Bharathidasan Govt. College for Women (Autonomous)
Puducherry

Department of Botany

Syllabus for

B.Sc. Botany (MAIN AND ALLIED) Choice Based Credit System (CBCS)
Revised from 29/01/2018 – Corrected version

Details of papers and scheme of examination
Effective from the academic year 2020-2021

1.Programme Outcome:

The main objective of this programme is to impart the fundamental and advanced knowledge of Plant science to the students. The multifarious curriculum and its activities of the programme encourage the students to understand the basic concepts and learn skillset in Botany. It is designed to inspire the students to gain the essential knowledge in botany and instil love for various skills required for the future endeavours. The students are trained to understand the concepts and acquire knowledge of botany through effective theoretical teaching, hands-on practical training, and field studies. The continuous assessments are done in the form of tests, seminars, assignments, quizzes, etc in order to ensure the learning skills of the students and outcomes of the various courses offered. It aims to achieve these outcomes by assisting the students through effective teaching, good laboratory infrastructure, departmental library and congenial classroom environment. The programme caters to the needs of the students to crack entrance examinations for higher studies as well as competitive examinations for securing jobs. The knowledge and expertise thus gained would help students to acquire jobs in various departments of agriculture and in national laboratories viz, ICAR, CSIR, BSI and ICMR. They can also compete for the other general competitive exams like IFS, UPSC and other state services. Apart from this the students can also become entrepreneurs especially in the field of medicinal botany, Mushroom cultivation, organic farming, in the production of bio-fertilizers, organic acid, enzymes etc. The successful completion of the programme would help the students not only in academics but also in their chosen careers.

2.Course Outcome:

(i) Foundation Courses for Zoology UG Programmes

Allied Botany I DSE – I	These need-based courses are offered to help the students to acquire the basic concepts of Botany and be useful to crack the competitive examinations. in the first semester they will learn the evolutionary plant biology through the model systems. In the second semester they will learn the fundamentals of cell biology, plants physiology, tissue culture and microbiology.
Allied Botany II DSE – II	

(ii) Main Courses for B.Sc. Botany Programme

SEMESTER I	
NAME OF THE COURSE	OUTCOME
BOTANY PAPER-I: **BIODIVERSITY I** (ALGAE, FUNGI & LICHENS) DSC -I	Course helps students appreciate the biodiversity and evolutionary development of lower plants. Highlights the significance and economic prospective of algae, fungi and lichens and possibility of generating ideas for entrepreneurship.
BOTANY PAPER-II: **PHYTOPATHOLOGY** DSC -I	The course enables the students to acquire concepts of plant pathology and helps to realize the biology behind the plant diseases and economic loss and the possibility of developing effective disease mitigating methods.
PUBLIC ADMINISTRATION **AECC-1**	The course teaches the leadership and management skills to the students and trains them to be responsible citizens.
SEMESTER II	
BOTANY PAPER-III: Biodiversity II (Bryophytes, Pteridophytes) DSC -II	Course helps students to understand the biology, evolution, and economic significance of Bryophytes and Pteridophytes and thereby enhance their knowledge.
BOTANY PAPER-IV: Gymnosperms and Palaeobotany DSC -II	Paper helps the students to gain knowledge evolution, structure and reproduction of Gymnosperm, and also the fundamentals of the palaeobotany and its significance in the context of plant evolution.
ENVIRONMENTAL STUDIES **AECC-II**	Studying this course helps to better understand environment and environmental issues and causes and consequences of environmental degradation. This makes them informed citizens about environment and knowledge they acquire would help them both for higher studies and job prospective.
SEMESTER III	
BOTANY PAPER-V: Embryology of Angiosperms DSC -III	This paper provides fundamental knowledge on how plants reproduce, complete their life cycle and their developmental aspects which adds on to their knowledge on plant biology.
BOTANY PAPER-VI: Anatomy of Angiosperms **Skill Enhancement Course - I**	Here the students will learn the structural arrangement of plant organs. How different tissues organise to form organs and plant body.
SEMESTER IV	
BOTANY PAPER-VII: Microbiology DSC -IV	Paper imparts basic concepts of microbiology an advanced subject to the students. Gaining the knowledge on basics microbiology would

	immensely help them in future higher studies and possible job opportunities.
BOTANY PAPER-VIII: Cell Biology **Skill Enhancement Course - II**	Here the students will learn about the fundamental unit of life the cell. Subject provides knowledge on how cell works it architecture and other functional aspects and this essential knowledge is must for students of biology
SEMESTER V	
BOTANY PAPER-IX: Morphology and Taxonomy of Angiosperms DSC -V	This course introduces diverse morphological adaptation of plants and trends in plant taxonomy. It also provides hands-on experience; herbarium preparation and field trip impart taxonomic skills to students. Course provides good opportunity to learn taxonomy which an essential and highly desired skills
BOTANY PAPER-X: Medicinal Botany – **GE-I**	This course provides conceptual knowledge on traditional medicinal systems and medicinal importance of plants. This course is highly relevant in the current alternative plant-based medicines and students gets opportunity to learn this concepts through this paper.
BOTANY PAPER-XI: Genetic and Plant Breeding DSC -VI	The paper will provide conceptual understanding to the students about laws inheritance and how one can use these laws to make a better hybrid plant through the breeding programme. Here students will acquire the basic knowledge on two essential subjects genetics and breeding.
BOTANY PAPER-XII: Molecular Biology DSC -VII	This course teaches the students, the how cell works at molecular level and fundamental molecular machinery that drives life. The knowledge gained through this course will immensely help students to improve their concepts of biology and highly useful for the future advanced studies
BOTANY PAPER-XIII Mushroom Cultivation **Skill Enhancement Course - III**	This course imparts basic knowledge and concepts on Mushroom cultivation. Provides complete guide for cultivation economically important mushrooms and management of disease and market. These skills greatly helps them to achieve their self-employment goal or to be entrepreneur by setup a small scale mushroom cultivation start-up.
SEMESTER VI	
BOTANY PAPER-XIV: Plant Biochemistry DSC -VIII	The course introduces the key biochemical processes of the cell and building blocks of the cell. This knowledge helps the students for their advanced studies as well cracking the various competitive exams related to biology

BOTANY PAPER-XV: Plant Physiology DSC - IX	The paper will impart the basic concepts of plant physiology and how different physiological processes drive the plant life. This concept gained through this course adds on to their over knowledge on plant systems
BOTANY PAPER-XVI Plant Biotechnology DSC - X	This paper introduces the students to the concepts of the plant Biotechnology and how these can be exploited for human welfare and commercial significance of biotechnology.
BOTANY PAPER-XVII Computer applications in biology, bioinformatics and Biostatistics. **Skill Enhancement Course - IV**	This course exposes the student to an inter-disciplinary subject integration of biology, computers and biostatistics. Here students will learn how power of computation can be used solve the issue related to biology and their application in real life. They will also be learning the basic biostatistics and applications of statistics in field of biology. Statistics has become essential in field of biology and gaining the knowledge will improve the skillset of students. In this informatics era gained knowledge in this inter disciplinary courses not only improve their skillset but also enhances their job opportunities.
BOTANY PAPER-XVIII Bioanalytical Techniques in Botany **GE- II**	Through this course students will learn the application of various analytical tools and techniques employed in the field of biology. Course will impart the principles of analytical tools and their real-life applications. This course will improve the knowledge of students in advanced analytical tools and improves their prospects in future career.

3. Course Guidelines

Objectives of the Course

To make the students learn about the biodiversity and the various anatomical features of the plants.

To provide the necessary scientific knowledge in identifying and describing the plants.

To explain and make them understand the various physiological processes of plants.

To familiarise them with conservation of natural resources and sensitize them to the protection of endangered plant species.

To provide training in handling the various scientific equipment and its importance in research.

To expose them to the economic importance of plants and their products in various commercial fields.

Course Updation

The syllabus is updated periodically with the external and internal subject experts including an industrialist and an alumna. The recent scientific findings and their uses in the field of botany are included in the course.

Scope for Higher education and Research

On successful completion of B.Sc., Botany degree the students can pursue their Post graduate studies in the following subjects.

1. Botany
2. Biotechnology
3. Microbiology
4. Environmental studies
5. Biochemistry
6. Forestry
7. Horticulture etc.,

Candidates with Botany degree can do research in different fields such as

1. Plant taxonomy
2. Plant biochemistry
3. Molecular biology
4. Plant pathology
5. Environmental research
6. Biodiversity conservation etc.

4.1 Course Distribution

The Choice-Based Credit System (CBCS) is being implemented in the college from the Academic year 2016-2017. The scheme was prepared on the model of the CBCS scheme proposed by UGC.

Category	No. of Papers	Credits	Total Credits
Part I (Language)	4	3	12
Part II (English)	4	3	12
DSC – (Discipline Specific Course)	18		58
DSE – (Discipline Specific Elective)	4	6	24
SEC – (Skill Enhancement Course)	4		14
AECC – (Ability Enhancement Course)	2	2	04
GE – (Generic Elective)	2	4	08
Total	42	-	

4.2 Course distribution Semester wise

Semester	PART I Language	PART II English	DSC	DSE	SEC	AECC	GE
I	01	01	3	2	-	01	-
II	01	01	3	2		01	-
III	01	01	2	2	01	-	-
IV	01	01	2	2	01	-	-
V	-	-	4		01	-	01
VI	-	-	4		01	-	01
Total	04	04	18	8	04	02	02

Total No. of Papers 42

4.3 Credits for each Semester

Semester	
I	22
II	22
III	20
IV	20
V	24
VI	24
Total	132

4.4 Course Structure

SEMESTER- I

Sl.No	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	Part-I	D9201	Language - I	3	3 +3
2	Part- II	D9001	English - I	3	3 +3
3	DSC -I	D0451	Biodiversity- I (Algae, Fungi & Lichens)	3	3 +2
4		D0452	Phytopathology	3	3 +2
5		D0453	Main Practical - I	2	4
6	DSE – I	D0704	Allied Zoology- I	4	4
7		D0705	Allied Zoology practical - I	2	4
8	AECC – I	D9604	Introduction to Public Administration	2	2
Total Credits				22	

SEMESTER-II

Sl.No	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	Part-I	D9202	Language - II	3	3 +3
2	Part- II	D9002	English – II	3	3 +3
3	DSC -II	D0454	Biodiversity- II (Bryophytes & Pteridophytes)	3	3 +2
4		D0455	Biodiversity- III Gymnosperms & Paleobotany	3	3 +2
5		D0456	Main Practical – II	2	4
6	DSE – II	D0709	Allied Zoology - II	4	4
7		D0710	Allied Zoology practical - II	2	4
8	AECC – II	D9701	Environmental studies	2	2
Total Credits				22	

