
# 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)

¸ÀAvÀ C¯ÉÆÃ²AiÀÄ¸ï
PÁ¯ÉÃdÄ
(¸ÁéAiÀÄvÀÛ)
ªÀÄAUÀ¼ÀÆgÀÄ- 575 003

**ST ALOYSIUS COLLEGE**
**(Autonomous)**
P.B.No.720
MANGALURU- 575 003, INDIA
Phone:+91-0824 2449700,2449701
Fax: 0824-2449705
Email: principal_sac@yahoo.com
principal@staloysius.edu.in
Website: www.staloysius.edu.in

**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**
**3rd 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**

ST ALOYSIUS COLLEGE MANGALORE 575 003 AUTONOMOUS

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, Pharmacognocy, 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 meaningfull, 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<br>Theory | **G507.1** Biodiversity – I | 4 | 3 | 20 | 80 | 100 | 2 |
| Elective | **G507.1 E Organic farming** | 2 | 2 | 10 | 40 | 50 | 1 |
| Practical | **G507.1P** | 3 | 3 | 10 | 40 | 50 | 1 |
| Second Semester<br>Theory | **G507.2** Biodiversity –II, Cell biology , Histology and Anatomy | 4 | 3 | 20 | 80 | 100 | 2 |
| Elective | **G507.2 E Plant Nutraceuticals** | 2 | 2 | 10 | 40 | 50 | 1 |
| Practical | **G507.2P** | 3 | 3 | 10 | 40 | 50 | 1 |
| Third Semester<br>Theory | **G507.3** Biodiversity –III, Morphology and Embryology of Angiosperms | 4 | 3 | 20 | 80 | 100 | 2 |
| Elective | **G507.3E Medicinal Botany** | 2 | 2 | 10 | 40 | 50 | 1 |
| Practical | **G507.3P** | 3 | 3 | 10 | 40 | 50 | 1 |
| Fourth Semester<br>Theory | **G507.4** Plant Systematics and Commercial Botany | 4 | 3 | 20 | 80 | 100 | 2 |
| Elective | **G507.4E Nursery and Gardening** | 2 | 2 | 10 | 40 | 50 | 1 |
| Practical | **G507.4P** | 3 | 3 | 10 | 40 | 50 | 1 |

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

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

**UNIT-I** **12HR**

**BIODIVERSITY:** **3HR**

INTRODUCTION TO THE CONCEPT, VALUE, THREATS AND CONSERVATION OF BIODIVERSITY, **CLASSIFICATION** -INTRODUCTION OF TERMS -PROKARYOTES AND EUKARYOTES WITH EXAMPLES, 5 - KINGDOM CLASSIFICATION OF LIVING ORGANISAMS - SALIENT FEATURES WITH EXAMPLES,3 KINGDOM CLASIFICATION IN EUKARYOTA

GENERAL CLASSIFICATION OF PLANTS AND INTRODUCTION OF THE FOLLOWING TERMS - CRYPTOGAMS-THALLOPHYTA, BRYOPHYTA, PTERIDOPHYTA, TRACHEOPHYTA AND PHANEROGAMS (SPERMATOPHYTA) - GYMNOSPERMS, ANGIOSPERMS WITH EXAMPLES

**VIRUSES:** **7 HR**

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 –$T_4$

MODE OF TRANSMISSION OF VIRUSES

**MULTIPLICATION** –STEPS INVOLVED IN REPLICATION OF RNA VIRUS-TMV (INCLDING FLOW CHART OF REPLICATION OF GENETIC MATERIAL )

DNA VIRUS-T4 -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

**VIRAL PLANT DISEASES** -TOBACCO MOSAIC DISEASES IN BEAN/CUCUMBER OR ON ANY HOST , VEIN CLEARING DISEASES ,BUNCY TOP OF BANANA AND KATTE DISEASES OF CARDAMOM**(TO BE COVERED IN PRACTICALS)**

**PRIONS AND VIRIODS** – A BRIEF NOTE WITH EXAMPLES AND SIGNIFICANCE

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

**BACTERIA** **10 HR**

OCCURRENCE,A BRIEF NOTE ON BERGY'S CLASSIFICATION , MORPHOLOGY, FLAGELLATION, ULTRA STRUCTURE OF BACTERIAL CELL, ENDOSPORE FORMATION AND NOTE ON GERMINATION

**NUTRITION IN BACTERIA**: AUTOTROPHIC BACTERIA (TYPES OF PHOTO AND CHEMOAUTOTROPHS), HETEROTROPHIC BACTERIA, REPRODUCTION- BINARY FISSION

**GENETIC RECOMBINATION IN BACTERIA**- CONJUGATION, TRANSFORMATION AND TRANSDUCTION

**ACTINOMYCETES-**GENERAL CHARACTERS WITH EXAMPLES AND SIGNIFICANCE

ARCHAEBACTERIA- GENERAL CHARACTERS WITH EXAMPLES AND SIGNIFICANCE

**ECONOMIC IMPORTANCE**: BENEFICIAL ASPECTS AND HARMFUL ASPECTS

DISEASES IN PLANTS, ANIMALS AND HUMAN BEINGS (FIVE EXAMPLES OF EACH, MENTION ONLY), EXPLAINATION OF DISEASES IN PLANTS: CITRUS CANKER AND SOFT ROT OF VEGETABLES-CARROT **(TO BE COVERED IN PRACTICALS) AND** WILT OF PEPPER (CHILLY) ,CROWN GALL DISEASE

**MYCOPLASMA** **2HR**

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 **(TO BE COVERED IN PRACTICALS)** SANDAL SPIKE AND YELLOW DISEASE OF COCONUT

**UNIT III:** **12HR**

**CYANOBACTERIA** INTRODUCTION ,GENERAL ACCOUNT ON -HABIT AND HABITAT , **6HR**

RANGE OF THALLUS STRUCTURE

REPRODCUTION - VEGETATIVE- FISSION, FRAGMENTATION AND HORMOGONES

ASEXUAL REPRODUCTION- ENDOSPORES, EXOSPORES, NANNOSPORES, AKINETES

THALLUS STRUCTURE- ***GLOEOCAPSA, SPIRULINA, OSCILLATORIA, NOSTOC, RIVULARIA, GLOEOTRICHIA, SCYTONEMA*** **AND** ***STIGONEMA***

