTIL , PISTILLODE, SIMPLE, COMPOUND,

PLACENTATION- MARGINAL, AXILE, PARIETAL, BASAL, CENTRAL, FREE CENTRAL AND SUPERFICIAL

**TYPES OF FRUITS:** SIMPLE- FLESHY-POME,BERRY ,DRUPE, PEPO HESPERIDIUM AND BALUSTA

DRY DEHISCENT:LEGUME,FOLLICLE,SILQUA AND TYPES OF CAPSULES

DRY INDEHISCENT:CARYOPSIS ,ACHENE AND CYPSELLA

,CREMOCARP,REGMA,CARCERULE AND NUT

SCHIZOCARPIC FRUIT :LOMENTUM

AGGREGATE :ETAERIO OF FOLLICLES AND BERRIES

MULTIPLE TYPES- SYCONUS AND SOROSIS (**CAN BE COVERED IN PRACTICALS**)

**SEED:** STRUCTURE ,TYPES- DICOT AND MONOCOT, ENDOSPERMOUS AND NON ENDOSPERMOUS

## **UNIT IV: PLANT EMBRYOLOGY**

**12 HR**

**POLLINATION:** INTRODUCTION TYPES - SELF AND CROSS POLLINATION ,

**4HR**

CONTRIVANCES FOR SELF AND CROSS POLLINATION,

TYPES OF CROSS POLLINATION – ANEMOPHILY, ZOOPHILY,ENTOMOPHILY,

HYDROPHILY, MALACOPHILY AND CHIROPTEROPHILY

SPECIAL TYPES- LEVER ( SALVIA) AND PISTON MECHANISMS

## **EMBRYOLOGY (DEVELOPMENTAL BIOLOGY)**

**3HR**

STRUCTURE OF ANTHER (T.S.) ,MICROSPOROGENESIS, DEVELOPMENT OF MALE GAMETOPHYTE

STRUCTURE OF OVULE(V.S), TYPES OF OVULES AND MEGASPOROGENESIS,

DEVELOPMENT OF FEMALE GAMETOPHYTE

**FERTILIZATION:** TRIPLE FUSION, DOUBLE FERTILIZATION AND SIGNIFICANCE

**1HR**

**ENDOSPERM:** TYPES OF ENDOSPERM

**4 HR**

**EMBRYO:** STRUCTURE AND DEVELOPMENT OF DICOT AND MONOCOT EMBRYOS

**SEED:** PARTS OF DICOT AND MONOCOT SEEDS AND DEVELOPMENT

## REFERENCES:

1. BHATNAGAR, S.P. (2000) : THE EMBRYOLOGY OF ANGIOSPERMS (4TH EDITION) VIKAS PUBLISHING HOUSE(P)LTD., UBS PUBLISHER'S DISTRIBUTORS, NEW DELHI
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**G507.3P BIODIVERSITY III, MORPHOLOGY AND EMBRYOLOGY OF ANGIOSPERMS  
(PRACTICALS OF 3 HR EACH, 1 PRACTICAL PER WEEK)**

1. STUDY OF PTERIDOPHYTES – MORPHOLOGY OF SPOROPHYTES IN *PSILOTUM* AND T.S. OF SYNANGIUM  
MORPHOLOGY OF SPOROPHYTE OF *SELAGINELLA*, ANATOMY OF RHIZOME AND RHIZOPHORE CONE W.M. AND L.S
2. MORPHOLOGY OF SPOROPHYTE OF *PTERIS*, ANATOMY OF RHIZOME, SPOROPHYLL T.S. AND GAMETOPHYTE
3. MORPHOLOGY OF SPOROPHYTE, *MARSELIA*, ANATOMY OF RHIZOME AND SPOROCARP (H.L.S.)
4. STUDY OF GYMNOSPERMS – *CYCAS*: MORPHOLOGY OF SPOROPHYTE, ANATOMY OF LEAFLET, CORALLOID ROOTS AND ITS ANATOMY, MALE CONE, MICROSPOROPHYLLS AND ITS T.S MEGASOPROPHYLLS, OVULE AND L.S.
5. *PINUS*: MORPHOLOGY OF SPOROPHYTE, ANATOMY OF NEEDLE, MALE CONE AND ITS L. S., POLLEN GRAINS W.M, FEMALE CONE, L.S. AND OVULE, L.S.
6. MORPHOLOGY OF SPOROPHYTE IN *GNETUM*- ANATOMY OF YOUNG STEM, EXCENTRIC SECONDARY GROWTH, MALE CONE AND ITS L. S., FEMALE CONE, ITS L.S., OVULE L.S.
7. STUDY OF LEAF TYPES- SIMPLE AND COMPOUND, LEAF STIPULES- ADNATE, INTERPETIOLAR, FOLIACEOUS AND OCHREATE  
MODIFICATIONS—LEAF TENDRILS, LEAF SPINES, PHYLLODE AND LEAFY BUDS
8. STUDY OF TYPES OF INFLORESCENCE :SIMPLE RACEME, PANICLE, SPIKE, SPADIX, CORYMB, UMBEL GLOBOSE HEAD, CAPITULUM,, SOLITARY, SIMPLE, MONOCHASIAL, DICHASIAL CYMES, CYATHIUM, VERTICILLASTER AND HYPANTHODIUM
9. ANther- T.S. OF YOUNG AND MATURE ANther, TYPES OF PLACENTATION AND OVULES
10. STUDY OF TYPES OF FRUITS- SIMPLE FLESHY, SIMPLE-DRY DEHISCENT AND INDEHISCENT, AGGREGATE AND COMPOSITE  
PARTS OF DICOT AND MONOCOT SEED, V.S OF DICOT AND MONOCOT EMBRYO, SEPARATION AND MOUNTING OF EMBRYOS OF RICE AND GRAM
11. FIELD VISITS/WORKSHOP
12. PRACTICAL TEST

## II BSC III SEM PRACTICAL EXAMINATION

### G 507.3P BIODIVERSITY- III, MORPHOLOGY AND EMBRYOLOGY OF ANGIOSPERMS

MAX MARKS: 40

TIME: 3 HR

1. PREPARE A TEMPORARY STAINED SLIDE OF MATERIAL **A AND B**. **6X2=12**  
(PREPARATION-3, LAB.SKETCH-1, IDENTIFICATION WITH CLASSIFICATION-1)
2. WRITE CRITICAL COMMENTS ON **C, D, E AND F** **3X4=12**  
(IDENTIFICATION- 0½, REASONS-2½)
3. IDENTIFY THE GIVEN SLIDES **G, H AND I**. **3X3=9**  
(IDENTIFICATION-½, LAB.SKETCH-1½, REASONS-1)
4. RECORD **07**

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**SPECIMEN A –PTERIDOPHYTE**

**SPECIMEN B – GYMNOSPERM**

**SPECIMEN C, D, E, F – PTERIDOPHYTE/GYMNOSPERM/MORPHOLOGY OF ANGIOSPERM**

**SPECIMEN G, H, I – SLIDES FROM ANY GROUPS (ONE EACH FROM EMBRYOLOGY, PTERIDOPHYTEAND GYMNOSPERM)**

## II BSc. III SEMESTER

### G 507.3E MEDICINAL BOTANY

Choice based credit system – **Interdisciplinary**-An elective course for skill Development which enables an exposure to some other discipline/domain

**30 Hours (2 hrs/week)**

#### Course outcome

On completion of this course student will be able :

- To understand the concept of plant based medicine
- To understand the Medico-ethnobotanical sources
- To identify local wild edible and medicinal plants

#### Unit 1

**15 hrs**

History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda, Siddha, Unani Systematic position & medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, blood pressure and skin diseases.

Phytochemistry - active principles and methods of their testing, identification and utilization of the medicinal herbs; *Catharanthus roseus* (cardiotonic), *Withaniasomnifera* (drugs acting on nervous system), *Clerodendron phlomoides* (anti-rheumatic) and *Centella asiatica* (memory booster). Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds)

#### Unit II

**15 hrs**

Medico-ethnobotanical sources in India; Significance of the following plants in ethnobotanical practices (along with their habitat and morphology) *Holigarna ferruginea*, *Cynodon dactylon*, *Cymbopogon citratus*, *Achyranthus aspera*, *Azadirachta indica*, *Ocimum*

*sanctum*, *Vitex negundo*, *Gloriosa superba*, *Tribulus terrestris*, *Pongamia pinnata*, *Cassia*

*auriculata*, *Indigofera tinctoria*, *Mimosa pudica*, *Phyllanthus amarus*, *Cyperus rotundus*, *Aerva lanata*.