SEMESTER-III

Sl.No	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	Part-I	D9203	Language – III	3	3 +3
2	Part-II	D9003	English – III	3	3 +3
3	DSC - III	D0457	Embryology of Angiosperm	3	4 +2
4		D0459	Main Practical – III	2	4
5	DSE - III	D0312	Allied Chemistry – I	4	4
6		D0313	Allied Chemistry Practical - I	2	2
7	SEC - I	D0458	Anatomy of Angiosperm	3	4 +2
	Total Credits			20	

SEMESTER – IV

Sl.No	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	Part-I	D9204	Language – IV	3	3+3
2	Part-II	D9004	English – IV	3	3+3
3	DSC - IV	D0460	Microbiology	3	4 +2
4		D0462	Main Practical – IV	2	4
5	DSE - IV	D0317	Allied Chemistry – II	4	4
6		D0318	Allied Chemistry Practical - II	2	2
7	SEC - II	D0461	Cell Biology	3	4 +2
	Total Credits			20	

SEMESTER- V

Sl.No.	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	DSC - V	D0463	Morphology and Taxonomy of Angiosperm	4	4 +2
2	DSC - VI	D0465	Genetics & Plant Breeding	4	4 +2
3	DSC – VII	D0466	Molecular Biology	4	4 +2
4	DSC	D0467	Main Practical - V	4	8
5	SEC – III	D0468	Mushroom Cultivation	4	4
	GE-I	D0464	Medicinal Botany	4	4+2
	Total Credits			24	

SEMESTER-VI

Sl.No.	Course Category	Course Code	Title of the Paper	Credits	No. of hours/ week Theory + Practical
1	DSC - VIII	D0469	Plant Biochemistry	4	4 +2
2	DSC - IX	D0470	Plant Physiology	4	4 +2
3	DSC - X	D0471	Plant Biotechnology	4	4 +2
4	DSC	D0473	Main Practical - VI	4	8
5	SEC- IV	D0472	Computer Application, Bioinformatic & Biostatistics	4	4+2
6	GE-II	D0474	Bioanalytical Techniques in Botany	4	4
	Total Credits			24	

5. Regulations

5.1 Eligibility for Admission: Qualify the 12th or equivalent examination from a recognized board with Botany, Zoology, Chemistry, Physics and English.

5.2 Duration of the Programme

The Programme duration is Three Academic years, containing Six Semesters.

5.3 Medium of Instruction

The Medium of Instruction is English.

5.4 Scheme of Examination

The End-Semester Examination (ESE) for each course carries a maximum of 75 Marks and the Continuous Internal Assessment (CIA) is for 25 Marks.

5.5 Components of Internal Assessments: -

Announced/Unannounced Tests	- 5 Marks
Assignment	- 5 Marks
Attendance	- 5 Marks
Model Examination	- 10 Marks
Total	- 25 Marks

5.6 Attendance Scale

96% to 100%	- 5
91% to 95%	- 4
86% to 90%	- 3
81% to 85%	- 2
76% to 80%	- 1
Below 75%	- Admissible for the Examination with Condonation Fee.
Below 60%	- Not admissible to appear for the Examination.

5.7 Criteria for 'Pass Mark'

Minimum Pass Mark - 40

No Minimum Pass Mark for Internal Assessment

Minimum Pass Mark for ESE - 30

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System for I B.Sc. Botany (Main), Semester - I
Paper I: Biodiversity I: Algae, Fungi & Lichens
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0451
Theory: 3 hrs. (3 Credits)
Max. marks: 100
CIA: 25
ESE: 75

Objective

- To study, identify and understand the salient features of Algae, Fungi and Lichens.

Unit I

General Characters of Algae, Classification (Fritsch, 1945), Life Cycle types in Algae, Economic importance of Algae.

Unit II

Detailed study of following genera (Systematic Position, Occurrence, Structure, Reproduction and Life Cycle): Nostoc, Oedogonium, Navicula, Sargassum and Polysiphonia.

Unit III

General Characters of Fungi, Classification (Ainsworth,1973), detailed study of following genera (Systematic Position, Occurrence, Structure, Reproduction and Life Cycle): Albugo, Rhizopus, Aspergillus, Peziza and Agaricus.

Unit IV

General Characters of Lichens, Classification based on fungal partner and kinds of frutifications, Structure of Crustose, Foliose and Fruticose lichens, Reproduction in Lichens, detailed study of Usnea.

Unit V

Indian contribution to Algology: M.O.P.Iyengar, T.V.Desikachary, Indian contribution to Mycology: K.S.Thind, C.V.Subramaniam. Economic importance of Fungi, Economic importance of Lichens.

Suggested Reading

Text Books

1. Vashishta, B.R. 1990. Botany for Degree Students – Algae. S. Chand and Co. Ltd., Calcutta.
2. Sharma, O.P. 2006. Text book of Fungi. Tata McGraw-Hill Co., New Delhi.

Reference Books

1. Bold, H.C. and Wyne, M.J. 1978. Introduction to the Algae. 2nd Edition, Prentice Hall, NJ.
2. Fritsch, F.E. 1945. Structure and reproduction of Algae. Cambridge University Press, Cambridge
3. Kumar, H.D. 1990. The Algae. Affiliated East-West Press Pvt. Ltd., New Delhi.
4. Vashishta, B.R. 1990. Botany for Degree Students – Algae. S. Chand and Co. Ltd., Calcutta.

5. Sharma, O.P. 2011. Algae. Tata McGraw-Hill Co., New Delhi.
6. Alexoupolos, C.J., Mims, C.W. and Blackwell, M. 2007. Introductory Mycology. John Weily and Sons, New Delhi.
7. Mehrotra, R.S. and Aneja, K.R. 1999. An introduction to Mycology, New Age International, New Delhi.
8. Hale, M.E. 1983. The Biology of Lichens, 3rd Ed, Edward Arnold (Publishers) Ltd., London.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System for I B.Sc. Botany (Main), Semester - I
Paper II: Phytopathology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0452
Theory: 3 hrs. (3 Credits)
Max. Marks: 100
CIA: 25
ESE: 75

Objective

- To study various symptoms of plant diseases, pathogens and preventive and control methods for important diseases of crop plants.

Unit I

Definition, Significance and History of Phytopathology, Brief notes on E.J. Butler and T.S. Sadasivan.

Unit II

Notes on various Symptoms of Plant diseases: Rots, Rusts, Smuts, Leaf spots, Blights (Leaf blight), Mildews, Cankers and Mosaics.

Unit III

Detailed study of the following Plant Diseases (including Symptoms, causative organism, Disease cycle and Control): Tobacco mosaic, Citrus canker, Rust of Wheat, Blast of Rice, Tikka disease of Groundnut, Red rot of Sugarcane.

Unit IV

Disease Resistance in Plants: Horizontal and Vertical resistance, Structural and Chemical Resistance of Plants to Pathogens, Hypersensitive reaction.

Unit V

Preventive and Control methods of Plant Diseases: Quarantine Check, Breeding for Disease Resistance, Chemicals used to control Plant diseases, Biological Control of Plant Diseases.

Suggested Reading

Text Books

1. Bilgrami, K.S. and Dube, H.C. 1989. A textbook of Modern Plant Pathology. Vikas Publishing House Pvt. Ltd. New Delhi.
2. Rangaswami, G. 1975. Diseased of crop plants in India. Prentice-Hall of India Pvt. Ltd., New Delhi.

Reference Books

1. Mehrotra, R.S. and Ashok Aggarwal. 2006. Plant Pathology. Tata McGraw Hill, New Delhi.
2. Pandey, B.P. 2012. Plant Pathology – Pathogen & Disease. S. Chand & Co.
3. Sambamurty, A.V.S.S. 2006. A Textbook of Plant Pathology. IK International Pvt., New Delhi.

4. Schumann, G.L. and Cleora J. D'Arcy. 2009. Essential Plant Pathology, 2nd Edition. APS Press, USA.
5. Singh, R.S. 2009. Plant Diseases. Oxford & IBH Publishing Company Pvt. Ltd., New Delhi.
6. Singh, R.S. 2010. Introduction to Principles of Plant Pathology. Oxford & IBH Publishing Company Pvt. Ltd., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System for I B.Sc. Botany (Main), Semester - I
Main Practical Paper- I covering Biodiversity I (Algae, Fungi & Lichens) and Phytopathology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0453
Practical: 4 Hrs (2 credit)
Max. marks: 40
CIA: 08
ESE: 32

Suggested Laboratory Exercises

1. Study and identification of Nostoc.
2. Study and identification of Oedogonium.
3. Study and identification of Sagrassum.
4. Study and identification of Polysiphonia.
5. Study and identification of Albugo.
6. Study and identification of Rhizopus.
7. Study and identification of Aspergillus
8. Study and identification of Peziza
9. Study and identification of Agaricus
10. Study of Lichens: Morphology, types using specimens/pictures.
11. Study and identification of pathogen, disease symptoms and host of the following plant diseases:
    a) Mosaic disease of tobacco.
    b) Canker on Citrus plants.
    c) Rust of Wheat
    d) Paddy Blast
    e) Tikka disease
    f) Red rot of sugarcane.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Botany, Semester - I
Main Practical Examination, Main Practical Paper- I
Covering papers Biodiversity, I (Algae, Fungi & Lichens) and Phytopathology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0453
Duration – 3 hrs

1. Make suitable micro-preparation of A and B. Identify, draw and give salient features. Leave the slides for valuation.
   (Preparation-3, Identification-1, Diagram-2, Salient features-2) (2 x 8 = 16 marks)

2. Identify and draw the Pathogen with the help of micro-preparation of the given specimen C. Name the disease caused, host plant and write the symptoms. Leave the slide for valuation.
   (Preparation -2, Pathogen -1, Symptoms - 2, Disease & host plant - 1, Diagram -2) (1 x 8 = 8 marks)

3. Identify the symptoms and write a note on specimen D.
   (Identification – 1, Diagram – 1, Salient features – 2) (1 x 4 = 4 marks)

4. Identify, draw and give salient features of E, F, G, H.
   (Identification-1, Diagram-2, Salient features-2) (4 x 5 = 20 marks)

Practical - 48

To be normalized to – 24
Record - 05
Viva voce - 03

32

Key for Main Practical I

A. Algae specimen (sectioning)
B. Fungi specimen
C. Pathology material (sectioning)
D. Pathology - Specimen for identification symptoms
E. Lichen specimen/figure
F. Slide/Figure of algae
G. Slide/Figure of fungi
H. Slide/Figure of phytopathology.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester - I
Allied Botany for B.Sc., Zoology Main – Paper - I
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code –D0404
Theory- 4 hrs (4 Credits)
Max. marks - 75
CIA - 15
ESE - 60

Objectives:

- To understand the structural organization, reproduction and economic importance of various groups of microbes and plants

Unit I

General characters of algae; structure and reproduction of Oedogonium. General characters of fungi; structure and reproduction of Aspergillus.