**ECONOMIC IMPORTANCE**- BENEFICIAL ASPECTS AND HARMFUL ASPECTS

**DIVERSITY OF CRYPTOGAMS- ALGAE** **6HR**

HABIT AND HABITAT, RANGE OF THALLUS ORGANISATION, CLASSIFICATIONS (SMITH AND FRITSCH) UP TO CLASSES

**CHLOROPHYCEAE:** SALIENT FEATURES

***CHLAMYDOMONAS***- *CELL STRUCTURE*

ASEXUAL REPRODUCTION- ZOOSPORE, APLANOSPORES AND PALMELLA STAGE

SEXUAL REPRODUCTION- ISO, ANISO AND OOGAMOUS TYPES

***PANDORINA AND EUDORINA***- THALLUS CONSTRUCTION

***VOLVOX*** –THALLUS ORGANISATION, REPRODUCTION-VEGETATIVE ,ASEXUAL AND SEXUAL TYPES

***HYDRODICTYON***- THALLUS ORGANISATION

**UNIT IV** **12HR**

**DIVERSITY OF CRYPTOGAMS- ALGAE (CONTINUED)** **7HR**

***OEDOGONIUM***- THALLUS ORGANISATION

ASEXUAL REPRODUCTION- ZOOSPORES, AKINETES

SEXUAL REPRODUCTION- MACRANDROUS TYPES AND NANNANDROUS TYPE

***SPIROGYRA***-THALLUS ORGANISATION ,

SEXUAL REPRODUCTION- SCALARIFORM, LATERAL CONJUGATION

***CLADOPHORA***-THALLUS ORGANISATION,

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** 5TH 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** 2ND EDITION. OXFORD & IBH.
14. SMITH G. M. 1955. **CRYPTOGAMIC BOTANY VOL I.** ALGAE & FUNGI. MCGRAW HILL BOOK CO. INC. 2ND EDITION.
15. SMITH K. M 1990. **PLANT VIRUSES** 6TH 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, LABLED 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**


1. Bradley F.M, Ellis B.W, Philips E. 2019. Ultimate encyclopedia of Organic farming- New edition
2. Martin D.L. 2018. Rodale's Ultimate Encyclopedia of Organic Gardening. Penguin random House
3. The Complete Book on Organic Farming and Production of Organic Compost NPCS Board of Consultants &Engineers , Asia Pacific Business Press Inc.
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 DECOMPOSIERS AND DERMATOPHYTES

VEGETATIVE ORGANISATION

REPRODUCTIVE STRUCTURES- ASEXUAL AND SEXUAL TYPES

TYPES OF NUTRITION- SAPROPHYES, 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**

**PUCCINIA**-LIFE CYCLE IN PRIMARY AND SECONDARY HOSTS -UREDOSPORES, TELEUTOSPORES ,BASIDIOSPORES,- PYCNIOSPORES AND AECIOSPORES)

**AGARICUS**- LIFE CYCLE AND EXPLANATION OF VEGETATTIVE AND FRUITNG BODY,DEVELOPMENT OF BASIDIOSPORES

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

**ECONOMIC IMPORTANCE OF FUNGI**

BENIFICIAL 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

**NEGATIVE INTERACTIONS :MYCOPATHOLOGY** **4HR**

PATHOGENESIS, CAUSATIVE ORGANISMS, TYPES OF SYMPTOMS, ETIOLOGY AND CONTROL MEASURES

**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 **(TO BE TAUGHT IN PRACTICALS)** ABNORMAL LEAF FALL OF RUBBER , POWDERY MILDEW OF CEREALS ,COFFEE RUST AND WILT OF COTTON

**FRUITS AND VEGETABLES**- WHITE RUST OF CRUCIFERAE, LATE BLIGHT OF POTATO AND POWDERY MILDEW OF GRAPES **(TO BE TAUGHT IN PRACTICALS)**BLACK MOLD ,GREEN MOLD OF FRITS AND VEGETABLES, AND POWDERY MILDEW OF GRAPES

**NEMATOPATHOLOGY :** ROOT KNOT OF TOMATO **1HR**

AN ACCOUNT OF BIOPESTICIDES AND BIOCONTROL **2HR**

**UNIT III** **12HR**

**DIVERSITY OF CRYPTOGAMS- BRYOPHYTA** **3HR**

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

***RICCIA*** : MORPHOLOGY OF GAMETOPHYTE,ANATOMY OF THALLUS, SEXUAL REPRODUCTION –STRUCTURE OF SEX ORGAS AND SPOROPHYTE **2HR**

***PORELLA****:* MORPHOLOGY OF GAMETOPHYTE **1HR**

***ANTHOCEROS:*** MORPHOLOGY OF GAMETOPHYTE, ANATOMY OF THALLUS,SEXUAL REPRODUCTION –STRUCTURE OF SEX ORGAS AND SPOROPHYTE AND EVOLUTIONARY SIGNIFICANCE **3HR**

**MOSS:** MORPHOLOGY OF GAMETOPHYTE, ANATOMY OF THALLUS,SEXUAL REPRODUCTION –STRUCTURE OF ANTHERDIAL AND ARCHEGONIAL CLUSTERS, SPOROPHYTE AND SPORE DISPERSAL MECHANISM **3HR**

**UNIT IV** **12HR**

**CELL BIOLOGY ,PLANT HISTOLOGY AND ANATOMY**

**CELL BIOLOGY:** INTRODUCTION,CHROMATIN ORGANISATION- NUCLEOSOMES,SOLENOIDS AND METAPHASE FIBRE , PARTS OF THE TYPICAL METAPHASE CHROMOSOME, CELL DIVISION, CELLCYCLE, STAGES OF MITOSIS, MEIOSIS **5HR**

**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

**REFERENCES**


1. ALBERTS BRUCE ET AL 2002. **MOLECULAR BIOLOGY OF THE CELL** 4 EDITION. GARLAND SCIENCES.
2. ALEXOPOULOS C.J. 1962. **INTRODUCTORY MYCOLOGY** WILEY EASTERN LTD.,
3. ANEJA K.R. 1966**. EXPERIMENTS IN MICROBIOLOGY, PLANT PATHOLOGY, TISSUE CULTURE AND MUSHROOM CULTIVATION** 2ND EDITION VISHWA PRAKASHAN, NEW DELHI.
4. CUTTER E.G 1978. **PLANT ANATOMY PART 1&2**. ELBS.
5. DUBE H.C 1983, AN **INTRODUCTION TO FUNGI** VIKAS PUBLICATIONS.
6. ESAU. K. (1980) : PLANT ANATOMY, (2ND EDITION) WILEY EASTERN LTD., NEW DELHI, BANGALORE, BOMBAY, CALCUTTA, MADRAS, HYDRABAD
7. FAHN, A. (1997) : PLANT ANATOMY PERGAMON PRESS, OXFORD-
8. GANGULEE, DAS & DUTTA 2002, **COLLEGE BOTANY VOL II** NCBA(P) LTD.
9. KUMAR S.S**.: ON THE INDIAN RECENT STUDIES BRYOPHYTES**. 1995. P.V 262.
10. LAL, J. & PARIHAR, 2003N.S **AN ANNOTATED DICTIONARY OF MOSSES**
11. PANDEY S.N, S.P MISRA & P.S RIVEDI 1972**. A TEXT BOOK OF BOTANY VOL II**. 2/3 VIKAS PUBL.
12. PANDEY B.P 1999. **PLANT PATHOLOGY** S.CHAND & CO.
13. POWAR C.B 1983. **CELL BIOLOGY** 3RD EDITION STIMATAGE PUBLICATIONS
14. ROY S. C AND KALYAN KUMAR DE.2005, **CELL BIOLOGY** NCBA(P)LTD
15. SRIVASTAVA H.N,. PANDEY S.N. S.P MISRA & P. S TRIVEDI 1972. **A TEXT BOOK OF BOTANY VOL II**. 2ND EDITION VIKAS PUBLICATIONS.
16. SRIVASTAVA H.N 1998. **BRYOPHYTA**.
17. .SRIVASTAVA H. N 1998. **ANATOMY OF ANGIOSPERMS,** PRADEEP PUBLICATIONS. NEW DELHI
18. VASHISTA P.C 1994, **PLANT ANATOMY,** PRADEEP PUBLICATIONS ,NEW DELHI
19. VASHISTA B.R. 2000. **FUNGI** S.CHAND AND CO.LTD ,NEW DELHI
20. VASHISTA P.C & P.S GILL 1998. **CELL BIOLOGY AND MOLECULAR BIOLOGY**. PRADEEP PUBLICATIONS
21. WEBSTER J. 1980. **INTRODUCTION TO FUNGI** 2ND EDITION.