Role of ethnobotany in modern medicine with special reference to *Phyllanthus niruri*, *Rauwolfia serpentina*, *Trichopus zeylanicus*, *Artemisia vulgaris*, *Withaniasomnifera*.

Wild edible plants of the locality : *Aporosa lindleyana*, *Phyllanthus emblica*, *Syzigium caryophyllatum*, *Artocarpus hirsutus*, *Ixoracoccinia*, *Amaranthus viridis*, *Cassia tora*, *Colocasia esculenta*, *Carissa congesta*, *Garcinia indica*.

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4. Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons, Chichester



## II B.Sc IV SEMESTER

### G 507.4 PLANT SYSTEMATICS AND COMMERCIAL BOTANY

48 HOURS, PER WEEK / 4 HR

#### UNIT I:

12HR

#### TAXONOMY

5HR

**INTRODUCTION:** SYSTEMS OF CLASSIFICATION, SALIENT FEATURES WITH MERITS AND DEMERITS

**ARTIFICIAL SYSTEM-** KARL VON LINNAEUS

**NATURAL SYSTEM-** DETAILED STUDY OF BENTHAM AND HOOKER CLASSIFICATION

**PHYLOGENETIC SYSTEMS** –OUTLINE AND SALIENT FEATURES OF ENGLER AND PRANTLE

AN INTRODUCTION TO APG SYSTEM OF CLASSIFICATION

**MODERN TRENDS IN TAXONOMY**–A BRIEF STUDY OF CYTOTAXONOMY, CHEMOTAXONOMY, NUMERICAL AND MOLECULAR TAXONOMY

**PLANT NOMENCLATURE-** BINOMINAL NOMENCLATURE WITH PRINCIPLES AND GUIDELINES, INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (**ICBN**)

6HR

**HERBARIA:**INTRODUCTION, HERBARIUM TECHNIQUES (PLANT COLLECTION, PROCESSING AND PRESERVATION) AND DIGITAL HERBARIA

**HERBARIA:** REGIONAL HERBARIA, NATIONAL HERBARIA AND INTERNATIONAL HERBARIA

**BOTANICAL GARDENS:** SIGNIFICANCE OF NATIONAL AND INTERNATIONAL BOTANICAL GARDENS AND ARBORATUM

**FLORAS:** REGIONAL AND NATIONAL WITH SIGNIFICANCE

**TECHNICAL DESCRIPTION OF ANGIOSPERMIC PLANTS**

1HR

#### UNIT II

12HR

#### STUDY OF SELECTED FAMILIES (BENTHAM AND HOOKER,S SYSTEM OF

CLASSIFICATION): DIAGNOSTIC CHARACTERS WITH MORPHOLOGICAL PECULIARITIES (WHERE EVER APPLICABLE) AND ECONOMIC IMPORTANCE OF THE FOLLOWING FAMILIES

**DICOTYLEDONAE -POLYPETALAE** ANNONACEAE, CRUCIFERAE, MALVACEAE, TELIACEAE, RUTACEAE, ANACARDIACEAE, PAPILIONACEAE, CAESALPINIACEAE, MIMOSACEAE, CUCURBITACEAE AND APIACEAE

#### UNIT III:

12HR

#### STUDY OF FAMILIES ( CONTINUED)

7HR

DIAGNOSTIC CHARACTERS WITH MORPHOLOGICAL PECULIARITIES (WHERE EVER APPLICABLE) AND ECONOMIC IMPORTANCE OF THE FOLLOWING FAMILIES

**GAMOPETALAE:** RUBIACEAE, ASTERACEAE, APOCYANACEAE, ASCLEPIDACEAE, CONVULVACEAE, SOLANACEAE, SCROPHULARIACEAE, ACANTHACEAE AND LAMIACEAE

<b>APETALAE:</b> AMARANTHACEAE, EUPHORBIACEAE AND MORACEAE	<b>5HR</b>
<b>MONOCOTYLEDONAE:</b> LILIACEAE, ZINGEBERACEAE, MUSACEAE, ARECACEAE, ORCHIDACEAE AND POACEAE	
<b>UNIT IV:</b>	<b>12HR</b>
<b>COMMERCIAL BOTANY: INTRODUCTION ,SCOPE AND ITS IMPORTANCE</b>	<b>1HR</b>
DISTRIBUTION, FAMILY, BOTANICAL NAME, PARTS USED AND USES OF THE FOLLOWING	
<b>CEREALS AND MILLETS:</b> WHEAT,MAIZE,RICE RAGI AND JOWAR ( <b>IN PRACTICALS</b> )	
<b>PULSES:</b> COW PEA ,BENGAL GRAM,PEA,GREEN GRAM ,BLACK GRAM HORSE GRAM AND BEANS ( <b>IN PRACTICALS</b> )	
<b>OIL YIELDING PLANTS:</b> GROUND NUT, COCONUT OIL, SUNFLOWER OIL,MUSTARD ,CASTOR AND SESAME ( <b>IN PRACTICALS</b> )	<b>1HR</b>
EXTARCTION OF COCONUT OIL	
<b>SUGAR YIELDING PLANTS:</b> , SUGARCANE , BEET ROOT( <b>IN PRACTICALS</b> ) AND <i>STEVIA LEAF</i>	
EXTARCTION OF SUGAR FROM SUGARCANE	
<b>SPICES AND CONDIMENTS:</b> ,BLACK PEPPER,CLOVE ,CORIANDER,GINGER ,TURMERIC ,CARDAMOM,ONION,GARLIC, ,RED CHILLY, CINNAMON, BLACK CUMIN , ,ASAFOETIDA( <b>IN PRACTICALS</b> )	
<b>BEVERAGES:</b> COFFEE,TEA AND <i>COCOA</i> ( <b>IN PRACTICALS</b> ).	<b>1HR</b>
KOKUM (MANGOSTEEN) AND KOLANUT, EXTRACTION OF COFFEE ,COCOA	
<b>FIBER YIELDING PLANTS:</b> COTTON ,JUTE AND BANANA ( <b>ASSIGNMENT</b> )	<b>1HR</b>
<b>PRACTICALS</b> ) ,FLAX , <i>SUNHEMP</i> AND HEMP	
EXTRACTION OF FIBRE FROM JUTE AND COIR FROM <i>COCONUT</i>	
RUBBER YIELDING PLANT: RUBBER WITH EXTRACTION	
GUMS AND RESINS:SAPOTA,ACACI A,CASHEW AND AILANTHUS	
<b>NARCOTIC /STIMULANT PLANTS:</b> GANJA ,POPPY ,HEMP AND TOBACCO	<b>1 HR</b>
<b>TIMBER YIELDING PLANTS:</b>	<b>3HR</b>
TEAK ,ROSEWOOD ,SAL ,JACK SPECIES , RED SANDALWOOD , MAHOGANY , HOPEA ( <i>BOGI -HOPEA WHITIANA</i> ), INDIAN KINO TREE( <i>BENGA</i> ) AND <i>DIPTEROCARPUS</i> ( <i>DHUPA</i> )	
<b>FLAVORING AND PERFUMERAY PRODUCTS:</b> ROSE, VANILLA	<b>1HR</b>
SANDALWOOD ,EUCALYPTUS AND LAVENDER	
<b>ETHNOBOTANY: INTRODUCTION</b>	<b>3HR</b>
<b>MEDICINAL PLANTS:</b> DISTRIBUTION, FAMILY, BOTANICAL NAME, PARTS USED AND THERAPEUTIC USES OF THE FOLLOWING PLANTS	
SARPAGANDHA,FOXGLOVE, BELLADONA, ARJUN TREE,QUININE,NUX VOMICA, ALOE,, PERIWINKLE, GUDUCHI, BASIL, INDIAN PENNYWORT AND KURCHI	