Unit II

General characters of lichens, organization of thallus and their types (Leprose, Crustose, Foliose and Fruticose with suitable examples).

Unit III

General characters of bacteria; study of structure and reproduction of Escherichia coli. General characters of plant viruses; Tobacco Mosaic Virus – Structure, disease cycle, host and symptoms.

Unit IV

Study of structure, reproduction and life cycles of the following genera: Marchantia (Bryophyte), Selaginella (Pteridophyte) and Pinus (Gymnosperm).

Unit V

Taxonomy: Classification (Bentham and Hooker), study of Angiospermic families: Annonaceae, Cucurbitaceae, Apocynaceae, Euphorbiaceae and Poaceae and their economic importance.

Text books

1. Pandey, B.P. 2009. College Botany. Vol I. S. Chand & Co. Ltd., New Delhi.

Suggested Reading

2. Vashishta, B.R. 1990. Botany for Degree Students – Algae. S. Chand and Co. Ltd., Calcutta.
3. Sharma, O.P. 2006. Text book of Fungi. Tata McGraw-Hill Co., New Delhi.
4. Bilgrami, K.S. and Dube, H.C. 1989. A textbook of Modern Plant Pathology. Vikas Publishing House Pvt. Ltd.. New Delhi.
5. Mehrotra, R.S. and Ashok Aggarwal. 2006. Plant Pathology. Tata McGraw Hill, New Delhi.

6. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. 1993. Microbiology – Concepts and Applications, McGraw-Hill, New York.
7. Parihar, N.S. 2012. Introduction to Embryophyta - Bryophyta Vol.I. Surjeet Publications, New Delhi.
8. Vashishta, P.C. and Sinha, A.K. 2010. Botany for Degree Students – Gymnosperms. S. Chand & Co Ltd., New Delhi.
9. Pandey, B.P. 2014. Taxonomy of Angiosperms. S. Chand & Co. Ltd., New Delhi.
10. Sharma, O. P. 1996. Hill's Economic Botany. Tata McGraw Hill Publishing Company Ltd., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester - I
Allied Botany Practical paper-I for B.Sc., Zoology Main – Paper - I
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0405
Practical - 4 hrs (2 Credit)
Max. marks - 25
CIA - 05
ESE - 20

Suggested Laboratory Exercises

1. Study of the Bacterium Escherichia coli using slide/picture.
2. Study of Tobacco Mosaic Virus and symptoms of TMV disease using books/pictures.
3. Microscopic study of Oedogonium.
4. Microscopic study of Aspergillus.
5. Study of morphological types of Lichens using live or preserved specimens.
6. Study of anatomical features of Marchantia, Selaginella and Pinus.
7. Study of Taxonomic details and economic importance of
   a) Annonaceae
   b) Cucurbitaceae
   c) Apocynaceae
   d) Euphorbiaceae
   e) Poaceae.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester - I
Allied Botany Practical Examination
Allied Practical Paper – I
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0405
Duration – 3 hrs
Max. marks - 25
CIA - 05
ESE - 20

1. Make suitable micro-preparation of A and B. Leave the slide for valuation. Draw, identify and cite significant features.
   (Preparation-2, Identification-l, Diagram-1, Salient features-2) (2 x 6 = 12 marks)

2. Identify, draw and write notes on C and D.
   (Identification-1, Diagram-1, Salient features-2) (2 x 4 = 8 marks)

3. Identify the given specimen E to its family. Describe in technical terms and draw diagrams.
   (Family – 1, Technical description – 3, Diagram – 2) (1x 6 = 6marks)

4. Identify the family, binomial & morphology of the useful part of F.
   (Family – 1, Binomial – 1, Useful part – 2) (1 x 4 = 4marks)

Practical - 30

To be normalized to -15
Record - 03
Viva voce - 02

Total 20

Key for Allied Practical I (Zoology Main)

A. Bryophyte/Pteridophyte specimen (for sectioning)
B. Gymnosperm specimen (for sectioning)
C. Bacteria/Algae - slide/specimen/figure
D. Fungi - slide/specimen/figure
E. Taxonomy specimen
F. Economic Botany

Bharathidasan Govt. College for Women (Autonomous), Puducherry
I B.Sc. Botany (Main), Semester I
AECC Paper - I Introduction to Public Administration
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D9604
Theory: 2 hrs. (2 Credits)
Max. marks: 100
CIA: 25
ESE: 75

Objective

- To understand the Public Administration in Union, State and Union Territories of India.

Unit-I: Introduction:
Meaning, nature and scope of public Administration and its relationship with other disciplines. Evolution of public administration as a discipline - Woodrow Wilson, Henry Fayol, Max Weber and others. Evolution of Public Administration in India - Arthashastra - Colonial Administration up to 1947.

Unit-Il: Public Administration in India.
Enactment of Indian Constitution - Union government - The Cabinet - Central Secretariat - All India Services - Training of Civil Servants - UPSC - Niti Ayog - Statutory Bodies: The Central Vigilance commission, CBI. National Human Rights Commission, National Women's Commission, CAG.

Unit-III: State and Union Territories Administration.
Differential Administrative systems in Union Territories compared to States Organization of Secretariat - Position of chief secretary - Functions and Structure of Departments, Directorates - Ministry of Home Affairs.

Unit-IV: Union Territory Administration
Supervision of union territory Administration - Position of Lt. Governor in UT - Government of Union Territories Act 1963 - Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island.

Unit -V: Emerging Issues in Indian Public Administration.
Changing Role of District Collector - Civil Servants - Politicians relationship - Citizen’s character - Public Grievance Redressal mechanisms - The RTI Act 2005 - Social Auditing and Decentralization - Public Private Partnership.

Suggested Reading:
Text Books

1. Public Administration, A.R. Tyagi, 1"1 Ed ., Atma Ram sons, New Delhi, 1983.
2. Public Administration in India, Avasthi and Maheshwari, 1? Ed ., Lakshmi Narain Agarwal, 2013.

3. Public Administration in India-21" Century Challenges for Good Governance, R.B. Jain, 1" Ed ., Deep and Deep, New Delhi, 2002.
4. Public administration in India, Ramesh K Arora, 1" Ed ., Wishwa Prakashan, New Delhi, 2006.

Reference Books

1. Ramesh K Arora, Public Administration-Recent Perspective, 1" Ed ., Rawat Pub, 2011.
2. Rumki Basu, Public Administration-Concept and Theories, 1" Ed ., Sterling, New Delhi, 2013
3. Policy and Administration, Appleby P.H, 1" Ed ., University of Alabama Press, Alabama, 1949.
4. Gerald. E. Caden, Public Administration, 1" Ed ., Pablidas Publishers, California, 1982.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
I B.Sc. Botany (Main), Semester II
Paper III: Biodiversity II – Bryophytes and Pteridophytes
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0454
Theory: 3 hrs. (3 Credits)
Max. marks: 100
CIA: 25
ESE: 75

Objective

- To study and to understand the structure and reproduction of various genera of Bryophytes and Pteridophytes

Unit I

General Characters of Bryophytes, Classification (Rothmaler, 1951), Resemblances and differences of bryophytes with Algae.

Unit II

Detailed study of following genera (Systematic Position, Occurrence, Structure, Reproduction and Life Cycle): Marchantia, Anthoceros and Funaria.

Unit III

General Characters of Pteridophytes, Classification of Pteridophytes by G.M. Smith (1955), Resemblances and Differences with Bryophytes. Stelar organization in Pteridophytes, Heterospory and Seed habit.

Unit IV

Detailed Study of Following Genera (Systematic Position, Occurrence, Structure, Reproduction and Life Cycle): Lycopodium, Selaginella and Equisetum.

Unit IV

Indian contribution to Bryology with reference to works of S.R. Kashyap and Ram Udar; Economic importance of Bryophytes, Indian Contribution to Pteridology with particular reference to works of A. Abraham, and V.S. Manickam.

Suggested Reading

Text Books

1. Parihar, N.S. 2012. Introduction to Embryophyta - Bryophyta Vol.I. Surjeet Publications, New Delhi.
2. Sharma, O.P. 1990. Text book of Pteridophyta. MacMillan India Ltd., New Delhi.

Reference Books

1. Mukerjee, S.K. 1984. College Botany Vol II. New Central Agency, Calcutta.
2. Narayanaswami, R.V., Rao, K.N. and Raman. A. 2003. Outline of Botany.S. Vishwanathan Pvt. Ltd., Chennai.
3. Pandey, B.P. 2011. College Botany Vol.II. S. Chand and Co. Ltd., New Delhi.

4. Rashid, A. 1986. An Introduction to Bryophyta. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Smith, G.M. 1989. Cryptogamic Botany (Bryophytes and Pteridophytes) Vol –II. Tata MacGraw Hill Pub. Co. Ltd., New Delhi.
7. Watson, E.V. 1979. The Structure and Life of Bryophytes, B.I. Publications, New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Botany, Semester - II
Paper IV: Biodiversity III – Gymnosperms and Palaeobotany
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0455
Theory - 3 hrs (3 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives:

- To study and understand the structure and reproduction of Gymnosperms and Fossils.

Unit I

General characters of Gymnosperms and their Classification (K.R.Sporne, 1965) Resemblances and differences with the Pteridophytes and Angiosperms.

Unit II

Detailed study of the morphology, anatomy and reproduction of Cycas, (Developmental details not required).

Unit III

Detailed study of the morphology, anatomy and reproduction of Pinus and Gnetum (Developmental details not required).

Unit IV

Geological time scale; General account on fossils and fossilization; types of fossilization: compressions, impressions, casts, petrifactions (mineralized plants), compactions (Mummified plants), ambers.

Unit V

A detailed study of the following fossil genera – Rhynia, Lepidodendron, and Williamsonia. Brief note on the contributions of Birbal Sahni.

Suggested Reading

Text Book

1. Sambamurty, A.V.S.S. 2005. A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. I.K. International Pvt. Ltd., New Delhi.
2. Arnold, C.A. 1947. An Introduction to Palaeobotany. McGraw-Hill Book Co. New Delhi.

Reference Books

1. Agashe, S.N. 1995. Paleobotany – Plants of the past, their evolution, paleoenvironment and application of fossil fuels. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Bhatnagar S.P. and Alok Moitra. 1996. Gymnosperms. New Age International Publishers, Chennai.
3. Sporne, K.R. 1965. The morphology of Gymnosperms. B.I. Publications. New Delhi.
4. Vashishta, P.C. and Sinha, A.K. 2010. Botany for Degree Students – Gymnosperms. S. Chand & Co Ltd., New Delhi.