## 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 BLIFGT OF POTATO AND POWDERY MILDEW OF GRAPES

   **NEMATOPATHOLOGY :**ROOT KNOT OF TOMATO

   **BIOCONTRO 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, COLLENCHYMA, 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.**
LEAVE THE PREPARATION FOR INSPECTION. **05**
(PREPARATION-2, IDENTIFICATION-1, LABELLED SKETCH-2)

**3.** PREPARE A TEMPORARY STAINED SLIDE OF MATERIAL **C**. LEAVE THE PREPARATION FOR INSPECTION. **04**
(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**

---

**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, *Bifidobacteruim, 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.

**References**


1. Kalia, Manoranjan & Sood. 1996. Food Preservation and Processing. First Edition .Kalyani Publishers, India.
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**

**UNIT I** **12HR**

**DIVERSITY OF CRYPTOGAMS- PTERIDOPHYTA** **2 HR**

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 APOSPORY WITH EXAMPLES

CLASSIFICATION- - SALIENT FEATURES OF CLASSES WITH EXAMPLES FOR EACH CLASS

**RHYNIA**- MORPHOLOGY **1 HR**

**PSILOTUM** : MORPHOLOGY OF SPOROPHYTE, **2 HR**

ASEXAL REPRODUCTION :EXTERNAL, INTERNAL STRUTURE AND MORPHOLOGICAL VIEWS OF SYNANGIUM

**SELAGINELLA :** MORPHOLOGY OF SPOROPHYTE, RHIZOPHORE- MORPHOLOGICAL **3HR**

VIEWS AND ANATOMY ,STEM ANATOMY **(TO BE COVERED IN PRACTICALS),**

REPRODUCTION- MORPHOLOGY AND ANATOMY OF MALE CONE AND FEMALE CONE,

HETEROSPORY AND ITS SIGNIFICANCE,

GRAPHICAL REPRESENTATION OF LIFE CYCLE (HETEOROSPOROUS LIFE CYCLE FORM)

**PTERIS** :MORPHOLOGY OF SPOROPHYTE, ANATOMY OF RHIZOME **(TO BE COVERED IN** **4HR**

**PRACTICALS)**, REPRODUCTION - MORPHOLOGY AND ANATOMY OF SPOROPHYLL , SPORE DISPERSAL MECHANISM, STRUCTURE OF GAMETOPHYTE AND SEX ORGANS, GRAPHICAL REPRESENTATION OF LIFE CYCLE (HOMOSPOROUS LIFE CYCLE FORM)

**MARSILEA**-MORPHOLOGY OF SPOROPHYTE, ANATOMY OF RHIZOME **(TO BE COVERED IN PRACTICALS),**REPRODUCTION- MORPHOLOGY OF SPOROCARP, ANATOMY **(H.L.S TO BE COVERED IN PRACTICALS)**, MORPHOLOGICAL VIEWS IN BRIEF

**UNIT II:** **12 hrs**

**PHANEROGAMS - GYMNOSPERMS**

ORIGIN ,GENERAL ACCOUNT-HABIT AND HABITAT , EXTERNAL FEATURES OF **3HR**
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

**CYCAS**

MORPHOLOGY OF SPOROPHYTE,

ANATOMY OF LEAFLET**(TO BE COVERED IN PRACTICALS)**,CORALLOID ROOTS-MORPHOLOGY AND ANATOMY**(TO BE COVERED IN PRACTICALS),**

REPRODUCTION - MORPHOLOGY AND ANATOMY OF MALE CONE AND **3HR**
MEGASPOROPHYLLS

**PINUS** : MORPHOLOGY OF SPOROPHYTE, 3**HR**
ANATOMY OF PINUS NEEDLE**(T.S. TO BE COVERED IN PRACTICALS)**
REPRODUCTION- MORPHOLOGY and ANATOMY OF MALE CONE AND FEMALE CONE, MORPHOLOGICAL NATURE OF OVULIFEROUS SCALE AND STRUCTURE OF OVULE (V.S.)
**GNETUM** :MORPHOLOGY OF SPOROPHYTE, 3**HR**
**ANATOMY**- ANATOMY OF STEM (PRIMARY STRUCTURE- **(TO BE COVERED IN PRACTICALS),**ANAMOLOUS SECONDARY GROWTH(EXCENTRIC TYPE),
REPRODUCTION –MORPHOLOGY AND ANATOMY OF MALE CONE AND FEMALE CONE
BRIEF NOTE ON POLYEMBRYONY, APOMIXIS AND APOSPORY WITH EXAMPLES

**UNIT III**

**MORPHOLOGY OF ANGIOSPERMS** **12HR**

**DESCRIPTION OF A FLOWERING PLANT**: TYPICAL MONOCOT AND DICOT PLANT **1HR**

**ROOT** **2HR**
**TAP ROOT MODIFICATIONS -** CONICAL, FUSIFORM, NAPIFORM, TUBEROUS ROOTS
**UNDERGROUND ADVENTITOUS ROOT MODIFICATIONS – FOR STORAGE**: TUBEROUS, FASCICULATED, MONILIFORM,NODULOSE ROOTS (**MODIFICATIONS CAN BE COVERED IN PRACTICALS)**
**AERIAL ROOT MODIFICATIONS**: PROP, STILT, CLIMBING, RESPIRATORY, HAUSTORIA EPIPHYTIC AND ASSIMILATORY ROOTS (**MODIFICATIONS CAN BE COVERED IN PRACTICALS**)