## REFERENCES

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13. SUTARIA R.N 1962.3<sup>RD</sup> EDITION. **A TEXT BOOK OF SYSTEMATIC BOTANY**. KHADATAYA BOOK DEPOT. BALA HANUMAN, AHMEDABAD.
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## II BSC SEMESTER IV

### G507.4P PLANT SYSTEMATICS & COMMERCIAL BOTANY (PRACTICALS OF 3HRS EACH, ONE PRACTICAL PER WEEK)

1. TECHNICAL DESCRIPTION – DICOT AND MONOCOT PLANTS
2. STUDY OF DICOT FAMILIES  
POLYPETALAE:, MALVACEAE, TELIACEAE, RUTACEAE
3. STUDY OF PAPILIONACEAE, CAESALPINIAE, MIMOSAE
4. STUDY OF MYRTACEAE, ANACARDIACEAE, UMBELLIFERAE
5. STUDY OF GAMOPETALAE- RUBIACEAE, ASTERACEAE, APOCYANACEAE
6. STUDY OF ASCLEPIADACEAE, CONVULVULACEAE, SOLANACEAE
7. STUDY OF APETALAE- SCROPHULARIACEAE, ACANTHACEAE, LAMIACEAE
8. STUDY OF AMARANTHACEAE, EUPHORBIACEAE ORCHIDACEAE
9. MONOCOTS:, LILIACEAE, MUSACEAE ARECACEAE AND POACEAE
10. ECONOMIC BOTANY -- SCIENTIFIC NAME, COMMON NAME, PART USED AND IMPORTANCE  
**PULSES:** COW PEA,BENGAL GRAM,PEA,GREEN GRAM ,BLACK GRAM .HORSE GRAM AND BEANS  
**CEREALS AND MILLETS:** WHEAT,MAIZE,RICE RAGI AND JOWAR  
**SUGAR YIELDING PLANTS:** BEET ROOT AND SUGARCANE  
**OIL YIELDING PLANTS:** GROUND NUT, MUSTARD ,CASTOR ,SESAME AND COCONUT
11. ECONOMIC BOTANY -- SCIENTIFIC NAME, COMMON NAME, PART USED AND IMPORTANCE  
**SPICES AND CONDIMENTS:** PEPPER,CLOVE CORIANDER,GINGER ,TURMERIC ,CARDAMON, ONION, GARLIC, MANGOGINGER, RED CHILLY, CINNAMUM, CUMIN AND ASAFOETIDA  
**BEVERAGES:** COFFEE,TEA AND COCOA  
**FIBER YIELDING PLANTS:** COTTON ,JUTE AND *BANANA*  
**PLANTATION CROPS:** RUBBER , ARECANUT AND CASHEW
12. FIELD VISITS/INDUSTRIES
13. PRACTICAL TEST

**II BSC IV SEMESTER**

**G507.4P PLANT SYSTEMATICS AND COMMERCIAL BOTANY**

**TIME: 3HRS**

**MAX MARKS: 40**

1. DERIVE SYSTEMATICALLY AND ASSIGN THE PLANTS **A,B** AND **C** TO THEIR RESPECTIVE FAMILIES GIVING SALIENT FEATURES **4X3=12**  
(DERIVATION-01, FAMILY NAME-01, SALIENT CHARACTERS-02)
2. DESCRIBE THE PLANTS **D** IN TECHNICAL TERMS **03**
3. WRITE THE FLORAL DIAGRAM AND FLORAL FORMULA OF **E** **03**  
(FLORAL DIAGRAM-02, FLORAL FORMULA=01)
4. WRITE THE ECONOMIC IMPORTANCE OF **F, G, H, I, J** AND **K** **6X2=12**  
(SCIENTIFIC NAME -½,.FAMILY ½, PART USED WITH USES-1)
5. CLASS RECORDS **05**
6. HERBARIUM **05**

**SPECIMEN A, B AND C – ONE EACH FROM POLYPETALAE, GAMOPETALE AND APETALAE**

**SPECIMEN D - POLYPETALAE OR GAMOPETALAE**

**SPECIMEN E – PLANT WITH LARGE FLOWER OR LARGE FLOWER BUD TO BE GIVEN**

**DICOT/MONOCOT**

**II BSc. IV SEMESTER**  
**G 507.4E NURSERY AND GARDENING**

Choice based credit system – **Interdisciplinary**-An elective course which enables an exposure to some other discipline/domain

**30 Hours (2 hrs/week)**

**Course outcome**

On completion of this course student will be able :

- To understand the the concept and importance of gardening
- To maintain a nursery
- To commercialize the knowledge

**Unit I**

**15 Hrs**

**Introduction:** Definition, objectives, scope and building up of infrastructure for nursery

**Planning and seasonal activities** - Planting - direct seeding and transplants. Nursery Management and Routine Garden Operations. Different types of gardening- Landscape and home gardening - parks and its components, plant materials and design

**Gardening operations:** soil laying, manuring, watering.

Principles of organic farming ,Management of pests.

Green house - mist chamber, shade house and glass house for propagation.

**Unit II**

**15 Hrs**

**Propagation methods:** Sowing/raising of seeds and seedlings, transplanting of seedlings. Air-layering, cutting, selection of cutting , propagule collecting season, treatment of cutting , rooting medium and planting of cuttings, Hardening of plants.

**Ornamental Plants with examples:** Flowering annuals; herbaceous, perennials, Divine vines, Shade and ornamental trees, Ornamental bulbous and foliage plants, Cacti and succulents, Ornamental palms, Medicinal, Aromatic plants and Hydrophytes

Cultivation of plants in pots, Indoor gardening, Bonsai.

Cultivation of Important flowers (Anthuriums, Orchids, Marigold, Jasmine)

**References**

1. Ratha Krishnan, P., Rajwant K. Kalia, Tewari, J.C. and Roy, M.M. 2014. Plant Nursery Management: Principles and Practices. Central Arid Zone Research Institute, Jodhpur.
2. Smith E.C. 2009. Vegetable garden bible. Storey Publishing LLC, USA.
3. Uberoi M. 2002. The Penguin Book of Gardening in India. Penguin random house publishers, New Delhi
4. Batth A.S. 2016. Home Gardeners' Guide Indian Garden Flowers, New Delhi.

### III B.Sc SEMESTER V

#### G 507.5a ENVIRONMENTAL SCIENCE

42 HOURS

#### UNIT I

14HR

#### MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

2HR

INTRODUCTION TO ENVIRONMENT, SCOPE AND IMPORTANCE OF ENVIRONMENTAL SCIENCES,, ENVIRONMENTAL FACTORS, NEED FOR PUBLIC AWARENESS: PERSONAL INVOLVEMENT, INDIA'S ENVIRONMENTAL CONCERNS AND GLOBAL ENVIRONMENTAL ISSUES

#### THE ECOSYSTEMS

5HR

CONCEPTS , FUNCTIONING, COMPONENTS AND PRODUCTIVITY.

ENERGY FLOW IN AN ECOSYSTEM, FOOD CHAIN FOOD WEB AND ECOLOGICAL PYRAMIDS.

MAJOR ECOSYSTEMS-TERRESTRIAL, AQUATICAND MAN-ENGINEERED (CROPLAND) ECOSYSTEMS

#### BIODIVERSITY AND ITS CONSERVATION LEVELS OF BIODIVERSITY

7HR

GENETIC DIVERSITY, SPECIES DIVERSITAND ECOSYSTEM DIVERSITY.