5. Vashishta P.C., Sinha A.K. and Kumar A. 2006. Botany For Degree Students: Gymnosperms. S. Chand & Company Ltd., New Delhi.
6. Pandey, B.P. College Botany. Vol II. S. Chand & Co., New Delhi.
7. Seward, A.C. 1991. Fossil Plants. Today & Tomorrow's Printers & Publishers, New Delhi.
8. Gangulee, H.C. and Kar, A.K. 1992. College Botany, Vol II. New Central Agency, Calcutta.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Botany, Semester - II
Main Practical Paper- II covering papers Bryophytes and Pteridophytes and Gymnosperms and Palaeobotany
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0546
Practical: 4 Hrs (2 credit)
Max. marks - 40
CIA - 08
ESE - 32

Suggesting Laboratory Exercises

1. Observation, study of morphological and anatomical features of Marchantia.
2. Observation, study of morphological and anatomical features of Anthoceros.
3. Observation, study of morphological and anatomical features of Funaria.
4. Observation, study of morphological and anatomical features of Lycopodium.
5. Observation, study of morphological and anatomical features of Selaginella.
6. Observation, study of morphological and anatomical features of Equisetum.
7. Observation, study of morphological and anatomical features of Cycas.
8. Observation, study of morphological and anatomical features of Pinus.
9. Observation, study of morphological and anatomical features of Gnetum.
10. Study of fossils: Rhynia, Lepidodendron, and Willamsonia using specimens/pictures/slides.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Botany, Semester - II
Main Practical Examination, Main Practical Paper- II
Covering papers Biodiversity II (Bryophytes and Pteridophytes and Gymnosperms and Palaeobotany)
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code: D0456
Duration – 3 hrs

1. Make suitable micro-preparation of A. Identify, draw and give salient features. Leave the slides for valuation.

   (Preparation -2, Identification-1, Diagram-2, Salient features-2) (1 x 7 = 7 marks).

2. Make suitable micro-preparation of B and C. Identify, draw and give salient features. Leave the slides for valuation.

   (Preparation-3, Identification-1, Diagram-2, Salient features-2) (2 x 8 = 16 marks)

3. Identify, draw and give salient features of D, E, F, G, H.

   (Identification-1, Diagram-2, Salient features-2) (5 x 5 = 25 marks)

Practical - 48
To be normalized to - 24
Record - 05
Viva voce - 03

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Key for Main Practical I

A. Bryophyte material (sectioning)
B. Pteridophyte material (sectioning)
C. Gymnosperm material (sectioning)
D. Slide/Figure of Bryophyte
E. Slide/Figure of Pteridophyte
F. Slide/Figure of Gymnosperm
G. Slide/Figure of Paleobotany
H. Slide/Figure of Paleobotany

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester - II
Allied Botany for B.Sc., Zoology Main – Paper - II
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code –D0409
Theory - 4hrs (4 Credits)
Max. marks - 75
CIA - 15
ESE - 60

Objectives

- To understand cellular organization and to have good knowledge in Plant Physiology, Microbiology, Tissue culture and Plant Ecology.

Unit I

Cytology: Study of plant cell in detail. Anatomy: Study of primary structure in stem and root of dicot and monocot. Study of anatomy of leaf (dicot and monocot).

Unit II

Plant Physiology: Brief account of respiration, photosynthesis, absorption and transport of ions and water, transpiration.

Unit III

Phytohormones (Auxins, Gibberellins and Cytokinins). Basic knowledge of plant tissue culture (callus formation and organogenesis).

Unit IV

Applied Microbiology: Production of alcoholic beverage (beer), antibiotic (penicillin) and organic acid (acetic acid). Methods of production and uses of biofertilizers (Blue green algal biofertilizers).

Unit V

Plant Ecology: Study of ecosystem: Food chain and food web, ecological pyramids, energy flow, biogeochemical cycles (Carbon and Nitrogen). Hydrophytes and Xerophytes.

Text book

1. Gangulee, H.C. and Kar, A.K. 1992. College Botany, Vol I, II & III. New Central Agency, Calcutta.

Suggested Reading

Fahn, A. 1982. Plant Anatomy. Pergamon Press U.K.
1. Pandey, B.P. 2002. Plant Anatomy. S. Chand & Co., New Delhi.
2. Thorpe, N.O. 1984. Cell Biology. John Wiley & Sons,New York,USA.
3. Jain, V.K. 1988. Fundamentals of Plant Physiology, S.Chand and Co. Ltd.,New Delhi.
4. Salisbury, F.B. and Ross, C.W. 1986. Plant Physiology. 3rd edition. CBS Publishers, New Delhi.

5. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. 1993. Microbiology – Concepts and Applications, McGraw-Hill, New York.
6. Stainer,R.V, Adelberg,E.A and Ingraham,J.L. 1976. General Microbiology. 4th edition. Macmillan, London,UK.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Company, London.
8. Verma, P.S. and Agrawal, V.K. 2010. Environmental Biology – Principles of Ecology. S. Chand and Co. Ltd., New Delhi.
9. Shukla, R.S. and Chandel, P.S. 2005. A Textbook of Plant Ecology. S. Chand, New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester -II
Allied Botany Practical paper-II for B.Sc., Zoology Main – Paper - II
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code –D0410
Practical - 4 hrs (2 Credit)
Max. marks - 25
CIA - 05
ESE - 20

Suggested Laboratory Exercises

Observation and identification of plant cell organelles -

1. Mitochondrion
2. Nucleus
3. Endoplasmic reticulum
4. Chloroplast
5. Golgi bodies
6. Microscopic preparation/sectioning and microscopic examination of T.S. of stem (Dicot and Monocot)
7. Microscopic preparation/sectioning and microscopic examination of T.S. of Root (Dicot and Monocot)
8. Microscopic preparation/sectioning and microscopic examination of T.S. of Leaf (Dicot and Monocot)
9. Study of physiological process (in Unit II) through experimental set-up/picture.
10. Identification of Inoculum (microbe employed in industrial processes), raw material and products (minimum one beverage, one antibiotic and one organic acid).
11. Study of ecological pictures/models, sectioning of hydrophytes and xerophytes in relation to unit IV.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Zoology, Semester - II
Allied Botany Practical Examination, Allied Botany Practical Paper - II
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0410
Duration – 3 hrs

1. Make suitable micro-preparation of given specimen A. Draw diagram, identify giving reasons. Leave the slide for valuation.
   (Preparation -3, Identification-l, Diagram-3, Salient features-3)
   1 x 10 =10 marks

2. Make suitable micro-preparation of given specimen B. Draw diagram, identify giving reasons. Leave the slide for valuation.
   (Preparation - 3, Identification-1, Diagram-2, Salient features-2)
   1x 8 = 8 marks

3. Identify, draw and write on the salient features of C, D and E.
   (Identification with reasons-2, Diagram-1) 3 x 3 = 9 marks

4. Identify by giving the salient features of F.
   (Identification – 1, Diagram – 1, Salient features – 1) 1 x 3 = 3 marks

Practical - 30

To be normalized to -15
Record - 03
Viva voce - 02

Total 20

Key for Allied Practical II (Zoology Main)

A- Anatomy (sections)- Dicot stem/Monocot stem/Dicot root/Monocot root/Dicot leaf/Monocot leaf.
B- Ecology (Section) Xerophyte/Hydrophyte
C- Microbiology slide
D- Cell organelle Photomicrograph
E- Ecology – Slide/Specimen/Picture
F- Plant tissue culture (Photomicrograph/Figure/Model/Equipment)

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, I B.Sc. Botany, Semester - II
AECC Paper - II Environmental studies.
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D9701
Theory - 2 hrs (2 Credits)
Max. marks – 100
CIA - 25
ESE - 75

Objectives:

To acquaint students with the physical environment, its components and the major issues. The impact of human activities on environment, environmental problems, hazards and risks.

Unit I: Introduction to Environmental Studies and Ecosystem

Multidisciplinary nature of environmental studies - Scope and importance - Concept of sustainability and sustainable development. Ecosystem - Structure and function of ecosystem - food chains, food webs and ecological succession - forest ecosystem grassland ecosystem - desert ecosystem - aquatic ecosystems.

Unit II: Natural Resources

Land resources - land degradation - soil erosion and desertification - causes and impacts due to mining, dam building on environment - use and over-exploitation of surface and ground water - floods, droughts - conflicts over water - energy resources Renewable and non-renewable energy sources-use of alternate energy sources, growing energy needs.

Unit III: Biodiversity and Conservation

Genetic, species and ecosystem diversity - biodiversity patterns and global biodiversity hot spots - India as a mega-biodiversity nation - endangered and endemic species of India - habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions conservation of biodiversity- nature reserves, tribal populations and rights.

Unit IV: Environmental Pollution

Environmental pollution types- causes, effects and control of pollution - air, water, soil and noise pollution - nuclear hazards and human health risks - solid waste management - control measures of urban and industrial waste.

Unit V: Environmental Policies

Climate change - global warming - ozone layer depletion- acid rain and impacts on human communities and agriculture. Environment Protection Act- Wildlife Protection Act. Forest Conservation Act Montreal and Kyoto protocols and Convention on Biological Diversity.

Suggested Reading
Text Books

1. Environmental studies, Erach Bharucha, Ist Ed ., Universities Press, 2005.

2. Environmental and Ecology, Anil K.De and Arnab K. De, Ist Ed ., New Age International, 2009.

3. Environmental science and Engineering, Anubha Kaushik, 5th Ed ., New Age International, 2016.

4. Essentials of Ecology and EnvironmentalScience, Rana, 5th Ed .,PHI, 2013.

Reference Books

1. Fundamentals of Ecology, Eugene P. Odum and W.B.Saunders, 1" Ed ., London,1971.
2. Environmental Science, Tyler Miller, 14s Ed ., Cengage, 2014.
3. Environmental Science, Botkin and Keller, 8th ed ., Wiley India,2012.
4. Environmental Studies; From Crisis to Cure, Rajagopalan, 3rd Ed .,

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester III
Paper V: Embryology of Angiosperms
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0457
Theory - 4 hrs (3 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objective

- To understand reproductive processes of flowering plants.

Unit I

Flower as a modified shoot, Structure and development of microsporangium. Pollinium, Translator apparatus, Gynostegium. Development of male gametophyte, pollen structure.

Unit II

Structure and development of Megasporangium (Ovule), types of ovules – Orthotropus, anatropus, campylotropus, amphitropous, circinotropous. Megasporogenesis, female gametophyte (embryo sac) – structure, development of monosporic (Polygonum), bisporic (Allium), tetrasporic (Peperomia) embryo sacs.

Unit III

Pollination– Autogamy, Geitonogamy, Xenogamy, adaptations for self and cross pollinations, agents of pollination. Fertilization: Pollen germination and pollen tube growth, Double fertilization.

Unit IV

Endosperm: Nuclear, Cellular and Helobial, ruminate endosperm. Embryo: structure and development of dicotyledonous embryo (Capsella) and monocotyledonous embryo (Triticum). Parthenocarpy, Apomixis and Polyembryony.

Unit V

Seed structure and development, seed appendages, seed dispersal. Dormancy: Importance and types of dormancy, overcoming seed dormancy. Embryology in relation to Taxonomy.