**STEM** **2HR**
**UNDERGROUND STEM MODIFICATIONS:** RHIZOME, TUBER, BULB AND CORM
**SUB AERIAL STEM MODIFICATIONS**: RUNNER, STOLON, OFFSET AND SUCKER
**AERIAL STEM MODIFICATIONS**: STEM TENDRIL, THORN, PHYLLOCLADE, CLADODE AND BULBIL

**LEAF:** PARTS OF THE LEAF -TYPICAL MONOCOT AND DICOT LEAF **2HR**
**PHYLLOTAXY:** ALTERNATE, OPPOSITE (DECUSSATE AND SUPERPOSED), WHORLED
**TYPES**-SIMPLE AND COMPOUND LEAVES WITH TYPES
**VENATION**:-TYPES OF RETICULATE AND PARALLEL VINATION
**LEAF STIPULES**- FREE LATERAL, ADNATE, INTERPETIOLAR, INTRAPETIOLAR FOLIACEOUS, OCHREATE AND BUD SCALES
**LEAF MODIFICATIONS:** LEAF TENDRILS, LEAF SPINES, SCALY LEAF, PHYLLODE, AND LEAFY BUDS, INSECTIVOROUS PLANTS: PITCHER, BLADDER AND DROSERA

**INFLORESCENCE**: **RACEMOSE:** SIMPLE RACEME, PANICLE, SPIKE, SPADIX, CORYMB, **2HR**
UMBEL,CATKIN, , HEAD, GLOBOSE ANDHEAD
**CYMOSE**: SIMPLE CYME, MONOCHASIAL CYMES ( SCORPOID CYME, HELICOID CYME), DICHASICIAL AND POLYCHASIAL CYMES)
**SPECIAL TYPES**: CYATHIUM, VERTICILLASTER, THYRSUS,AND HYPANTHODIUM
( **CAN BE COVERED IN PRACTICALS**)

**FLOWER MORPHOLOGY**

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

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

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

**COROLLA AND THEIR VARIATIONS**: CRUCIFORM, , ROSACEOUS, PAPILIONACEAOUS ,CAMPANULATE, TUBULAR, SALVER SHAPED, INFUNDIBULIFORM, ROTATE, , BILABIATE 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,SILIQUA AND TYPES OF CAPSULES

DRY INDEHISCET: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
2. DWIVEDI J.N 1990. **EMBRYOLOGY OF ANGIOSPEMS** 2ND EDITION. RASTOG & CO. MEERUT.
3. CHOPRA, G.W., & VERMA, Y. (1988) : GYMNOSPERMS PRADEEP PUBLICATIONS, JALANDHAR,
4. GANGULEE, DAS & DUTTA 2002, **COLLEGE BOTANY** VOL I NCBA (P) LTD.
5. PANDEY S.N S.P MISRA & P.S TRIVEDI 1972. **A TEXT BOOK OF BOTANY** VOL-II 2 EDITION VIKAS PUBLICATIONS.
6. PANDEY B.P ---**A TEXT OF BOTANY GYMNOSPEMS**. B.SC II.S.CHAND &CO.LTD
7. PANDEY B.P 2012 COLLEGE BOTANY ,REVISED EDITION S.CHAND &CO.LTD
8. PARIHAR N.S 1987**. AN INTRODUCTION TO EMBRYOPHYTA** VOL I. BRYOPHYTA CENTRAL BOOKDEPOT ALLAHABAD.
9. RASHHED, A. (1999) : AN INTRODUCTION TO PTERIDOPHYTA VIKAS PUBLISHING CO., NEW DELHI,
10. SPORNE K.R.(1965) **THE MORPHOLOGY OF GYMNOSPERMS**. B.I PUBL.BOMBAY
11. SPORNE, K.R. (1970) : THE MORPHOLOGY OF PTERIDOPHYTES (THE STRUCTURE OF FERNS AND ALLIED PLANTS) HUTCHINSON UNIVERSITY LIBRARY, LONDON
12. SRIVASTAVAH.N 1998. FUNDAMENTALS OF PTERIDOPHYTES. PRADEEP PUBLICATIONS
13. SRIVASTAVAH.N 1998. **GYMNOSPERMS**. PRADEEP PUBLICATIONS JALANDHAR, INDIA
14. VASHISTA, P.C. (1997) : BOTANY FOR DEGREE STUDENTS-PTERIDOPHYTA. S. CHAND & CO., NEW DELHI,
15. VASHISTA, P.C. (1996) : BOTANY FOR DEGREE STUDENTS-GYMNOSPERMS(2ND EDN.,) S. CHAND & CO.,NEW DELHI

**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 SPOROPHYTEOF ***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 ONOCOT 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**

---

**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, UnaniSystematic 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; *Catharanthusroseus* (cardiotonic), *Withaniasomnifera*(drugs acting on nervous system), *Clerodendronphlomoides* (anti-rheumatic) and *Centellaasiatica* (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 ethno botanical practices (along with their habitat and morphology) *Holigarnaferruginea,Cynodondactylon,Cymbopogoncitratus,Achyranthusaspera,Azadirachtaindica,Ocimum sanctum,Vitexnegundo,Gloriosasuperba,Tribulusterrestris,Pongamiapinnata,Cassia auriculata,Indigoferatinctoria*, *Mimosa pudica,Phyllanthusamarus, Cyperusrotundus, Aervalanata.*

Role of ethnobotany in modern medicine with special reference to *Phyllanthusniruri, Rauvolfiasepentina*, *Trichopuszeylanicus*, *Artemisia vulgaris* ,*Withaniasomnifera*.

Wild edible plants of the locality :*Aporusalindleyana, Phyllanthusemblica, Syzigiumcaryophyllatum, Artocarpushirsutus, Ixoracoccinia, Amaranthusviridis, Cassia tora, Colocasiaesculenta, Carissa congesta, Garcineaindica.*

**References**


1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India. 2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2ndedn. Agrobios, India.
2. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.
3. Pharmacognosy, Dr.C.K.Kokate et al. 1999. NiraliPrakashan
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 BENTHEM 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** ANNNONACEAE, 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, CONVOLVULACEAE, SOLANACEAE, SCROPHULARIACEAE, ACANTHACEAE AND LAMIACEAE

**APETALAE:** AMARANTHACEAE, EUPHORBIACEAE AND MORACEAE **5HR**

**MONOCOTYLEDONAE:** LILIACEAE, ZINGEBERACEAE, MUSACEAE, ARECACEAE, ORCHIDACEAE AND POACEAE

**UNIT IV:** **12HR**

**COMMERCIAL BOTANY: INTRODUCTION ,SCOPE AND ITS IMPORTANCE** **1HR**

DISTRIBUTION, FAMILY, BOTANICAL NAME, PARTS USED AND USES OF THE FOLLOWING

**CEREALS AND MILLETS**: WHEAT,MAIZE,RICE RAGI AND JOWAR **(IN PRACTICALS)**

**PULSES:** COW PEA ,BENGAL GRAM,PEA,GREEN GRAM ,BLACK GRAM HORSE GRAM AND BEANS **(IN PRACTICALS)**

**OIL YIELDING PLANTS:**GROUND NUT**,** COCONUT OIL, SUNFLOWER OIL,MUSTARD **1HR**
,CASTOR AND SESAME **(IN PRACTICALS)**