BIOGEOGRAPHICAL CLASSIFICATION OF INDIA

VALUE OF BIODIVERSITY, GLOBAL BIODIVERSITY, INDIAN BIODIVERSITY, INDIA AS A MEGA-DIVERSITY NATION

HOTSPOTS OF BIODIVERSITY, THREATS TO BIODIVERSITY, ENDANGERED SPECIES OF INDIA, ENDEMIC SPECIES OF INDIA,

CONSERVATION METHODS-*IN SITU* AND *EX SITU* CONSERVATION

#### UNIT II

14

#### ECOLOGICAL GROUPS AND ECOLOGICAL ADAPTATIONS

9HR

ECOLOGICAL GROUPS: INTRODUCTION AND CLASSIFICATION

HYDROPHYTES :CLASSIFICATION

MORPHOLOGICAL , ANATOMICAL , PHYSIOLOGICAL CHARACTERS AND

ADAPTA TIONS IN :1.LEMNA, 2.PISTIA, 3.EICHHORNIA, 4.TRAPA, 5.UTRICULARIA,

6.POTAMOGETON, 7.HYDRILLA, 8.CERATOPHYLLUM, 9.VALLISNARIA, 10.NYMPHAEA,

11.TYPHA, 12.JUSSIAEA, 13.SAGITTARIA

XEROPHYTES :CLASSIFICATION

MORPHOLOGICAL , ANATOMICAL , PHYSIOLOGICAL CHARACTERS AND

ADAPTATIONS IN -1.ALOE, 2.AGAVE, 3.OPUNTIA, 4.EUPHORBIA, 5.ASPARAGUS, 6.RUSCUS,

7.CALATROPIS, 8.ACACIA, 9.CAPPARIS, 10.ZIZYPUS, 11.MUEHLENBECKIA, 12.CASUARINA,

13..NERIUM, 15.ARGEMONE

EPIPHYTES: CLASSIFICATION

MORPHOLOGICAL , ANATOMICAL , PHYSIOLOGICAL CHARACTERS AND

ADAPTATIONS IN - 1.VANDA, 2.DISCHIDIA, 3.BULBOPHYLLUM, 4.FICUS

HALOPHYTES: CLASSIFICATION

MORPHOLOGICAL , ANATOMICAL , PHYSIOLOGICAL CHARACTERS AND ADAPTATIONS IN - 1.AVICINNIA, 2.RHIZOPHORA.

PARASITES :CLASSIFICATION

MORPHOLOGICAL , ANATOMICAL , PHYSIOLOGICAL CHARACTERS AND ADAPTATIONS IN : 1.BALANOPHORA 2.RAFFLESIA 3.ORBANCHOE 4.SANTALUM 5.CUSCUTA 6.LORANTHUS 7.VISCUM

**MESOPHYTES:**

ANATOMY OF DICOTS AND MONOCOTS :ROOT ,STEM AND LEAF (TO BE COVERED IN PRACTICALS)

**ECOLOGICAL SUCCESSION**

**5HR**

INTRODUCTION ,TYPES –1.AUTOGENIC 2. ALLOGENIC 3. DEFLECTED 4. INDUCED, 5.PRIMARY 6. SECONDARY 7. AUTOTROPHIC 8. HETEROTROPHIC 9. PROGRESSIVE 10 .RETROGRESSIVE SUCCESSIONS

PROCESS IN SUCCESSION: 1.NUDATION, 2.MIGRATION, 3.ECESIS, 4.AGGREGATION, 5.INVASION, 6.COMMUNITY RELATIONSHIPS 7.COMPETITION, 8.REACTION, 9.STABILIZATION

HYDROSERE: 1.PLANKTON STAGE, 2.SUBMERGED STAGE, 3.FLOATING STAGE, 4.REED SWAMP STAGE, 5.MARSH MEADOW STAGE, 6.WOODLAND STAGE, 7.CLIMAX VEGETATION

XEROSERE: 1.CRUSTOSE LICHEN STAGE, 2.FOLIOSE LICHEN STAGE, 3.MOSS STAGE, 4.HERBACEOUS STAGE, 5.SHRUB STAGE, 6.CLIMAX VEGETATION

**UNIT III**

**14HR**

**SOCIAL ISSUES AND ENVIRONMENT**

**UNSUSTAINABLE TO SUSTAINABLE DEVELOPMENT-POPULARIZATION OF CONCEPT OF SUSTAINABLE DEVELOPMENT, URBAN PROBLEMS RELATED TO ENERGY, VARIATION IN GLOBAL PATTERNS OF ENERGY CONSUMPTION, ENERGY CONSUMPTION AS A MEASURE OF QUALITY OF LIFE, ENERGY PROBLEMS IN INDIA AND SOLUTION**

**4HR**

**WATER CONSERVATION: RAIN WATER HARVESTING, WATERSHED MANAGEMENT, WATERSHED CONSERVATION PRACTICES, SOLUTION FOR WATER CONSERVATION AND CASE STUDIES**

**2HR**

**RESETTLEMENT AND REHABILITATION- PROBLEMS ASSOCIATED, REHABILITATION WITH DEVELOPMENT AND SUCCESSFUL DEVELOPMENTAL RESETTLEMENT PROGRAMME**

**ENVIRONMENTAL ETHICS-NEED FOR AN INTERNATIONAL AND REGIONAL EQUITY**

**1HR**

**CLIMATE CHANGE-GREENHOUSE EFFECT, GLOBAL WARMING AND CLIMATE CHANGE, IMPACT OF GLOBAL WARMING, OZONE LAYER DEPLETION, NUCLEAR ACCIDENTS, NUCLEAR HOLOCAUST, WASTE LAND RECLAMATION AND WASTELAND MANAGEMENT- ENERGY PLANTATION**

**5HR**

**CONSUMERISM : COSTS OF CONSUMERISM,GENERATION OF WASTE PRODUCTS, PREVENTION OF CONSUMERISM**



## REFERENCES

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2. AGARWAL K.C 1993, **ENVIRONMENTAL BIOLOGY** 2<sup>ND</sup> EDITION AGRO BOTANICAL PUBLICATIONS INDIA.
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16. SWAMINATHAN M.S AND S.JANA. (EDS) 1992. **BIODIVERSITY** MAC MILLAN INDIA.
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**III B.Sc SEMESTER V**  
**G507.5b MOLECULAR BIOLOGY I AND GENETICS**

	<b>42 HOURS</b>
<b>UNIT I MOLECULAR BIOLOGY I</b>	<b>14HR</b>
<b>NUCLEIC ACIDS</b>	<b>5HR</b>
INTRODUCTION, DISCOVERY, CHEMICAL COMPOSITION, ,STRUCTURE OF DNA- WATSON CRICK MODEL, BRIEF NOTE ON TYPES OF DNA, ORGANELLE DNA (MITO DNA AND PLASTID DNA) WITH FUNCTIONS CONCEPT OF GENE- CISTRON, MUTON AND RECON  EXPERIMENTAL EVIDENCES TO PROVE DNA AS GENETIC MATERIAL- GRIFFITH, AVERY ET.AL ., HERSHEY AND CHASE EXPERIMENTS	
<b>DNA-REPLICATION</b>	<b>3HR</b>
EXPERIMENTAL EVIDENCE IN BRIEF- MESELSON AND STHAL EXPERIMENT,STEPS INVOLVED IN SEMI-CONSERVATIVE METHOD OF REPLICATION	
<b>GENETIC CODE</b> –DISCOVERY, CHARACTERISTIC FEATURES WITH EXAMPLES	<b>1HR</b>
<b>PROTEIN SYNTHESIS</b>	<b>5HR</b>
PROTEIN SYNTHESIS- STEPS AND MECHANISM OF TRANSCRIPTION AND TRANSLATION(PROCESS OF INITIATION ELONGATION AND TERMINATION )	
<b>UNIT II:</b>	<b>14HR</b>
<b>MENDELISM:</b> MEHODOLOGY , CONCEPTS OF INFERITANCE BASED ON MONOHYBDID AND DIHYBRID CROSSES	<b>3 HR</b>
<b>DEVIATIONS FROM MENDELISM</b>	<b>2HR</b>
CONCEPTS AND PRINCIPLES OF INCOMPLETE DOMINANCE, MONOHYBRID WITH PLANT EXAMPLE  MULTIPLE ALLELISM- SELF STERILITY ALLELES IN PLANTS WITH EXAMPLES	
<b>INTERACTION OF GENES:</b>	<b>4HR</b>
INTRODUCTION, TYPES- INHERITANCE PATTERN OF COMPLEMENTARY, SUPPLEMENTARY, EPISTATIC, DUPLICATE GENES WITH A PLANT EXAMPLE FOR EACH CONCEPT OF QUANTITATIVE / POLYMERIC GENE INTERACTION IN PLANTS	<b>1HR</b>
<b>CROSSING OVER:</b> TYPES ,CYTOLOGICAL BASIS OF CROSSING OVER IN PLANTS , SIGNIFICANCE	<b>2HR</b>
<b>LINKAGE</b> CONCEPT ,INCOMPLETE LINKAGE IN PLANTS	<b>2HR</b>
-EXAMPLE–MAIZE, NOTE ON LINKAGE MAP AND SIGNIFICANCE	