Suggested Reading

Text Books

1. Bhojwani. S.S. and Bhatnagar, S.P. 2004. The Embryology of Angiosperms. Vikas Publishing House (P) Ltd., New Delhi.
2. Maheshwari, P. 1950. An Introduction to the Embryology of Angiosperms. McGrawHill Books Co.

Reference Books

1. Bendre, A.M. and Pande, P.C. 2002. Introductory Botany. Rastogi Publications, Meerut.
2. Dwivedi, J.N. 1986. Embryology of Angiosperms. Rastogi & Co. Meerut.

3. Fageri, K and Van der Piji 1989. The Principles of Pollination Ecology. Pergamon Press, Oxford, UK.
4. Hartman, H. T. and Kester, D.E. 1976. Plant Propagation: Principles and Practices, 3rd edition. Prentice Hall of India Pvt. Ltd., New Delhi.
5. Johri, B.M. 1984. Embryology of Angiosperms. Springler-Verlag, Berlin.
6. Pandey, B.P. College Botany. Vol II. S. Chand & Co., New Delhi.
7. Sadhu, M.K. 1989. Plant Propagation. New Age International Publishers.
8. Twyman, R.M. Developmental Biology. Viva Books Pvt. Ltd. New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester III
Paper VI: Anatomy of Angiosperms
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0458
Theory - 4 hrs (3 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objective

- To understand internal structures of the plant parts

Unit I

Cell wall – primary and secondary structure and functions. Plasmodesmata, Thickening of the cell wall, Pits, Chemical nature. Tissues: Meristematic and Permanent tissues, Classification of permanent tissues: simple tissues - parenchyma, types of parenchyma, collenchyma, types of collenchyma, sclerenchyma and sclerenchyma fibres and sclereids; complex tissues- xylem - primary and secondary xylem, tracheids, vessels and fibers. Phloem - primary and secondary phloem, sieve cell and sieve tube element.

Unit II

Meristems - Classification: Development, origin, plane of division, position and function. Types: Apical, intercalary and lateral meristems. Apical meristem: Root apex - Apical Cell theory, Histogen theory, Tunica Corpus theory, Korper-kappe theory, Quiescent centre. Shoot apex: Apical Cell theory, Histogen theory, Tunica Corpus theory. Lateral meristem: Origin, Types - Vascular cambium and cork cambium, Fascicular and interfascicular.

Unit III

Primary structure in dicot and monocot stem. Primary structure in dicot and monocot root. Secondary structure in dicot and monocot stem. Secondary structure in dicot and monocot root. Periderm: Phelloderm, Phellogen and Phellem, Annual rings- Spring wood and autumn wood, Sapwood and Heartwood, Dendrochronology, Dendroclimatology,

Unit IV

Anomalous secondary growth: Dicot stem: Inverted cortical bundles - Nyctanthes, Medullary bundles - Boerhaavia. Special type of secondary growth in Monocot stem – Dracaena.

Unit V

Anatomy of dicot leaf, Anatomy of monocot leaf. Stomatal types: Anomocytic, anisocytic, paracytic and diacytic. Secretory tissue system - Laticifers, oil glands and glandular hairs. Sectioning (Cross section, longitudinal, radial and tangential), Staining (single & double), peeling & maceration.

Text Books:

1. Pandey B.P. Plant Anatomy. S. Chand & Company Ltd. New Delhi, India.

2. Sharma O.P. Plant Anatomy. Tata McGraw-Hill Publishing Company Ltd. New Delhi, India.

Reference Books:

1. Cutter, J.D. 1988. Plant Anatomy. Part I &II, Edward Arnold, London.
2. Esau, K. 1977. Anatomy of Seed plants. John Wiley & Sons, U.S.A.
3. Fahn, A. 1982. Plant Anatomy. Pergamon Press U.K.
4. JohanesOn, D.A. 1940. Plant microtechnique - McGraw Hill Book Co., New Delhi.
5. Mauseth, J.D. 1988. Plant Anatomy. The Benjamin/Cumming Pub.,U.SA.
6. Pandey, B.P. 2002. Plant Anatomy. S. Chand & Co., New Delhi.
7. Sass. J.E. 1958. Botanical Microtechnique. Ames, Iowa.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester – III
Main Practical paper III – Covering papers Embryology of Angiosperms and Anatomy of Angiosperms
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code- D0459
Practical- 4 hrs (2 Credits)
Max. marks - 40
CIA - 08
ESE - 32

Suggested Laboratory Exercises

Embryology of Angiosperms
Morphology and Anatomical Study of the following:

1. Flower and floral parts
2. Anther – T.S. of Anther
3. Study of Pollinium, Translator, Gynostegium and pollen grains. 4. Ovule types, embryo sac (Mature)
5. Dicot and monocot embryo.
6. Endosperm and study of seed appendages.

Anatomy of Angiosperms

1. Study of Simple tissues - Parenchyma, Collenchyma, Sclerenchyma.
2. Study of Complex tissues - Xylem, Phloem.
3. Study of Dicot stem - Primary structure.
4. Study of Dicot root - Primary structure.
5. Study of Monocot stem - Primary structure.
6. Study of Monocot root - Primary structure.
7. Study of Anomalous secondary growth - Nyctanthes, Boerhaavi, Dracaena.
8. Study of Dicot leaf - Internal structure.
9. Study of Monocot leaf - Internal structure.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester – III
Main Practical Paper- III – Covering papers Embryology of Angiosperms and Anatomy of Angiosperms
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0459
Duration 3 hrs

1. Make suitable micro-preparation of A and B. Leave the slide for valuation. Draw and identify giving reasons.
   (Preparation-3, Identification-l, Diagram-1, Salient features-2) (2x7=14marks)

2. Make suitable micro-preparation of C. Leave the slide for valuation. Draw and identify the anomaly giving reasons.
   (Preparation-2, Identification -1, Diagram-l, Salient features-2) (1 x 6 = 6 marks)

3. Make suitable micro-preparation of D. Leave the slide for valuation. Draw and identify giving reasons.
   (Preparation -3, Identification-1, Diagram- 1, Salient features-2) (1 x 7 = 7 marks)

4. Dissect and mount the embryo of the specimen E. Leave the slide for valuation.

   (Preparation-4, Diagram-1) (1 x 5 = 5 marks)

5. Dissect and mount the pollinium of specimen F. (1 x 4 = 4 marks)

6. Identify, draw and give salient features of G, H, I, J
   (Identification – 1, Diagram – 1, Salient features – 1) (3 X 4 = 12 marks)

Practical - 48
To be normalized to - 24
Record - 05
Viva voce - 03

Total 32

Key for Main Practical III

A. Dicot or Monocot Stem / Root (Section)
B. Dicot or Monocot leaf (Section)
C. Anomalous Stem (Section)
D. Anther (Section)
E. Embryo (Dissection)
F. Pollinium (Dissection)
G. Anatomy (Slide)
H. Anatomy (Slide)
I. Embryology (Slide / Specimen)
J. Embryology (Slide / Specimen)

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester IV
Paper VII: Microbiology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0460
Theory - 4 hrs (3 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To learn the basic techniques involved in the isolation and cultivation of microbes.
- To enable the students to identify microorganisms by cultural characteristics and staining procedures.
- To know the application of microorganisms in agriculture and industries

Unit I

Important developments in Microbiology. Classification of bacteria based on gram staining, shape, mode of nutrition and temperature requirement. Brief note on virus classification.

Unit II

Morphology and fine structure of Mycoplasmas, viruses (T4 phage and TMV) and bacteria; Growth of bacteria (sigmoid); Reproduction of bacteria- fission, fragmentation and recombination's (Transformation, Conjugation and Transduction). Extra chromosomal DNA (plasmid only).

Unit III

Types of microbial culture media; Preparation of microbial cultures – sterilization methods – pure culture technique; Staining: Simple staining and Gram staining – flagellar staining - Capsular staining, staining of endospore. Preservation of microbial cultures.

Unit IV

Soil Microbiology: decomposition of organic matter. Agricultural microbiology: production of bacterial, cyanobacteria and mycorrhizal biofertilizers.

Unit V

Food microbiology: single cell protein, microbial spoilage of food (meat and fish), microbial contamination of milk and preservation. Industrial Microbiology: Production of alcoholic beverages (bear and wine), antibiotics (Penicillin and Streptomycin), notes on biopesticides and sewage disposal.

Suggested Reading

Text Books

1. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. 1993. Microbiology – Concepts and Applications, McGraw-Hill, New York.
2. Atlas, R.M. 1986. Basic and Practical Microbiology. Macmillan Publishing Company, New York.

References

1. Alexander , M. 1961. Introduction to soil microbiology. John Wiley and Sons, New York.
2. Ananthanarayan, R and C.K. Jayaram Paniker.1996. Text book of Microbiology. Orient Longman, Hyderabad.
3. Casida, L.E. JR. 2010. Industrial Microbiology. New Age International Publishers, New Delhi.
4. Das H.K. 2010.Textbook of Biotechnology (4^{th} Edition). Wiley India Pvt Ltd., New Delhi.
5. Hawker, L.E. and Linton, A.H. 1979. Micro-organisms. Edward Arnold, London.
6. Prescott, L.M., Harley, J.P.and Klein, D.A. 2002. Microbiology. McGraw-Hill Co., New York.
7. Aneja,K.R. 1993. Experiments in Microbiology, Plant Pathology and Tissue Culture. Wishwa Publication, New Delhi.
8. Dubey, R.C. and Maheswari, D.K. 2010. A Text Book of Microbiology. S. Chand Co., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester IV
Paper VIII: Cell Biology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0461
Theory - 4 hrs (3 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To understand the structure of plant cell and cell organelles
- To understand the process of cell cycle

Unit I

Diversity of cell size and shape. Cell theory. Structure of prokaryotic and eukaryotic cells. Cell wall, Plasma membrane - chemical composition, structure - lamellar models and fluid mosaic model.

Unit II

Ultra structure and functions of Nucleus, Strucuture and functions of Chloroplast, Endoplasmic Reticulum, Dictyosome, Mitochondria and Microbodies (Peroxisomes and Glyoxysomes), Spherosomes, Ribosomes, Microtubules and Microfilaments.

Unit III

Cell cycle : Dividing phase, Interphase, G1phase, S phase, G2 phase. Mitosis : Mitotic phases, Cytokinesis, Karyokinesis. Meiosis : Meiotic phases - Meiosis I & Meiosis II, Significance of meiosis.

Unit IV

Chromosomes: Structure and organization - Chromonema, chromomere, chromatid, pimary constriction, secondary constriction, satellite, telomere, heterochromatin and Euchromatin, Nucleosome.

Unit V

Special type of chromosomes: Salivary gland chromosome, Lampbrush chromosome, B-chromosomes. Chloroplast DNA and Mitochondrial DNA.