EXTARCTION OF COCONUT OIL

**SUGAR YIELDING PLANTS**:, SUGARCANE , BEET ROOT**(IN PRACTICALS)** AND *STEVIA LEAF*

EXTARCTION OF SUGAR FROM SUGARCANE

**SPICES AND CONDIMENTS**:,BLACK PEPPER,CLOVE ,CORIANDER,GINGER ,TURMERIC ,CARDAMOM,ONION,GARLIC, ,RED CHILLY, CINNAMON, BLACK CUMIN , ,ASAFOETIDA**(IN PRACTICALS)**

**BEVERAGES:** COFFEE,TEA AND *COCOA* (**IN PRACTICALS)**. **1HR**

KOKUM (MANGOSTEEN) AND KOLANUT, EXTRACTION OF COFFEE ,COCOA

**FIBER YIELDING PLANTS***:* COTTON ,JUTE AND BANANA **(ASSIGNMENT)** **1HR**
**PRACTICALS)** ,FLAX , **SUNHEMP** AN*D* HEMP

EXTRACTION OF FIBRE FROM JUTE AND COIR FROM *COCONUT*

RUBBER YIELDING PLANT: RUBBER WITH EXTRACTION

GUMS AND RESINS:SAPOTA,ACACI A,CASHEW AND AILANTHUS

**NARCOTIC /STIMULANT PLANTS**: GANJA ,POPPY ,HEMP AND TOBACCO **1 HR**

**TIMBER YIELDING PLANTS**: **3HR**

TEAK ,ROSEWOOD ,SAL ,JACK SPECIES , RED SANDALWOOD , MAHOGANY , HOPEA (BOGI -HOPEA WHITIANA), INDIAN KINO TREE( BENGA) AND DIPTEROCARPUS(DHUPA)

**FLAVORING AND PERFUMERAY PRODUCTS***:* ROSE, VANILLA **1HR**

SANDALWOOD ,EUCALYPTUS AND LAVENDER

**ETHNOBOTANY:** INTRODUCTION **3HR**

**MEDICINAL PLANTS:** 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**


1. BENDRE A AND KUMAR A (1998-99) : ECONOMIC BOTANY RASTOGI PUBLICATIONS, MEERUT, INDIA-274PP.,
2. CHOPRA G.L **ANGIOSPERMS** PRADEEP PUBLICATIONS DUTTA AD.C 1979 **CLASS BOOK OF BOTANY**, OXFORD UNIVERSITY PRESS.
3. GANGULEE, DAS AND DUTTA 2002, **COLLEGE BOTANY** VOL I NCBA(P) LTD.
4. GAMBLE J.S 1957 **FLORA OF PRESIDENCY OF MA**DRAS VOL I-III. BSI, CALCUTTA.
5. GOPALKRISHNA BHAT K 2003 **FLORA OF UDUPI**, INDIAN NATURALIST (REGR)
6. GUPTA R.K 1972. **TEXT BOOK OF SYSTEMATIC BOTANY**. ATMA RAM AND SONS. DELHI-6
7. MUKERJEE S.K 2006**, COLLEGE BOTANY** VOL-III NCBA (P) LTD.
8. PANDEY. B.P-- **TAXONOMY OF ANGIOSPEMS**.
9. PANDEY, B.P. (2000) : ECONOMIC BOTANY S. CHAND & CO., NEW DELHI-534PP.,
10. PANDEY B.P.2003.MODERN PRACTICAL BOTANY VOLUME II S CHAND & COMPANY LTD DELHI
11. SALDHANA C.J 1996. **FLORA OF KARNATAKA**, OXFORD & IBH
12. SAMBAMURTHY, A.V.V.S. & SUBRAHMANYAN, N.S. (1989) : A TEXT BOOK OF ECONOMIC BOTANY WILEY EASTERN LTD., NEW DELHI, BANGALORE, BOMBAY, CALCUTTA, GUWAHATI, HYDERABAD, LUCKNOW, MADRAS, PUNE-875PP.,
13. SUTARIA R.N 1962.3$^{RD}$ EDITION. **A TEXT BOOK OF SYSTEMATIC BOTANY**. KHADATAYA BOOK DEPOT. BALA HANUMAN, AHEMEDABAD.
14. VASISHTA P.C--**TAXONOMY OF ANGIOSPEMS**.
15. VERMA .V 1995 A TEXT BOOK OF BOTANY ,EMKAY PUBLICATIONS NEW DELHI

## 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, CONVOLVULACEAE, 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<br>(DERIVATION-01, FAMILY NAME-01, SALIENT CHARACTERS-02) | **4X3=12** |
| **2.** | DESCRIBE THE PLANTS **D** IN TECHNICAL TERMS | **03** |
| **3.** | WRITE THE FLORAL DIAGRAM AND FLORAL FORMULA OF **E**<br>(FLORAL DIAGRAM-02, FLORAL FORMULA=01) | **03** |
| **4.** | WRITE THE ECONOMIC IMPORTANCE OF **F, G, H, I, J** AND **K**<br>(SCIENTIFIC NAME -½,.FAMILY ½, PART USED WITH USES-1) | **6X2=12** |
| **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.OROBANCHOE 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**