<b>UNIT: III</b>	<b>14HR</b>
<b>SEX DETERMINATION</b>	<b>2HR</b>
NOTE ON CHROMOSOMAL MECHANISMS OF SEX DETERMINATION WITH SUITABLE PLANT EXAMPLES FOR EACH TYPE(FLOW CHART ONLY)	
NOTE ON SEX CHROMOSOMES AND MECHANISM IN <i>MELANDRIUM ALBUM</i> AND GENE CONTROLLED MECHANISM IN PLANTS (MAIZE, PAPAYA, <i>LUFFA</i> AND <i>ASPARAGUS</i> )	
<b>MUTATIONS</b>	
<b>GENOMATIC MUTATIONS (NUMERICAL VARIATIONS )</b>	<b>1HR</b>
ANEUPLOIDY- TRISOMY IN <i>DATURA</i> AND NULLISOME IN WHEAT	
HAPLOIDY IN PLANTS: OCCURRENCE, CYTOLOGY AND SIGNIFICANCE	<b>1HR</b>
POLYPLOIDY:ORIGIN OF AUTO AND ALLOPOLYPLOIDY	<b>3HR</b>
SIGNIFICANCE - ROLE OF AUTO AND ALLOPOLYPLOIDY IN PLANT BREEDING, SPECIATION AND EVOLUTION WITH EXAMPLES	
(PRODUCTION/ORIGIN OF RAPHANOBASSICA, TETRAPLOID AND HEXAPLOID VARIETIES OF WHEAT, TOBACCO,COTTON AND TRITICALE)	
<b>CHROMOSOMAL ABERRATIONS (STRUCTURAL VARIATIONS): TYPES ,CYTOLOGY AND SIGNIFICANCE OF DELETIONS, DUPLICATIONS, INVERSIONS AND TRANSLOCATIONS IN PLANTS</b>	<b>4 HR</b>
<b>POINT/GENE MUTATION: DEFINITION OF DOMINANT ,RECESSIVE , GERMINAL AND LETHAL MUTATIONS</b>	<b>1 HR</b>
NOTE ON – SPONTANEOUS, SOMATIC, BIOCHEMICAL MUTATIONS WITH AN EXAMPLE FOR EACH TYPE	
MECHANISM OF MUTATION- BASE PAIR AND FRAME SHIFT MUTATIONS.	<b>2HR</b>
INDUCED MUTATION :NOTE ON-TYPES OF PHYSICAL AND CHEMICAL MUTAGENS AND THEIR EFFECTS	

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**G507.5P ENVIRONMENTAL SCIENCE MOLECULAR BIOLOGY I AND GENETICS  
PRACTICALS BASED ON G507.5a AND G507.5b, ONE PRACTICAL OF 4 HRS PER WEEK)**

**1. MINOR EXPERIMENT .**

STUDY OF POND ECOSYSTEM: STUDY OF ALL THE BIOTIC COMPONENTS- PRODUCERS, CONSUMERS, PRIMARY, SECONDARY, TERTIARY AND DECOMPOSERS

**2. MAJOR EXPT AND SPOTTERS**

**STUDY OF ECOLOGICAL GROUP: MESOPHYTES- ANATOMY OF DICOT AND MONOCOT STEM, DICOT AND MONOCOT ROOT, DICOT AND MONOCOT LEAF**

**3. MAJOR EXPERIMENTS AND SPOTTERS**

**STUDY OF ECOLOGICAL GROUP : HYDROPHYTES - MORPHOLOGY OF :** FREE FLOATING FORMS: *PISTIA, EICHHORNIA, SALVINIA, LEMNA, AZOLLA*

SUBMERGED FLOATING: *HYDILLA, UTICULARIA, CERATOPHYLLUM*

ROOTED SUBMERGED: *VALLISNERIA*

ROOTED WITH FLOATING LEAVES: *NYMPHAEA, MARSILEA*

EMERGENT: *LIMNOPHYLLA, HETEROPHYLLA, TYPHA, JUSSIAEA, SAGITTARIA, RANUNCULUS*

**STUDY OF ANATOMY OF HYDROPHYTES:** T.S OF *HYDRILLA* STEM, *NYMPHAEA* PETIOLE, *JUSSIAEA, VALLISNERIA*

**4 MAJOR EXPERIMENTS AND SPOTTERS**

**STUDY OF ECOLOGICAL GROUP -XEROPHYTES :MORPHOLOGICAL CHARACTERS -** ALOE, AGAVE, OPUNTIA, EUPHORBIA, ASPARAGUS, RUSCUS, CALATROPIS, ACACIA, CAPPARIS, ZIZYPUS, MUEHLENBECKIA, CASUARINA, , NERIUM, ARGEMONE

STUDY OF ANATOMY OF XEROPHYTES: T.S OF NERIUM LEAF, T.S OF CASUARINA PHYLLOCLADE, T.S OF ACACIA PHYLLODE, T.S OF MUEHLENBECKIA, T.S OF ASPARAGUS CLADODE

**STUDY OF ECOLOGICAL GROUP: EPIPHYTES - MORPHOLOGY OF:** *VANDA, BULBOPHYLLUM, DRYNARIA, ANATOMY OF VANDA* EPIPHYTIC ROOT

**5. MAJOR EXPERIMENTS AND SPOTTERS**

**STUDY OF ECOLOGICAL GROUP: HALOPHYTES**

**MORPHOLOGY OF:** *SPINIFEX, AVICENNIA* PNEUMATOPHORE, *RHIZOPHORA* VIVIPARY ANATOMY OF *AVICENNIA* PNEUMATOPHORE (T.S)

**STUDY OF ECOLOGICAL GROUP: PARASITES**

TOTAL STEM PARASITE- *CUSCUTA*, SEMI STEM PARASITE *LORANTHUS* ROOT PARASITE- *BALANOPHORA*

## MOLECULAR BIOLOGY AND GENETICS

### 6. MAJOR EXPERIMENT

1. ISOLATION OF DNA FROM YEAST CELLS
2. ISOLATION OF DNA FROM COCONUT ENDOSPERM
3. ISOLATION OF DNA FROM LEAVES

### 7 MAJOR EXPERIMENT

SEPARATION OF EYE PIGMENTS IN *DROSOPHILA*, AND DETERMINATION OF RF VALUE BY CIRCULAR PAPER CHROMATOGRAPHY METHOD

#### SPOTTERS

- 8 KARYOTYPE AND TRISOMY IN *DATURA* : MORPHOLOGICAL VARIATIONS IN THE SHAPE OF THE CAPSULES

LINKAGE MAP

RECIPROCAL TRANSLOCATION HETEROZYGOTES-SEGREGATION PATTERNS AND GAMETES FORMATION

- 9 **MINOR EXPERIMENT** ; TO SOLVE GENETIC PROBLEMS

MENDELISM- MONO AND DIHYBRID CROSSES WITH TEST CROSSES

INCOMPLETE DOMINANCE- MONO AND DIHYBRID CROSSES

- 10 **MINOR EXPERIMENT** : TO SOLVE GENETIC PROBLEMS

INTERACTION OF GENES- COMPLIMENTARY, SUPPLEMENTARY, EPISTATIC AND DUPLICATE GENES.