Suggested Reading
Text Books

1. Arumugam,N. 2012. Cell Biology. Saras Publications, Kanyakuamri.
2. Gupta, P.K. 2004. 3rd Edition. Cell and Molecular Biology. Rastogi Publications, New Delhi.

Reference Books

1. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th Ed. Lippincott Williams and Wilkins, Philadelphia.
2. Gerald Karp. 2002. Cell and Molecular Biology, John Wiley & Sons, New York.
3. Nath, V. 1981. Cell Biology. S. Chand, New Delhi.
4. Paul, A. 2011. Textbook of Cell and Molecular Biology. Books and Allied (P) Ltd. Kolkata.
5. Powar, C.B. 1981. Cell Biology. Himalaya Publishing House, Banglore
6. Sharma, A.K and Sharma, A. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering, Harwood Academic Publications, Australia.
7. Verma, P.S and Agarwal, V.K. 1993. A Textbook of Cytology. S. Chand & Co., New Delhi.
8. Verma, P.S and Agarwal, V.K. 2002. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester – IV
Main Practical paper IV – Covering papers Cell Biology and Microbiology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0462
Practical – 4 hrs (2 Credit)
Max. marks - 32
CIA - 08
ESE - 40

Suggested Laboratory Exercises

Cell Biology

1. Observation of plant cells in Onion peel.
2. Observation of plant cells in Hydrilla leaf.
3. Observation of staminal cells of Rhoeo.
4. Preparation of Root Tip squash.
5. Identification of stages in mitosis.
6. Preparation of smear of anther.
7. Identification of stages in meiosis.
8. Study of Electron micrograph of eukaryotic cell.
9. Study of Electron micrograph of cell organelles.
10. Study of Electron micrograph of mitotic stages.

Microbiology

11. Study of structure of bacteria (E.g. E. coli)
12. Gram staining
13. Study of microbial growth.
14. Preparation of medium
15. Serial dilution method – isolation of microbes from soil.
16. Study of viral structure (TMV – Photograph)
17. Study of important microbiological tools (Laminar Air Flow Chamber, Autoclave, Inoculation needle and loop, Inoculation hood, Hot air oven etc.)

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, II B.Sc. Botany (Main), Semester – IV
Main Practical paper IV – Covering papers Cell Biology and Microbiology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0462
Duration 3 hrs

1. Stain the specimen A with Gram stain. Identify and draw. Write the staining procedure. Leave the slide for valuation.
(Preparation-3, Identification- 1, Procedure-3, Diagram-1 marks) (1 x 8 = 8 marks)

2. Comment on the given setup, draw diagram and write notes on material B
(Identification-2, Diagram-2, Notes-3) (1 x 7 = 7 Marks)

3. Prepare Squash/Smear of the material C. Identify any two stages giving reasons. Leave the slide for valuation.
(Preparation-5, Diagram-4, Salient features-4) (1 x 13 = 13 Marks)

4. Identify, draw and give the salient features of D, E, F & G.
(Identification-1, Diagram-2, Salient features-2) (4 x 5 = 20 marks)

Practical - 48

To be normalized to - 24
Record - 05
Viva voce - 03

Total 32

Key to for Main Practical IV

A. Gram staining
B. Microbiological setup
C. Mitosis/meiosis (onion root tip/Tradescantia flower)
D. Microbiology slide/ Figure.
E. Microbiology media
F. Cell Biology Slide/Figure
G. Cell Biology Slide/Figure

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester V
Paper IX: Biodiversity IV – Morphology and Taxonomy of Angiosperms
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0463
Theory - 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To understand the morphological characteristics of the angiosperms
- To learn the nomenclature, classifications, principles and techniques in taxonomy
- To familiarize the locally available plant species based on taxonomic characters

Unit I

Detailed study of morphology of root and stems. Types of inflorescences. Flower: Calyx shapes and modifications, Corolla- Shapes, Androecium – Cohesion and adhesion of stamens, Gynoecium – style, stigma and ovary. Origin of Angiosperms.

Unit II

Angiosperm classification- Artificial, Natural and Phylogenetic systems of classification. An outline of Linnaeus, Bentham and Hooker and Engler and Prantl systems of classification and their merits and demerits. Introduction to APG III system of classification. Modern trends in Taxonomy - Chemotaxonomy, Numerical Taxonomy, Cytotaxonomy.

Unit III

Plant Nomenclature: taxonomic hierarchy, binomial and polynomial, ICBN, (ICN), principles of priority, type concept, valid and effective publication, author citation.
Herbarium techniques: (Collection, pressing, drying, poisoning, mounting and preserving of plant specimens), importance of herbaria. Brief notes on keys and flora, revisions and monographs. Molecular Taxonomy – RFLP, RAPD.

Unit IV

Study of the following Angiosperm families and their economic importance: Annonaceae, Capparidaceae, Rutaceae, Leguminosae (Faboideae, Caesalpinioideae, and Mimosaideae) Cucurbitaceae.

Unit V

Study of the following Angiosperm families and their economic importance: Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Liliaceae and Poaceae.

Suggested Reading

Text Books

1. Vashista, P.C 1991. Taxonomy of Angiosperms. S. Chand & Co., New Delhi.
2. Lawrence, G.H.M. 1951. Taxonomy of Vascular Plants. The Macmillan Company. New York.

Reference books

1. Davis, P. H. and Heywood, V. H. 1973. Principles of Angiosperm Taxonomy. Rebert E. Kreiger Pub. Co,. New York.
2. Dutta, A.C and T.C Dutta, 1996. Botany for Degree Students. Oxford University Press, Chennai.
3. Henry A.N, and Chandrabose, M. 1980. An aid to International code of Botanical Nomenclature. Today & Tomorrow's Printers and Publishers. New Delhi.
4. Hutchinson, J. 1973. 3rd Edition. The Families of Flowering Plants. Oxford University Press, Oxford.
5. Jain, S.K. and R.R. Rao. 1977. A Handbook of Field and Herbarium Methods. Today & Tomorrow's Printers and Publishers, New Delhi.
6. Naik, V.N. 2000. Taxonomy of Angiosperms. Tata McGraw- Hill Publishing Company. New York.
7. Singh, G. 2005. Plant Systematics – Theory and Practice. Oxford & IBH, New Delhi.
8. Verma, B.K. 2011. Introduction to Taxonomy of Angiosperms. PHI learning Pvt.Ltd., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester V
Paper X: Generic Elective Paper-I Medicinal Botany
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0464
Theory - 4hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To enrich the knowledge on traditional medicinal systems as well as rich herbal diversity of our region.
- To identify medicinal taxa.
- To acquire knowledge on herbal drugs.

Unit I

Introduction, historical background of medicinal botany. Folk medicine, a brief outline on traditional systems of medicine – Ayurvedha, Siddha, Unani and Homeopathy. Ethnobotany. Present status of medicinal botany.

Unit II

Pharmacognosy, crude drug classification, drug adulterations and substitutions, evaluation of drugs by morphological, microscopic and chemical methods.

Unit III

Plant secondary metabolites of medical importance: source, description of the products, chemical constituents, active principles and therapeutic uses of the following.

i)	Carbohydrates	Ispaghula (Plantago ovata), Agar
ii)	Glycosides	Senna (Cassia sp), Digitalis and Glycyrrhiza
iii)	Tannins	Acacia, Myrobalan (Terminalia chebula)
iv)	Fixed oils	Ground nut oil (Arachis hypogaea), Castor oil (Ricinus communis)
v)	Volatile oils	Eucalyptus, Clove, Lemon and Ocimum
vi)	Resins	Asafoetida and Pinus
vii)	Alkaloids	Rauvolfia, Atropa and Opium
viii)	Steroids	Solanum, Dioscorea

Unit IV

Toxins of plant origin: Allergens, Teratogens and hallucinogens from hemp. Poisonous plants (Thevetia Peruviana and Strychnos nux-vomica) Types of plant poison, action of poisons, treatments.

Unit V

Cultivation of medicinal plants: Cassia senna, Coleus forskolii, Ocimum basilicum, Phyllanthus amarus and Aloe vera. Marketing of medicinal plant products.

Suggested Reading

Text Books

1. Kokate, C.K, Purohit, A.P and Gokhale, S.B. 1998. A Textbook of Pharmacognosy. Nirali Prakasan, Pune.
2. Trease, G.E. 1952. A Text book of Pharmacognosy. Bailliere Tindal & Cox, London.

Reference Books

1. Jain, S.K. (ed) 1981 Glimpses of Indian Ethnobotany- Oxford & IBH Publishing Co., New Delhi.
2. Jain, S.K. and Mudgal, V. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.
3. Joshi, S.G. 2000 Medicinal plants. Oxford & IBH Publishing Co., New Delhi.
4. Rastogi, R.R. and B.N. Mehrotra. 1993. Compendium of Indian Medicinal Plants. Vol. I & II. CSIR, Publication and Information Directorate, New Delhi.
5. Wallis, T.E. 1960. Text book of Pharmacognosy. J & A Churchill Ltd, London.
6. Iyengar, M.A. 1974. Pharmacognosy of Powdered Crude Drugs. Manipal.
7. Iyengar, M.A. 1975. Anatomy of Crude Drugs. Manipal.
8. Satyavati, G.V., Raina, M.K and Sharma, M. 1976. (Eds.) Medicinal Plants of India. Vols. 1 & 2, ICMR, New Delhi.
9. Bhattacharjee, S.K. 1998. Handbook of Medicinal Plants. Pointer Publishers, Jaipur.
10. Chopra, R.N., Nayar, S.L. and Chopra, I.C. 1956. Glossary of Indian Medical Plants. C.S.I.R, New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester V
Paper XI: Genetics and Plant Breeding
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0465
Theory - 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objective

- To understand the basic theoretical concepts and techniques of Genetics and Plant breeding

Unit I

Mendelian and Non-Mendelian inheritance – Laws of Mendel, Mendel's experiments – reciprocal cross, Monohybrid Cross, Dihybrid cross, back cross, test cross. Gene Interactions - Codominance, Incomplete dominance, Lethal genes, Complementary, Supplementary, Inhibitory and Duplicate gene interaction, pleiotropy, polygenic inheritance. Gene environment Effects – Expressivity & Penetrance. Multiple alleles in plants (self incompatibility).

Unit II.

Linkage and Crossing over - Linkage Group – complete linkage, incomplete linkage, coupling phase and repulsion phase. Crossing Over – cytological basis of crossing over. Chromosome mapping - two and three point test crosses and their significance.

Unit III

Sex determination - Chromosomal basis of sex determination – XX-XY, XX-XO and ZZ-ZW method, Sex chromosome in Melandrium, Geneic basis of Sex determination, Sex-linked inheritance in man (haemophilia). Maternal inheritance in snails and Paramecium; cytoplasmic inheritance in Mirabilis (Plastids). Cytoplasmic male sterility in Maize.