1. AGARWAL, V.K.. ( 1999) : CONCEPT OF ECOLOGY (ENVIROMENTAL BIOLOGY) S. CHAND & CO., NEW DELHI-264PP.,
2. AGARWAL K.C 1993, **ENVIRONMENTAL BIOLOGY** 2ND EDITION AGRO BOTANICAL PUBLICATIONS INDIA.
3. ARUMUGAM, N. (1994) : CONCEPTS OF ECOLOGY (ENVIRONMENTAL BIOLOGY) SARAS PUBLICATIONS, NAGERCOIL, TAMILNADU-402PP.,
4. BHATIA K.N. AND K.K SHARMA 1988, **A TREATISE ON PLANT ECOLOGY** 3RD EDITION PRADEEP PUBLICATIONS.
5. P.S. CHANDEL (1991) : PLANT ECOLOGY & SOIL SCIENCE S.CHAND & CO., NEW DELHI-305+97PP.,
6. ELDREDGE. N.1992: **SYSTEMATICS ECOLOGY AND THE BIODIVERSITY** CRISIS REP.2003.
7. GARDNER R.H, KEMP, W.M, KENNEDY, VICTOR, S AND PETERSON J.E: **SCALING RELATIONS IN EXPERIMENTAL ECOLOGY** 2001. REP 2002.
8. KUMAR, H.D. (1992) : MODERN CONCEPTS OF ECOLOGY (7TH EDN.,) VIKAS PUBLISHING CO., NEW DELHI-377PP.,
9. KUMAR H.D. (2000) : BIODIVERSITY & SUSTAINABLE CONSERVATION OXFORD & IBH PUBLISHING CO., LTD., NEW DELHI -420PP.,
10. MACKENZIE, A.. A.S. BALL & S.R. VINDEE (1999) : INSTANT NOTES IN ECOLOGY VIVA BOOKS (P) LTD., DELHI, BOMBAY, CHENNAI -321PP.,
11. MC KINNEY M.L AND R.M SHOCH. 1998. **ENVIRONMENTAL SCIENCE-WEB ENHANCED EDITION** JONES & BARTLETT PUBLICATIONS. BOSTON.
12. NEWMAN, E.I. (2000) : APPLIED ECOLOGY BLACKWELL SCIENTIFIC PUBLISHER, U.K-328PP., CHAPMAN, J.L.
13. SHARMA P.D 1990, **ELEMENTS OF ECOLOGY** RASTOGI PUBLICATIONS.
14. SHARMA P.D 2000, **ECOLOGY AND ENVIRONMENT** RASTOGI PUBLICATIONS
15. SHUKLA R.S. AND, CHANDEL P.S 2005 **A TEXT BOOK OF PLANT ECOLOGY** S.CHAND PUBLICATIONS.
16. SWAMINATHAN M.S AND S.JANA. (EDS) 1992. **BIODIVERSITY** MAC MILLAN INDIA.
17. THIWARI M., KHULBA K, THIWARI A, ENVIRONMENTAL SCIENCE. 2007. I.K INTERNATIONAL PUBLISHING HOUSE PVT LTD.
18. VASHISHTA, P.C. (1989-90) : PLANT ECOLOGY VISHAL PUBLICATIONS, DELHI, JALANDHAR-284PP.,

## III B.Sc SEMESTER V
## G507.5b MOLECULAR BIOLOGY I AND GENETICS

**42 HOURS**

**UNIT I MOLECULAR BIOLOGY I** **14HR**

**NUCLEIC ACIDS** **5HR**

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

**DNA-REPLICATION** **3HR**

EXPERIMENTAL EVIDENCE IN BRIEF- MESELSON AND STHAL EXPERIMENT,STEPS INVOLVED IN SEMI-CONSERVATIVE METHOD OF REPLICATION

**GENETIC CODE** –DISCOVERY, CHARACTERISTIC FEATURES WITH EXAMPLES **1HR**

**PROTEIN SYNTHESIS** **5HR**

PROTEIN SYNTHESIS- STEPS AND MECHANISM OF TRANSCRIPTION AND TRANSLATION(PROCESS OF INITIATION ELONGATION AND TERMINATION )

**UNIT II:** **14HR**

**MENDELISM:** MEHODOLOGY , CONCEPTS OF INFERITANCE BASED ON MONOHYBDID AND DIHYBRID CROSSES **3 HR**

**DEVIATIONS FROM MENDELISM** **2HR**

CONCEPTS AND PRINCIPLES OF INCOMPLETE DOMINANCE, MONOHYBRID WITH PLANT EXAMPLE

MULTIPLE ALLELISM- SELF STERILITY ALLELES IN PLANTS WITH EXAMPLES

**INTERACTION OF GENES:** **4HR**

INTRODUCTION, TYPES- INHERITANCE PATTERN OF COMPLEMENTARY, SUPPLEMENTARY, EPISTATIC, DUPLICATE GENES WITH A PLANT EXAMPLE FOR EACH CONCEPT OF QUANTITATIVE / POLYMERIC GENE INTERACTION IN PLANTS **1HR**

**CROSSING OVER:**TYPES ,CYTOLOGICAL BASIS OF CROSSING OVER IN PLANTS , SIGNIFICANCE **2HR**

**LINKAGE** CONCEPT ,INCOMPLETE LINKAGE IN PLANTS **2HR**

-EXAMPLE–MAIZ*E*, NOTE ON LINKAGE MAP AND SIGNIFICANCE

**UNIT: III** **14HR**

**SEX DETERMINATION** **2HR**

NOTE ON CHROMOSOMAL MECHANISMS OF SEX DETERMINATION WITH SUITABLE PLANT EXAMPLES FOR EACH TYPE(FLOW CHART ONLY)

NOTE ON SEX CHROMOSOMES AND MECHANISM IN *MELANDRIUM ALBUM* AND GENE CONTROLLED MECHANISM IN PLANTS (MAIZE, PAPAYA, *LUFFA* AND *ASPARAGUS*

**MUTATIONS**

**GENOMATIC MUTATIONS** (NUMERICAL VARIATIONS ) **1HR**

ANEUPLOIDY- TRISOMY IN *DATURA AND* NULLISOME IN WHEAT

HAPLOIDY IN PLANTS: OCCURRENCE, CYTOLOGY AND SIGNIFICANCE **1HR**

POLYPLOIDY:ORIGIN OF AUTO AND ALLOPOLYPLOIDY **3HR**

SIGNIFICANCE - ROLE OF AUTO AND ALLOPOLYPLOIDY IN PLANT BREEDING, SPECIATION AND EVOLUTION WITH EXAMPLES

(PRODUCTION/ORIGIN OF RAPHANOBRASSICA, TETRAPLOID AND HEXAPLOID VARIETIES OF WHEAT, TOBACCO,COTTON AND TRITICALE)

**CHROMOSOMAL ABERRATIONS** (STRUCTURAL VARIATIONS): TYPES ,CYTOLOGY AND SIGNIFICANCE OF DELETIONS, DUPLICATIONS, INVERSIONS AND TRANSLOCATIONS IN PLANTS **4 HR**