**MINOR: EXPERIMENT** TO SOLVE GENETIC PROBLEMS

MULTIPLE ALLELES- SELF STERILITY ALLELES IN PLANTS

- 11 **MAJOR EXPERIMENT:** AGAROSE GEL ELECTROPHORESIS-PREPARATION OF GEL, LOADING OF SAMPLE, (1) AGAROSE GEL ELECTROPHORESIS-PREPARATION OF GEL & LOADING OF THE SAMPLE( DYE CAN BE GIVEN)

(DEMONSTRATION OF STAINING OF GEL AND VISUALISATION )

- 12 PRACTICAL TEST

**III B.Sc V SEM**

**G507.5P ENVIRONMENTAL SCIENCE, MOLECULAR BIOLOGY I AND GENETICS**

**TIME: 4HRS**

**MAX MARKS: 80.**

**1. MAJOR EXPERIMENT A (ENVIRONMENTAL SCIENCE)**

**12X1=12**

PREPARE A TEMPORARY STAINED SECTION OF THE GIVEN SPECIMEN AND LEAVE IT FOR INSPECTION

(PREPARATION -4, SKETCH & LABEL-4, IDENTIFICATION OF THE GROUP WITH ECOLOGICAL FEATURES -4)

**2 .MINOR EXPERIMENT B**

**6X1=6**

IDENTIFY AND COMMENT ON THE COMPONENTS OF THE GIVEN ECOSYSTEM

(DESCRIPTION OF ECOSYSTEM-2, IDENTIFICATION & COMMENT ON THE COMPONENTS -4)

**3. MAJOR EXPERIMENT C ( MOLECULAR BIOLOGY I /GENETICS)**

**12X1=12**

(REQUIREMENTS-1, PROCEDURE-4, SETTING AND PERFORMING-3, RESULT-2, PRINCIPLE INVOLVED-2)

**4. SOLVE THE GIVEN GENETIC PROBLEM D**

**6X1=6**

(DERIVATION- 5, ANSWERS -1)

**5. IDENTIFY AND COMMENT ON THE SPOTTERS E, F, G, H, I, & J**

**4X6=24**

(IDENTIFICATION-1, COMMENT-3,)

**6. CLASS RECORDS.**

**10X2=20**

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(NOTE TO THE EXAMINERS)

- 1. ONE MAJOR EXPERIMENT AND ONE MINOR EXPT ENVIRONMENTAL STUDIES (ALL BY LOTS)**
- 2. ONE MAJOR EXPERIMENT FROM MOLECULAR BIOLOGY I/ GENETICS AND ONE MINOR EXPERIMENT ANY - 1 GENETIC PROBLEM ( ALL BY LOTS)**
- 3. SPOTTERS: THREE FROM ENVIRONMENTAL SCIENCE AND THREE FROM MOLECULAR BIOLOGY-I AND GENETICS.(PHOTOGRAPHS OR PHOTOCOPIES CAN BE GIVEN ) THREE SPOTTERS FROM ENVIRONMENTAL STUDIES AND THREE FROM MOLECULAR BIOLOGY I AND GENETICS**
- 4. RECORD VALUATION BY INTERNAL EXAMINER (BASED ON CONTINUOUS ASSESSMENT)**
- 5. ANSWER PAPER VALUATION BY BOTH EXTERNAL & INTERNAL EXAMINERS**

### III B.Sc SEMESTER VI

#### G507.6a PLANT PHYSIOLOGY

42 HOURS

#### UNIT I

#### PLANT WATER RELATIONS

3HR

**CONCEPT OF IMBIBITION DIFFUSION OSMOSIS:** OSMOTIC PRESSURE ( O.P. ) ,  
SIGNIFICANCE OF OSMOSIS IN PLANTS, PLASMOLYSIS, AND ITS SIGNIFICANCE  
DIFFUSION PRESSURE DEFICIT (D.P.D.), TURGOR PRESSURE- (T.P.), PLANT CELL AS AN  
OSMOTIC SYSTEM, RELATION SHIP BETWEEN O.P., T.P., D.P.D., WATER POTENTIAL AND  
OSMOTIC RELATIONS OF PLANT CELLS, (RELATIONSHIP BETWEEN  $\Psi$ ,  $\Psi_s$ ,  $\Psi_p$  )

#### ABSORBTION OF WATER

2 HR

MECHANISM OF WATER ABSORBTION: 1) ACTIVE ABSORBTION OF WATER

A) ACTIVE OSMOTIC ABSORBTION OF WATER, b) ACTIVE NON OSMOTIC ABSORBTION OF  
WATER

2) PASSIVE ABSORBTION OF WATER, EXTERNAL FACTORS AFFECTING WATER  
ABSORBTION, RELATIVE IMPORTANCE OF ACTIVE AND PASSIVE ABSORBTION OF  
WATER, FIELD CAPACITY

**ASCENT OF SAP:** PATH OF ASCENT OF SAP, MECHANISM OF ASCENT OF SAP, a) VITAL  
THEORIES, b) ROOT PRESSURE THEORY, c) PHYSICAL FORCE THEORY - TRANSPIRATION  
PULL ( COHESION TENSION THEORY), CAVITATION (EMBOLISM IN VASCULAR PLANTS)

2 HR

**TRANSLOCATION OF ORGANIC SOLUTES:** DIRECTION OF TRANSLOCATION, PATH OF  
TRANSLOCATION OF ORGANIC SOLUTE, MECHANISM OF TRANSLOCATION THROUGH  
PHLOEM – MUNCH'S MASS FLOW HYPOTHESIS, PHLOEM LOADING AND UNLOADING

2 HR

#### TRANSPIRATION AND GUTTATION:

3 HR

TRANSPIRATION, KINDS OF TRANSPIRATION, MECHANISM OF TRANSPIRATION-- a)  
STARCH SUGAR INTERCONVERSION THEORY, b) PROTON EXCHANGE PUMP THEORY,  
SIGNIFICANCE OF TRANSPIRATION- a) ADVANTAGES OF TRANSPIRATION, b)  
TRANSPIRATION AS A NECESSARY EVIL, FACTORS AFFECTING THE RATE OF  
TRANSPIRATION, PLANT ANTITRANSPIRANTS, DAILY PERIODICITY OF TRANSPIRATION

GUTTATION: STRUCTURE OF HYDATHODE, MECHANISM OF GUTTATION, FACTORS



AFFECTING GUTTATION, DIFFERENCE BETWEEN TRANSPIRATION AND GUTTATION

**MINERAL NUTRITION:** ESSENTIAL AND NON ESSENTIAL ELEMENTS IN PLANTS,  
GENERAL FUNCTIONS OF ESSENTIAL ELEMENTS IN PLANTS, SPECIFIC ROLES AND  
DEFICIENCY SYMPTOMS OF FOLLOWING MINERAL ELEMENTS IN PLANTS

2 HR

MAJOR ELEMENTS: NITROGEN, PHOSPHOROUS AND MAGNESIUM

MINOR ELEMENTS: IRON, MANGANESE AND ZINC

SOILLESS GROWTH OR HYDROPONICS, AEROPONICS

## **UNIT II:**

14 HR

### **BIOENERGETICS:INTRODUCTION OF CONCEPT AND SIGNIFICANCE**

8 HR

**PHOTOSYNTHESIS-** HISTORY, PHOTOSYNTHETIC APPARATUS, PHOTOSYNTHETIC  
PIGMENTS, ABSORPTION SPECTRUM AND ACTION SPECTRUM, FLUORESCENCE AND  
PHOSPHORESCENCE, QUANTUM REQUIREMENT AND QUANTUM YIELD, RED DROP AND  
EMMERSON'S ENHANCEMENT EFFECT, TWO PIGMENT SYSTEM

**MECHANISM OF PHOTOSYNTHESIS-** EVIDENCES FOR THE EXISTENCE OF LIGHT AND  
DARK REACTIONS

1) LIGHT REACTION/ PRIMARY PHOTOCHEMICAL REACTION, SOURCE OF OXYGEN  
RELEASED IN PHOTOSYNTHESIS ,

PHOTOPHOSPHORYLATION- CYCLIC AND NON CYCLIC,

2) DARK REACTION/ CARBON FIXATION CYCLE /CALVIN CYCLE

C4 / DICARBOXYLIC ACID PATHWAY/ HATCH-SLACK PATHWAY, DIFFERENCE  
BETWEEN C3 AND C4 PLANTS,

FACTORS AFFECTING PHOTOSYNTHESIS, BLACKMAN'S LAWS OF LIMITING FACTORS  
WARBURG'S EFFECT, CO<sub>2</sub> COMPENSATION POINT, PHOTORESPIRATION AND GLYCOLATE  
METABOLISM (C2 CYCLE), SIGNIFICANCE OF PHOTORESPIRATION, CRASSULACEAN ACID  
METABOLISM ( CAM CYCLE), RUBISCO