Unit IV

Chromosomal mutation - Variation in Chromosomal Structure – Deletion, Duplication, Inversion and Translocation – behavior of chromosome during cell division and their consequences. Variation in Chromosomal Number – Aneuploidy and Euploidy (Polyploidy) – autopolyploidy and allopolyploidy in plants. Transposable Elements of Maize and evolutionary significance. Population genetics – Genotype frequencies, Allelic frequencies, Hardy-Weinberg law and equilibrium.

Unit V

Plant Breeding – Aims and objectives. Mode of reproduction in relation to breeding methods – vegetative (natural and artificial) and sexual. Methods of crop improvement- Selection-Mass, pure-line and clonal; hybridization in self and cross - pollinated crops; heterosis; plant introduction and acclimatization; mutation breeding.

Suggested Reading

Text Books

1. Gardener, J., Simmons, H.J. and Snustad, D.P. 2006. Principle of Genetics, John Wiley & Sons, New York.
2. Chaudhuri, H.K. 1994. Elementary principles of Plant Breeding. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Reference Books

1. Singh, B.D. 1990. Fundamentals of Genetics. Kalyani Publishers, New Delhi.
2. Strickberger, M.N. 1976. 2nd Ed. Genetics,. MacMillan Publishing Co., Inc.
3. Tamarin, R.H. 2007. Principles of Genetics. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
4. Ursula Goodenough. Genetics. Saunders college Publishing Co., Philadelphia, USA
5. Sharma, J.R. 1996. Principles and Practices of Plant Breeding. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
6. Singh, B.D. 2007. Plant Breeding – Principles and Methods. Kalyani Publishers, New Delhi.
7. Shella, V.L. 2011. Horticulture. MJP Publishers, Chennai.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester V
Paper XII: Molecular Biology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0466
Theory – 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To learn the recently emerged branches of biology that deals with the molecular structure of information molecules in living cells and to learn about the structure, replication of DNA, RNA, protein and gene expression.

Unit I

The Genetic Material: Nature of genetic material and fine structure of gene. Griffith experiment, transforming principle- Hershey & Chase experiment. RNA as genetic material in TMV. Physical and chemical structure of DNA and RNA- nucleoside and nucleotides. Forms of DNA (B-form, A-form & Z-form). Types of RNA (in Prokaryotes and Eukaryotes).

Unit II

Replication and Transcription of DNA: Replication of DNA- Meselson & Stahl experiment, semi-conservative, bidirectional, semi continuous model, Transcriptional machinery and key events - RNA polymerase, promoter gene- initiation, elongation and termination. Reverse transcription. Modification and processing of mRNA in eukaryotes.

Unit III

Protein synthesis and Gene regulation: Translation- features of genetic code- Wobble hypothesis, role of t-RNA and ribosomes. Initiation, elongation and termination- peptidyl transferase. Regulation of gene expression at transcriptional level. Lac Operon.

Unit IV

Gene mutation: Types of mutations - addition, deletion, inversion, translocation and substitution. Spontaneous and induced mutations, frame shift, tautomerization, depurination. Mutagens: Chemical and physical mutagens. Consequences of gene mutations in plants.

Unit V

Concepts on basic techniques of molecular biology: Polymerase chain reaction (basic PCR only) and its applications. Restriction enzymes - EcoRI. Southern blotting, Northern blotting and Western blotting techniques.

Suggested Readings Text Books

1. Verma, P.S. and Agarwal, V.K. 2009. Molecular Biology. S. Chand & Company Ltd., New Delhi.
2. Friefelder, D. 1987. 2nd Ed. Molecular Biology. Narosa Publishing House, New Delhi.

Reference Books

1. Allison, L.A. 2007. Fundamental Molecular Biology. Blackwell Publishing, USA.

2. Brown, T.A. 2001. 4th Ed. Gene cloning and DNA analysis – An Introduction, Blackwell Science, Oxford.
3. Chawla H.C. 2003. Plant Biotechnology- Laboratory Manual for Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. De Robertis, E.D.P. and De Robertis (Junior). E.M.F. 1987. Cell and Molecular Biology, Lea and Febiger, Philadelphia.
5. Desmond S.T. Nicholl. 2010. An Introduction to Genetic Engineering. Cambridge University Press, New Delhi.
6. Karp, G. 1988. Cell Biology (2nd ed.). Mc Graw Hill Book Co., New York.
7. Lewin, B. 2004. Genes VIII. Pearson Education, New Jersery.
8. Primrose, S., Twyman, R and Old, B. 2001. 6th Ed. Principles of Gene Manipulation, Blackwell Science, Oxford.
9. Smith- Keatry , P. 1991. Molecular Genetics, Mac Millan Pub. Co. Ltd., London.
10. Sheeler, P. and Bianchi, D.E. 2006. 3rd Ed. Cell and Molecular Biology.Wiley India (P.) Ltd., New Delhi.
11. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. 2004. Molecular Biology of the Gene. Dorling Kindersley Publishing Inc., New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany, Semester – V
Main Practical paper V – Covering papers Morphology and Taxonomy of Angiosperms, Medicinal Botany, Genetics and Plant Breeding and Molecular Biology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0467
Practical - 8 hrs (4 Credit)
Max. marks - 100
CIA - 25
ESE - 75

Suggested Laboratory Exercises

Morphology and Taxonomy of Angiosperms

1. Identification and drawing of vegetative parts belonging to the families mentioned in the syllabus.
2. Identification and drawing of floral parts of plants belonging to the families mentioned in the syllabus.
3. Identification and drawing of fruits of plants belonging to the families mentioned in the syllabus.
4. Technical description of plants from the dicot families mentioned in the syllabus.
5. Technical description of plants from the monocot families mentioned in the syllabus.
6. A field trip during the semester under the guidance of teachers.
7. Collection and submission of 25 herbarium sheets belonging to the families mentioned in the syllabus along with field notebook.
8. Studying the economic importance of at least three species from each family mentioned in the syllabus

Medicinal Botany

1. Morphological studies of plant parts used as drugs (for plants included in the syllabus).
2. Anatomical studies of plant parts used as drugs (for plants included in the syllabus).
3. Identification of crude drugs by histochemical
4. Demonstration of crude drugs by phytochemical methods.
5. Identification of drug adulterants.

Genetics and Plant Breeding

1. Training in solving problems as mentioned in the syllabus
2. Study of numerical and structural variations of chromosomes from figures and charts.
3. Identification of genetic disorder from photographs.
4. Mapping of chromosomes with suggested data.
5. Demonstration of hybridization techniques—emasculation and bagging of flowers, pollinating them manually.
6. Testing of seeds for viability and germination.

Molecular Biology

1. Identification of figure - DNA replication – Semi conservative method.
2. Identification of figure - Transcription in Protein synthesis.

3. Identification of figure - 70S Ribosomes association.
4. Identification of figure - Translation in Protein synthesis.
5. Identification of figure - Griffith Transformation experiment.
6. Isolation of DNA from coconut milk- SSC method (sodium chloride - sodium citrate method).
7. Extraction of RNA from yeast cells.
8. Separation of DNA/RNA by Agarose gel electrophoresis.
9. Staining of nucleic acids in vivo (Geimsa stain).
10. Identification of figure - Southern blotting, Northern blotting, Western blotting techniques.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
III B.Sc. Botany Main Practical Examination, Semester V
Main Practical Paper V – Covering papers Morphology and Taxonomy of Angiosperms, Medicinal Botany, Genetics and Plant Breeding and Molecular Biology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0467
Duration 3 hrs

1. Describe the given specimen A in technical terms. Draw L.S. of flower & CS of Ovary, Floral Diagram. Write the Floral Formula. Identify its Family by enumerating Salient features.
   (Description-3, L.S. of Flower and C.S. of Ovary 2, Floral Diagram and Formula-2, Systematic position & identification-2 marks) (1 x 9 = 9 marks)

2. Stain the materials from the given specimen B. List the materials required. Write the procedure. Leave the preparation for valuation.
   (Preparation-3, Procedure-3, List of materials-1, Sketch/Graph-1, Results-1)
   (1 x 9 = 9 marks)

3. Solve the problem C (1 x 8 = 8 marks)

4. Draw and write critical comments on D & E.

   (Identification-1, Diagram-2, Comments-3) (2 x 6 = 12 marks)

5. Identify the binomial, family and morphology of the useful part and give the economic importance and uses of F.
   (Binomial-1, Family-1, morphology of Useful part-1, Uses-2) (1 x 5 = 5 marks)

6. Identify, draw diagram and write salient features of G & H.
   (Identification-1, Diagram-1, Salient features-2) (3 x 4 = 12 marks)

Practical - 55
Record - 10
Herbarium and Field note - 07
Viva voce - 03

Total 75

Key for Main Practical V

A. Plant specimen (Taxonomy)
B. Molecular Biology – Staining DNA
C. Genetics problem
D. Medicinal Botany
E. Medicinal Botany
F. Plant specimen (Economic botany)
G. Molecular Biology Spotter
H. Plant Breeding Spotter

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester V
Paper- XIII -: Mushroom Cultivation
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code-D0468
Theory- 4 hrs (4 Credits)
Max. Marks- 100
CIA- 25 (including Practical)
ESE-75

Objectives

- To study the morphology and anatomy of mushrooms fruiting bodies
- To study the mushroom cultivation methods
- To study the useful ness of plants used by tribals

Unit I

Introduction to fungi. General characters of Agaricales. History of mushroom cultivation. Morphology and anatomical studies of edible mushrooms (Agaricus bisporus, Pleurotus ostreatus and Calocybe indica). Spore print and study of basidiospores

Unit II

Mushroom Cultivation Technique: Infrastructure, equipment, substrate, sterilization, preparation of spawn.

Unit III

Cultivation of white button mushroom (Agaricus bisporus): Preparation of compost, Spawning, Casing (Covering the spawned compost) and cropping and crop management. Cultivation of oyster mushroom (Pleurotus spp.) Substrate preparation, spawning, cropping and harvesting.

Unit IV

Cultivation of milky mushroom (Calocybe indica).: Substrate preparation, spawning, cropping and harvesting. Bed and hanging bag methods. Major diseases of mushrooms and their management. Poisonous and medicinal mushrooms.

Unit V

Mushroom storage and preservation: Short-term storage and long-term storage: Refrigeration, drying, canning, storage in salt solutions. Nutrition values of mushrooms. Mushroom as food. Mushroom Research Centres – National level. Marketing in India and abroad.

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Suggested reading

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester VI
Paper XIV: Plant Biochemistry
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0469
Theory – 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To understand the structure and properties of various biomolecules available in plants

Unit I

Atomic structure and chemical bonding, types of chemical bonding -Ionic and Covalent bond, bond energy, electrostatic force, van der Waals interactions. Bioenergetics: Energy, free energy, laws of thermodynamics, entropy, chemical equilibrium, oxidation-reduction potential. Redox reactions.