**POINT/GENE MUTATION**: DEFINITION OF DOMINANT ,RECESSIVE , GERMINAL AND LETHAL MUTATIONS **1 HR**

NOTE ON – SPONTANEOUS, SOMATIC, BIOCHEMICAL MUTATIONS WITH AN EXAMPLE FOR EACH TYPE

MECHANISM OF MUTATION- BASE PAIR AND FRAME SHIFT MUTATIONS. **2HR**

INDUCED MUTATION :NOTE ON-TYPES OF PHYSICAL AND CHEMICAL MUTAGENS AND THEIR EFFECTS

**REFERENCES**


1. ALBERTS BRUCE ET AL 2002. **MOLECULAR BIOLOGY OF THE CELL** 4TH EDITION. GARLAND SCIENCES, TAYLOR & FRANCIS GROUP.
2. DUBEY R.C **A TEXT BOOK OF BIOTECHNOLOGY**. S .CHAND PUBLICATIONS.
3. GARDNER E.J., M.J. SIMMONS & D.P.SNUSTAD.1991. **PRINCIPLES TO GENETICS** 8TH EDITION JOHN WILEY & SONS.
4. GUPTA, P.K. (2000) : GENETICS RASTOGI PUBLISHERS, MEERUT, INDIA-611PP.,
5. HERSKOWITZ, I.H. (1977) : PRINCIPLES OF GENETICS(2ND EDITION) MACMILLAN PUBLISHING CO., INC.,
6. KUMAR H.D 2000. **MOLECULAR BIOLOGY** VIKAS 2ND EDITION.
7. LEWIN BENJAMIN 2000. **GENES VII**. OXFORD UNIVERSITY PRESS LEWIN BENJAMIN 2000.
8. MEYYAN, R.P., (2000) : GENETICS & EVOLUTION SARAS PUBLICATION RASTOGI S.C 2006. **MOLECULAR BIOLOGY** CBS PUBLICATIONS.
9. SAMBAMURTY A.V.S.S. 1999. **GENETIC**S NAROSA PUBLICATIONS. HOUSE.
10. SANDHYA MITRA (1994) : GENETICS-A BLUE PRINT OF LIFE TATA MCGRAW HILL PUBLISHING CO., LTD., NEW DELHI- 1052PP
11. SHARMA R.K.AND SANGHA S.P.S., BASIC TECHNIQUES IN BIOCHEMISTRY AND MOLECULAR BIOLOGY,I.K. INTERNATIONAL HOUSE PUBLISHING LTD.
12. SINGH B.D.1990 **FUNDAMENTALS OF GENETICS** KALYANI PUBLICATIONS
13. SINHA, U .AND SINHA, S. (1989) : CYTOGENETICS, PLANT BREEDING & EVOLUTION VIKAS PUBLISHING HOUSE, NEW DELHI-408PP.,
14. STRICKBERGER M.W 1985. **GENETICS** 3RD EDITION. MACMILLAN PUBLICATIONS. SINGH B.D.1990 **FUNDAMENTALS OF GENETICS** KALYANI PUBLICATIONS
15. SNUSTAND D.P., AND SIMONS M.J.,S 2006 PRINCIPLES OF GENETICS 4 EDITIONSJOHN WILEY &SONS,INC(ASIA)PVT. LTD
16. TURNER P.C ET AL 1998. **INSTANT NOTES IN MOLECUALR BIOLOGY**, VIVA BOOKS PVT LTD.,
17. WATSON J.D.,BAKER T.A.,BELL S.P.,GAN A..,LEVINE M.,LOSICK R.,2004 EDITION **MOLECULAR BIOLOGY OF THE GENE** PEARSON PUBLICATION
18. WINCHESTER A.M. **GENETICS** 3RD EDITION.1966. OXFORD & IBH PUBLICATION.N.Y. & COLLIER-MACMILLAN, LONDON-836PP
19. WINTER, P.C ., HICKEY, G.I. & FLETCHER, H.L. (1999) : INSTANT NOTES IN GENETICS VIVA BOOKS (P)LTD., NEW DELHI, MUMBAI, CHENNAI-342PP.,

**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, CALATROPHIS, 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 A*VICENNIA* 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 ***DROSOPHIL*A**, 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,.: I) 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**

---

(NOTE TO THE EXAMINERS)

1. ONE MAJOR EXPERIMENT AND ONE MINOR EXPT ENVIRONMENTAL STUDIES (ALL BY LOTS)
2. ONE MAJOR EXPERIMENT FROM MOLECULAR BIOLOGY 1/ 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 1 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 Ψ, Ψs, Ψp )

**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 PRESSSURE THEORY, c) PHYSCIAL 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 ORGANCI 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, MECHANSIM OF TRANSPIRATION-- a) STARCH SUGAR INTERCONVERSION THEORY, b) PROTON EXCHNAGE PUMP THEORY, SIGNIFICANCE OF TRANSPIRATION- a) ADVANTAGES OF TRANSPIRATION, b) TRANSPIRATION AS A NECESSARY EVIL, FACTORS AFFECTING THR RATE OF TRANSPIRATION, PLANT ANTITRANSPIRANTS, DAILY PERIODICITY OF TRANSPIRATION

GUTTATION: STRUCTURE OF HYDATHODE, MECHANSIM 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 DEFECIENCY SYMPTOMS OF FOLLOWING MINERAL ELEMENTS IN PLANTS **2 HR**

MAJOR ELEMENTS: NITROGEN, PHOSPHOROUS AND MAGNESIUM
MINOR ELEMENTS: IRON, MANGANESE AND ZINC
SOILESS 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, FLUORESCENE AND PHOSPOROSCENCE, QUANTUM REQUIREMENT AND QUANTUM YEILD, RED DROP AND EMMERSONS ENHANCEMENT EFFECT, TWO PIGMENT SYSTEM

**MECHANSIM OF PHOTOSYNTHESIS**- EVIDENCES FOR THE EXISTANCE 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, BALCKMAN'S LAWS OF LIMITING FACTORS WARBURG'S EFFECT, CO2 COMPENSATION POINT, PHOTORESPIRATION AND GYLCOLATE METABOLISM (C2 CYCLE), SIGNIFICANCE OF PHOTORESPIRATION, CRASSULACEAN ACID METABLOISM ( 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 SCHUTLLE, 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 NAUTRE, NATURAL AUXINS, SYNTHETIC AUXINS, PHYSIOLOGICAL EFFECTS OF AUXINS,
2. GIBBERLINS: DISCOVERY CHEMICAL NAUTRE, PHYSIOLOGICAL EFFECTS OF GIBBERLINS
3. KINETIN AND CYTOKININS: DISCOVERY, CHEMICAL NAUTRE, ZEATIN, PHYSIOLOGICAL EFFECTS OF KINETIN/CYTOKININ
4. ETHYLENE: DISCOVERY, PHYSIOLOGICAL EFFECTS OF ETHYLENE
5. ABSCISSIC ACID: DISCOVERY CHEMICAL NAUTRE, 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