CHEMOSYNTHESIS, CARBON CYCLE IN NATURE, BACTERIAL PHOTOSYNTHESIS, GROUPS  
OF PHOTOSYNTHETIC BACTERIA, COMPARISON OF BACTERIAL PHOTOSYNTHESIS WITH  
THAT OF HIGHER PLANTS

**RESPIRATION-** MECHANISM OF RESPIRATION a) GLYCOLYSIS b) ANAEROBIC  
RESPIRATION/ FERMENTATION c) AEROBIC RESPIRATION/ KREB'S CYCLE, d) TERMINAL  
OXIDATION

6 HR

MODERN VIEW OF ELECTRON TRANSPORT SYSTEM, OXIDATION OF EXTRA  
MITOCHONDRIAL NADH (EXT NADH) GLYCEROPHOSPHATE SHUTTLE AND MALATE  
SHUTTLE, SIGNIFICANCE OF GLYCOLYSIS AND KREB'S CYCLE

RESPIRATORY QUOTIENT, FACTORS AFFECTING RESPIRATION, PASTEUR'S EFFECT,

DIFFERENCE BETWEEN OXIDATIVE PHOSPHORYLATION AND PHOTOPHOSPHORYLATION

**UNIT III**

**14 HR**

**GROWTH AND HORMONES**

**GROWTH** - DEFINITION, REGIONS OF GROWTH, GROWTH CURVE, MEASUREMENT OF GROWTH, DIRECT METHOD, HORIZONTAL MICROSCOPE METHOD, ARC AUXANOMETER, PFFEFER'S AUXANOMETER **1 HOUR**

**HORMONES**- NATURAL AND SYNTHETIC TYPES **5 HR**

1. AUXINS: DISCOVERY CHEMICAL NATURE, NATURAL AUXINS, SYNTHETIC AUXINS, PHYSIOLOGICAL EFFECTS OF AUXINS,
2. GIBBERLINS: DISCOVERY CHEMICAL NATURE, PHYSIOLOGICAL EFFECTS OF GIBBERLINS
3. KINETIN AND CYTOKININS: DISCOVERY, CHEMICAL NATURE, ZEATIN, PHYSIOLOGICAL EFFECTS OF KINETIN/CYTOKININ
4. ETHYLENE: DISCOVERY, PHYSIOLOGICAL EFFECTS OF ETHYLENE
5. ABSCISSIC ACID: DISCOVERY CHEMICAL NATURE, PHYSIOLOGICAL EFFECTS OF ABSCISSIC ACID

**PHOTOPERIODISM**: SHORT DAY PLANTS, LONG DAY PLANTS, DAY NEUTRAL PLANTS, PHOTOPERIODIC INDUCTION, PHYTOCHROME, GIBBERLINS AND FLOWERING RESPONSE **2 HR**

**VERNALISATION**: CONDITIONS NECESSARY FOR VERNALISATION, PRACTICAL UTILITY OF VERNALISATION **2HR**

**GERMINATION AND DORMANCY OF SEEDS AND BUDS**: DORMANCY OF SEEDS, FACTORS CAUSING DORMANCY OF SEEDS, ARTIFICIAL METHODS OF BREAKING SEED DORMANCY, PHYSIOLOGICAL AND BIOCHEMICAL CHANGES ACCOMPANYING SEED GERMINATION, QUISCENT SEEDS, LONGIVITY OF SEEDS, ORTHODOX AND RECALCITRANT SEEDS **2 HR**

**PLANT MOVEMENTS:** **2 HR**

A)MOVEMENTS OF LOCOMOTION- AUTONOMIC AND PARATONIC

- B) MOVEMENT OF CURVATURE
1. AUTONOMIC –VARIATION CURVATURE
  2. PARATONIC - VARIATION CURVATURE

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### III B.Sc. SEMESTER VI

#### **G507.6B MOLECULAR BIOLOGY II ,BIOTECHNOLOGY , PLANT PROPAGATION AND PHARMACOGNOSY**

3 HR PER WEEK /42 HOURS

**UNIT-1** 14 HR

**MOLECULAR BIOLOGY II** 4 HR

GENE REGULATION IN PROKARYOTES-LAC OPERON CONCEPT GENE REGULATION IN EUKRYOTES:A BRIEF NOTE ON m RNA PROCESSING , ,GENE SILENCING ,RNAEDITING ANDTRANSPOSONS

**BIOTECHNOLOGY** 3HR

GENE CLONING:TOOLS,STEPS AND APPLICATIONS-A BRIEF NOTE ON TRANSGENIC PLANTS ,MONOCLONAL BODIES ,GENE THERAPY AND BIOREMEDIATION

NOTE ON BIOHAZARDS AND BIOSAFETY

**PLANT TISSUE CULTURE** 3HR

**CONCEPT OF** TOTIPOTENCY, CELL DIFFERENTIATION, CALLUSING AND ORGANOGENESIS

**TISSUE CULTURE MEDIA** :PHYSICAL FACTORS AND NUTRIENTS REQUIREMENTS 1HR

(TOOLS AND TECHNIQUES- INSTRUMENTS ,LABORATORY ORGANISATION EXPLANS AND STERILIZATION ,TRANSFER:((**TO BE COVERED IN PRACTICALS**))

**MICROPROPAGATION-** TYPES OF MICRO PROPAGATION MERISTEM CULTURE, 2 HR  
ANTHER CULTURE, POLLEN CULTURE, CELL AND PROTOPLAST CULTURE

NOTE ON APPLICATION OF TISSUE CULTURE IN DIFFERENT FIELDS (GERM PLASM 1 HR  
CONSERVATION SOMACLONAL VARIATIONS,AGRICULTURE)

SYNTHETIC SEEDS(**TO BE TAUGHT IN PRACTICALS**)

**UNIT II** 14 HR

**PHARMACOGNOSY:** 3 HR

DEFINITION, HISTORY, SCOPE OF PHARMACOGNOSY, BRANCHES OF PHARMACOGNOSY,

ALTERNATIVE SYSTEMS OF INDIAN MEDICINE- AYUSH (AYURVEDA, UNANI, SIDDHA, HOMEOPATHY)

CRUDE DRUGS- INTRODUCTION, TYPES ORGANISED AND UN ORGANISED

CULTIVATION	2HR	
METHODS AND FACTORS AFFECTING CULTIVATION OF MEDICINAL PLANTS		
<b>DRUG EVALUATION PROTOCOL</b>	<b>3HR</b>	
CRUDE DRUG EVALUATION OF FOLLOWING ASPECTS WITH SUITABLE EXAMPLES - MORPHOLOGICAL, ANATOMICAL, ORGANOLEPTIC ASPECTS AND ACTIVE COMPONENTS (PHYTOCHEMICALS )OF ROOT,STEM,LEAF,SEED AND,FLOWER DRUGS		
<b>ISOLATION &amp; QUANTIFICATION METHODS</b>	<b>3 HR</b>	
PRINCIPLE, PROCEDURE AND APPLICATION OF SOXLET, TLC AND SPECTROSCOPY		
<b>DRUG ADULTERATION</b>	<b>3HR</b>	
TYPES OF ADULTERANTS AND SUBSTITUTES METHODS OF DETECTION WITH EXAMPLES		
<b>UNIT III</b>	<b>14 HR</b>	
<b>METABOLISM</b> - DEFINITION, TYPES (PRIMARY & SECONDARY )	<b>1 HR</b>	
<b>PRIMARY METABOLISM</b>		
PRIMARY METABOLITES- TYPES OF CARBOHYDRATES, PROTEINS AND LIPIDS WITH CRUDE DRUGS (SOURCE ,PROPERTIES ANDTHERAPEUTIC USES)	<b>3 HR</b>	
METABOLIC PATHWAYS -CITRIC ACID AND PENTOSE PATH WAYS WITH SIGNIFICANCE		
<b>SECONDARY METABOLISM</b>	<b>2HR</b>	
-SHICKMIC ACID AND MELOVINIC ACID PATHWAYS WIT HSIGNIFICANCE		
<b>SECONDARY METABOLITES</b>	<b>7 HR</b>	
DEFINITION, SOURCE, PHYSIOCHEMICAL PROPERTIES AND THERAPEUTIC PROPERTIES OF THE FOLLOWING CLASSIFIED TYPES OF SECONDARY METABOLITES -WITH TWO EXAMPLES FOR EACH OF THE FOLLWING TYPES		
ALKALOIDES	TANNINS	GLYCOSIDES
TERPENOIDES	PHENOLICS	FLAVANOIDES
STEROIDS	LIPIDS	RESINS