**REFERENCES:**


1. BIDWELL R.G.S 1979, **PLANT PHYSIOLOGY** 2ND EDITION. MACMILLAN PUBLICATIONS.
2. BUCHANAN B.B, GRUISSEM. W & JONES. R. L. 2000. **BIOCHEMISTRY AND PLANT PHYSIOLOGY** DEVLIN R.M & F.H WITHAM 1983. **PLANT PHYSIOLOGY** 4TH EDITION.CBS PUBLICATIONS.
3. DEVLIN, R.M. (1969) : PLANT PHYSIOLOGY HOLT, RINEHART & WINSTON & AFFILIATED EAST WEST PRESS (P) LTD., NEW DELHI
4. DEVLIN T.M 1997, **TEXT BOOK OF BIOCHEMISTRY WITH CLINICAL CO-RELATIONS.** WILEY-LISS 4TH EDITION.
5. GANGULEE, DAS & DUTTA 2002, **COLLEGE BOTANY** VOL-I NCBA(P)LTD
6. GILL P.S 2004 **PLANT PHYSIOLOGY** S.CHAND PUBLICATIONS.
7. JAIN V.K 2004 **FUNDAMENTALS OF PLANT PHYSIOLOGY**, S CHAND PUBLICATIONS.
8. JAIN J.L 2004, **FUNDAMENTALS OF BIOCHEMISTRY**, S.CHAND PUBLICATIONS
9. HOPKINS W.G 1999, **INTRODUCTION TO PLANT PHYSIOLOGY** JOHN WILEY & SONS, INC @ EDITION.
10. LAWLOR D.W 2001. **PHOTOSYNTHESIS** 3RD EDITION VIVA BOOKS PVT LTD.4262/3, ANSAR ROAD DARYAGANJ, NEW DELHI-110002.
11. LEHNINGER A.L, D.L NELSON & M.M COX 1993 **TEXT BOOK OF BIOCHEMISTRY**. CBS.PUBL DELHI-32
12. MUKERJI S & GHOSH A.K 2005 **PLANT PHYSIOLOGY** NCBA (P).
13. NOGGLE, R. & FRITZ (1989 ) : INTRODUCTORY PLANT PHYSIOLOGY PRENTICE HALL OF INDIA.
14. PANDEY, S.N. (1991) : PLANT PHYSIOLOGY VIKAS PUBLISHING HOUSE (P) LTD., NEW DELHI INDIA
15. RAO.KNG SUDHAKAR RAO & S BHARATAN 1987. **A TEXT BOOK OF PLANT PHYSIOLOGY-THE FUNCTIONING PLANT**. S VISHWANATHAN, MADRAS.
16. SALISBURY, F.B &C.W. ROSS (1999) : PLANT PHYSIOLOGY CBS PUBLISHERS AND PRINTERS, NEW DELHI GILL, P.S. (2000) : PLANT PHYSIOLOGY S. CHAND & CO., NEW DELHI
17. SRIVATSAVA H.N.2004. **PLANT PHYSIOLOGY**, PRADEEP PUBLICATIONS.
18. STRYER LUBERT 1995, **BIOCHEMISTRY** 4TH EDITION W.H FREEMAN & CO. NEW YORK, SAN FRANCISCO
19. TAIZ AND ZEIGER E.2003. **PLANT PHYSIOLOGY** 3RD EDITION PANIMA PUBLICATIONS. NEW DELHI-110002.
20. VERMA, V. (2001) : A TEXT BOOK OF PLANT PHYSIOLOGY EMKAY PUBLICATIONS, NEW DELHI
21. VERMA S.K 2005, **PLANT PHYSIOLOGY AND BIOCHEMISTRY** S.CHAND PUBLICATIONS.

## 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

**DRUG EVALUATION PROTOCOL** **3HR**

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

**ISOLATION & QUANTIFICATION METHODS** **3 HR**

**P**RINCIPLE, PROCEDURE AND APPLICATION OF SOXLET, TLC AND SPECTROSCOPY

**DRUG ADULTERATION** **3HR**

TYPES OF ADULTERANTS AND SUBSTITUTES
METHODS OF DETECTION WITH EXAMPLES

**UNIT III** **14 HR**

**METABOLISM**- DEFINITION, TYPES (PRIMARY & SECONDARY ) **1 HR**

**PRIMARY METABOLISM**

PRIMARY METABOLITES- TYPES OF CARBOHYDRATES, PROTEINS AND LIPIDS WITH CRUDE DRUGS (SOURCE ,PROPERTIES ANDTHERAPEUTIC USES) **3 HR**
METABOLIC PATHWAYS -CITRIC ACID AND PENTOSE PATH WAYS WITH SIGNIFICANCE

**SECONDARY METABOLISM** **2HR**

-SHICKMIC ACID AND MELOVINIC ACID PATHWAYS WIT HSIGNIFICANCE

**SECONDARY METABOLITES** **7 HR**

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 |

**REFERENCES**


1. ABDRAIN S ET AL 2003. **PLANT BIOTECHNOLOGY**. **THE GENETIC MANIPULATION OF PLANTS** OXFORD UNIVERSITY PRESS
2. BAJPAI P.K.2006 BIOLOGICAL INSTRUMENTATION AND METHODOLOGYS. CHAND &COMPANY LTD.
3. BARNUM S.R 1998, **BIOTECHNOLOGY** AN INTRODUCTION. VIKAS PUBLICATIONS
4. CHOPRA R.N., CHOPRA I.C., HANDA K.L. AND KAPUR L.D., 1994 INDIGENOUS DRUGS OF INDIA
5. AGARWAL, O.P. 1985, VOL. II CHEMISTRY OF ORGANIC – NATURAL PRODUCTS
6. HARMAN .H.T ET.AL.1997. PLANT PROPAGATION PRINCIPLES AND PRACTICES 6$^{TH}$ EDITION
7. KUMAR K DE 2004, PLANT TISSUE CULTURE NCBA (P)LTD.
8. **KOKATE** C. K., PUROHIT A. P., GOKHALE S. B-., PHARMACOGNOSY
9. **KOKATE** C. K., PUROHIT A. P., GOKHALE S. B.,-PRACTICAL PHARMACOGNOSY
10. **IYENGAR M.A, 2007, STUDY OF CRUDE DRUGS, MANIPAL PRESS ,LTD .MANIPAL**
11. **IYENGAR M.A, AND NAYAK S.G.K, ANATOMY OF CRUDE DRUGS 2008, , MANIPAL PRESS, LTD. MANIPAL**
12. RAMAWAT K.G, 2004 PLANT BIOTECHNOLOGY S.CHAND & CO PUBLICATIONS.
13. RAZDAN M.K 2003 INTRODUCTION TO PLANT TISSUE CULTURE. OXFORD & IBH 2 EDITION
14. SADHU M.K 1989 PLANT PROPAGATION WILEY EASTERN.
15. SHAH BIREN. 2009 TEXTBOOK OF PHARMACOGNOSY AND PHYTOCHEMISTRY, PUBLISHER, ELSEVIER (A DIVISIONOF REED ELSEVIER INDIA PVT. LIMITED),
16. SMITH JE.1988. **BIOTECHNOLOGY**.3$^{RD}$ EDITION CAMBRIDE UNIVERSITY PRESS LOW PRICE ED.
17. SINGH B.D 2003 BIOTECHNOLOGY KALYANI PUBLICATIONS
18. SHUKLA R.S., CHANDEL P.S 2004, **CYTOGENETIS, EVOLUTION AND PLANT BREEDING**. S.CHAND PUBLICATIONS
19. SRIVASTAVE A.K. 2006, MEDICINAL PLANTS, INTERNATIONAL BOOK DISTRIBUTIORS, DEHRADUN.
20. WALLIS, T.E. 1967, TEXT BOOKS OF PHARMACOGNOSY

**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 **D**IFFERENT 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 $CO_2$ DURING RESPIRATION

3 **MAJOR EXPERIMENTS**

**E**XPERIMENT 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, ANTHER 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 C**omment-**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**

*******