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**III B.Sc. SEMESTER VI**  
**PRACTICAL SYLLABUS FOR ALL STUDENTS**  
**G 507.6P PLANT PHYSIOLOGY, MOLECULAR BIOLOGY II, BIOTECHNOLOGY, PLANT**  
**PROPAGATION AND PHARMACOGNOSY**

PRACTICALS BASED ON G507.6A AND G507.6B, ONE PRACTICAL OF 3HR PER WEEK APPLICABLE TO  
IPSD CATEGORY)

**PLANT PHYSIOLOGY**

**1 MAJOR EXPERIMENT**

EXPERIMENT TO MEASURE THE OSMOTIC PRESSURE OF CELL SAP BY PLASMOLYTIC  
METHOD USING *RHOEO* LEAVES

**SPOTTERS**

THISTLE FUNNEL EXPERIMENT TO DEMONSTRATE ENDOSMOSIS

**MAJOR EXPERIMENT :**

GANONG'S POTOMETER EXPERIMENT TO DETERMINE RATE OF TRANSPIRATION UNDER  
DIFFERENT ENVIRONMENTAL CONDITIONS

**SPOTTERS**

GARREAU'S EXPERIMENT TO DEMONSTRATE THE UNEQUAL RATE OF TRANSPIRATION  
EXPERIMENT TO DEMONSTRATE THE SUCTION DUE TO TRANSPIRATION

**2 MAJOR EXPERIMENTS**

A) EXTRACTION AND SEPARATION OF PHOTOSYNTHETIC PIGMENTS BY PAPER  
CHROMATOGRAPHIC METHODS

**SPOTTERS**

GANONG'S COLORED LIGHT SCREEN EXPERIMENT TO DEMONSTRATE THE EFFECT OF  
DIFFERENT WAVELENGTH OF LIGHTS ON RATE OF PHOTOSYNTHESIS

**MAJOR EXPERIMENT**

GANONG'S RESPIROMETER EXPERIMENT TO DETERMINE THE AMOUNT OF OXYGEN  
ABSORBED AND CARBON DIOXIDE LIBERATED DURING AEROBIC RESPIRATION  
DETERMINATION OF RQ VALUE

**SPOTTERS**

MINOR EXPERIMENT TO DEMONSTRATE THE POROSITY IN DIFFERENT TYPES OF SOIL.  
MACDOUGALL'S RESPIROSCOPE EXPERIMENT TO DEMONSTRATE THE EVOLUTION OF CO<sub>2</sub>  
DURING RESPIRATION

**3 MAJOR EXPERIMENTS**

EXPERIMENT TO SHOW THE RELATION BETWEEN ABSORPTION AND TRANSPIRATION

**SPOTTERS**

KLINOSTAT EXPERIMENT TO DEMONSTRATE GEOTROPISM  
POROUS CLAY FUNNEL EXPT. TO DEMONSTRATE HYDROTROPHISM  
EXPERIMENT TO DEMONSTRATE HELIOTROPHISM

**MAJOR EXPERIMENT :**

CHEMICAL TESTS: QUALITATIVE ANALYSIS OF CARBOHYDRATES, PROTEINS, CELLULOSE  
OIL & LIGNIN IN THE GIVEN PLANT SOURCES SAMPLES

**PLANT PROPAGATION**

**4 SPOTTERS**

STUDY OF INSTRUMENTS: PH METER, LAF, INCUBATOR, HOT AIR OVEN, CENTRIFUGE,  
ELECTRIC BALANCE, AUTOCLAVE, MICROTOME, TLC,  
SPECTROPHOTOMETER/CALORIMETER,CAMERA LUCIDA ,LUXMETER  
TISSUE CULTURE– MICROPROPAGATION (TISSUE CULTURE)  
CULTURE MEDIA PROPAGATION, STERILIZATION TECHNIQUES, EXPLANTS, TRANSFER OF  
EXPLANTS, SEED GERMINATION ON AGARMEDIUM, CARROT ROOT CALLUSING,  
ORGANOGENESIS, ANTHOR CULTURE, SYNTHETIC SEED PREPARATION

**PHARMACOGNOSY:**

**5 SPOTTERS**

**STEM DRUGS** –,GINGER, ,KURCHI, EPHEDRA

**LEAF DRUGS** – DATURA, VINCA, VASAKA, SENNA

**FRUIT DRUGS** – CUMIN, CORIANDER, CARDAMON

**FLOWER DRUGS** – CLOVE

**SEED DRUGS** – NUX VOMICA,

**6 SPOTTERS**

MICROSCOPIC EXAMINATION: SURFACE PREPARATION – STUDY OF TYPES OF TRICHOMES  
AND STOMATAIN LEAF SAMPLES

MICROMETRY – LOW POWER AND HIGH POWER, CALIBERATION

PHYTOCHEMICAL EVALUATION AND ANALYTICAL METHODS- TLC OF SAMPLES

**7 MAJOR EXERIMENTS ANATOMY OF LEAF DRUGS : DATURA, VINCA, VASAKA, SENNA**

PRACTICAL TEST



## **B.Sc. SEMESTER VI**

PART A: COMPULSORY SET OF EXPERIMENTS

PART B: PROJECT/ ADDITIONAL PRACTICAL EXPERIMENTS

### **NOTE:**

- All Students will have regular practicals (Part A).
- Every student shall have 1 project in any one of the discipline for 50 Marks.
- Project topics can be given to the students in the beginning of V semester.
- Students who do not opt for project (Part B) in a particular subject, along with regular practicals (Part A) will have additional experiments (Part B) for 50 marks.

## **B.Sc. VI SEMESTER**

**PART A: COMPULSORY SET OF EXPERIMENTS**

**G507.6p Plant Physiology, Molecular Biology II**

**Biotechnology, Plantpropagation and Pharmacognosy**

**PART B: PROJECT/ ADDITIONAL PRACTICAL EXPERIMENTS**

**SCHEME OF PRACTICAL EXAMINATION**

### **NOTE:**

- All Students will have regular practicals (Part A).
- Every student shall have 1 project in any one of the discipline for 50 Marks.
- Project topics can be given to the students in the beginning of V semester.
- Students who do not opt for project (Part B) in a particular subject, along with regular practicals (Part A) will have additional experiments (Part B) for 50 marks.

**PART A: Compulsory set of experiments**

**50 marks**

**Total : 40 Marks**

**Internal Assessment: 10 Marks**

**Question Paper Pattern**  
**G507.6b Plant Physiology, Molecular Biology II**  
**Biotechnology, Plant propagation and Pharmacognosy**

**Time: 3Hrs**

**Max Marks: 40**

**1. Major experiment A**

**12X1=12**

Perform the given experiment and demonstrate the results. Leave the setup for inspection (Requirements-1, Setting and demonstration-3, Procedure-3 Result-2 Inference and Principle-3)

**2. Major experiment B**

**12X1=12**

Prepare a temporary stained section of the given specimen and leave it for inspection  
(Preparation -4, Identification- Biological Source, Scientific Name, family- 2, Identifying anatomical features- 4 ,Compounds -1 and Therapeutic uses-1 )

**3 Spotters-C,D,E and F**

**4X4 = 16**

(Identification-1, Diagram 1½ Comment-1½)

**PART B: Project OR Additional Experiments**

**50 Marks**

**Project (40+10=50 Marks)**

**Continuous Assessment=10 Marks**

**Report=30 Marks**

**Viva= 10 Marks**

**TOTAL=50 Marks**

**OR**

**Additional experiments (40+10=50 Marks)**

**Experimentation=20 Marks**

**Internal Assessment = 10 Marks**

**Record=10 marks**

**Viva=10 marks**

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