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Unit II

Carbohydrates: Classification; Structures, properties and biological functions of monosaccharides, disaccharides and polysaccharides. Biosynthesis of Sucrose and Starch.

Unit III

Amino Acids – Classification. Protein structure: Primary, Secondary, Tertiary and Quaternary structures. Denaturation & renaturation of Proteins.

Unit IV

Lipids: Classifications of lipids, physical and chemical properties of fats, structure and functions of saturated and unsaturated fatty acids. Biosynthesis of Saturated fatty acids, Beta oxidation.

Unit V

Enzymes: classification, Holoenzymes and Apoenzymes; mechanism of enzyme action, enzyme inhibition. Types of inhibition - Competitive, Non-competitive and Uncompetitive inhibition. Irreversible inhibition, Feedback inhibition, Allosteric inhibition, coenzymes.

Suggested Reading

Text Books

1. Jain, J.L., Jain, S and Jain, M. 2016. Fundamentals of Biochemistry. S. Chand and Co.
2. Satyanarayana, U and Chakrapani, U. 2017. Essentials of Biochemistry. Books and Allied (P) Ltd.

Reference books

3. Lehninger,A.L. 1999. 2nd Ed . Biochemistry,. Kalyani Publishers., New Delhi.
4. Jayaraman,J. 1981. Laboratory Manual in Biochemistry. Wiley Eastern Limited, New Delhi.
5. Conn, E.E., Stumpf, P.K., Bryening, G and Doi, R.H. 2001. 5th Ed Outlines of Biochemistry.John Wiley & Sons, New York.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester VI
Paper XV: Plant Physiology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0470
Theory - 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To acquire the basic knowledge needed for proper understanding of plant functioning.
- To make the students to realize the importance of all physiological processes that take place in plants.

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Unit I

Water relations: Importance of water, imbibition, diffusion and osmosis - water absorption and transport – active and passive absorption; Water potential, osmotic potential and pressure potential. Ascent of Sap (Root pressure, capillary transpirational pull).

Unit II

Transpiration, mechanism of stomatal movement; guttation. Mineral nutrition – Role of Major and Minor elements in plant nutrition - deficiency symptoms, mineral uptake (passive and active, ion exchange).

Unit III

Photosynthesis: Photosynthetic apparatus and pigment systems; Absorption and Action spectrum; Red drop and Emerson effect; cyclic and non-cyclic photo phosphorylation. Carbon fixation: C_3, C_4 and CAM pathway, factors affecting photosynthesis, photorespiration.

Unit IV

Respiration: Respiratory substrates, RQ, aerobic respiration, Glycolysis, TCA cycle, Electron transport and oxidative phosphorylation, Pentose phosphate pathway, factors affecting respiration. Nitrogen metabolism: Nitrogen fixation: Symbiotic and asymbiotic fixation.

Unit V

Phases of growth, factors affecting growth; Plant growth regulators – auxins, gibberellins, cytokinins, abscissic acid and ethylene - their physiological role. Brief notes on Plant movements; Photoperiodism; physiology of flowering; florigen concept; vernalization; Phytochrome. Physiology of senescence; fruit ripening. Physiology of seed germination.

Suggested Reading

Text Books

1. Jain, V.K. 1988. Fundamentals of Plant Physiology, S.Chand and Co. Ltd.,New Delhi.

2. Mukherji. S. and Ghosh, A.K. 2005. Plant physiology. New Central Book Agency Ltd., Kolkata.

Reference Books

1. Pandey, S.N. and Sinha, B.K. 1989. Plant Physiology, Vikas Publishing House . New Delhi.
2. Noggle G.R.and Fritz, G.J. 1986. 2nd Ed. Introduction to Plant Physiology. PrenticeHall of India Ltd., New Delhi.
3. Gupta, N.K and Gupta, S. 2005. Plant Physiology. Oxford & IBH Publishing Co. Ltd., New Delhi.
4. Sundararajan, S. 2000. Plant Physiology. Anmol Publication Ltd. New Delhi.
5. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology. Asia Ltd. Singapore.
6. Devlin, R.M. and Witham, F.H. 1986. 4th Ed. Plant Physiology,. CBS Publishing House,. New Delhi.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester VI
Paper XVI: Plant Biotechnology
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0471
Theory - 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To familiarize the students with the basic principles and techniques in tissue culture.
- To orient student learning towards application and career options in the field of biofertilizers.
- To impart knowledge on the production of transgenic plants and their safe handling and maintenance.

Unit I

Significance of biotechnology. Plant tissue culture: Definition, History of Plant Tissue Culture (PTC). Sterilization procedures for tissue culture. Cellular differentiation and redifferentiation, totipotency. Outlines on PTC media- (MS medium in detail). Plant growth regulators.

Unit II

Types of PTC: Callus culture and cell suspension culture. Direct and indirect organogenesis. Somaclonal variations and their uses in agriculture. Virus free plant production through meristem culture. Micropropagation (using axillary and apical bud cultures). Anther and pollen cultures.

Unit III

Protoplast isolation and culture. Somatic hybridization. - selection of somatic hybrids and cybrids. Somatic embryogenesis- artificial seed production. Basics of Secondary metabolite production - Production of Shikonin from Lithospermum erythrorhizon

Unit IV

Principles and tools of genetic engineering: Restriction enzymes- Type II endonucleases. Nomenclature of type II restriction endonucleases. DNA Ligases and polymerases. Cloning Vectors - pBR322, cosmids, Yeast artificial chromosome, Agrobacterium-mediated gene transfer.

Unit V

Gene delivery systems: Plant Viruses, Particle gun bombardment, Microinjection, Electroporation. Concepts on Microarray. Introduction to molecular markers. Production of transgenic plants (insect resistant plant -Bt gene). Principles behind the production of Golden rice. Plantibodies and edible vaccines.

Suggested Reading

Text Books:

1. Dubey R.C. A Textbook of Biotechnology. S. Chand & Company Ltd. New Delhi, India.
2. Purohit S.S. Plant tissue culture. Shyam Printing Press. Jodhpur, India.

Reference Books

1. Das H.K. 2010.Textbook of Biotechnology (4th Edition). Wiley India Pvt Ltd., New Delhi.
2. Satyanarayana, U. 2010. Biotechnology. Uppala Author Publisher interlinks, (A.P.)
3. Chawla H.C. 2003. Plant Biotechnology- Laboratory Manual for Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Desmond S.T. Nicholl. 2010. An Introduction to Genetic Engineering. Cambridge University Press, New Delhi.
5. Gupta, P.K. 2000. Elements of Biotechnology. Rastogi Publications, Meerut.
6. Ignacimuthu, S. 2003. Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Kumar H.D. 1998. Modern Concepts of Biotechnology. Vikas Publishing House Pvt Ltd., New Delhi.
8. Kumaresan V. 2010. Biotechnology. Saras Publication. Nagercoil, Tamil Nadu.
9. Prakash, J. and Pierik R.L.M. 1993. Plant Biotechnology- Commercial prospects and Problems. Science Publishers, Inc., U.S.A.
10. Primrose, S., Twyman, R. and Old, B. 2001. Principles of Gene Manipulation (6th Ed.). Blackwell Science, Oxford.

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester VI
Paper XVII: Computer Applications in Biology, Bioinformatics and Biostatistics
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code –D0472
Theory - 4 hrs (4 Credits)
Max. marks - 100
CIA - 25
ESE - 75

Objectives

- To understand the basic theoretical concepts and to get practical knowledge in computer applications towards Biology, Bioinformatics and Biostatics.
- To know the basics of Bioinformatics and Biostatics with its applications

Unit I

Introduction to computers: Type of computers, components of computer and its functions, input and output devices, operating systems, MS-Office (MSWord, MS-Excel and MS-Power point).

Unit II

Database software – MS access; Image editing software (Photoshop). Details of networks, internet & email, online and offline search. Outline of Search engines (Google); Pubmed, Scopus.

Unit III

Fundamentals of Geographic Information System (GIS) and Remote Sensing. GIS Softwares (Google Earth). Information systems in India – ENVIS and BTIS.

Unit IV

Introduction to Bioinformatics and its applications, History of Bioinformatics. Nucleic acid sequence databases – EMBL, GenBank, DDBJ. FASTA Format. Sequence searching and comparison software - BLAST; Pairwise sequence alignment and multiple sequence alignment, Clustal W; Phylogenetic tree (distance based, character based), Phylip.

Unit V

Introduction to Biostatistics, Measure of Central Tendency – Arithmetic Mean, - for Ungrouped Data, Grouped Data. Discrete Series- Direct Method, Continuous Series- Direct Method, Median - Computation of median, Discrete Series, Continuous Series; Mode - Computation of Mode, Discrete Series, Continuous Series. Measure of Dispersion –Measures based upon averages – Mean deviation & Standard deviation. Comparing Averages: The Student's t-Test for Independent Samples, Analyzing Frequencies: The Chi-Square Test, Introduction to Regression and Correlation.

Suggested Reading

1. Rajaraman, V. 2010. 5th Ed. Fundamentals of Computers. PHI Learning Pvt. Ltd., New Delhi.
2. Peter Norton. 2006. Introduction to Computers. Tata McGraw Hill (India) Ltd, New Delhi.
3. Alexis Leon and Mathews Leon. 1999. Introduction to Computers. Vikas Publishing House, New Delhi
4. Krane, D.E. and Raymer, M.L. 2009. Fundamental Concepts of Bioinformatics. Pearson Education, Inc.
5. Rastogi, S.C., Mendiratta, N. and Rastogi, P. 2004. Bioinformatics – Methods and Applications. Prentice Hall of India Pvt. Ltd., New Delhi.
6. Mani, K. and Vijayaraj, N. 2002. Bioinformatics for Beginners. Kalaikathir Achchagam, Coimbatore.
7. Genebank: http://www.ncbi.nlm.nih.gov/Genbank/
8. EMBL Nucleotide Sequence Database http://www.ebi.ac.uk/embl/
9. DDBJ: www.ddbj.nig.ac.jp/
10. Banerjee, P.K. 2012. Introduction to Biostatistics. S. Chand and Co. Ltd. New Delhi.
11. Rastogi, V.B. 2011. Fundamental of Biostatistics. Ane Books Pvt. Ltd

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester – VI
Main Practical paper VI – Covering papers Plant Biochemistry and Plant Physiology, Plant Biotechnology and Genetic Engineering and Computer Applications in Biology, Bioinformatics and Biostatistics.
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0473
Practical - 8 hrs (4 Credit)
Max. marks - 100
CIA - 25
ESE - 75

Suggested Laboratory Exercises

Plant Biochemistry

1. Quantitative estimation of soluble sugars and insoluble starch.
2. Separation of amino acids and sugars by paper chromatography.
3. To study the Enzyme activity –Amylase, catalase.
4. Separation of Chloroplast pigments using Paper Chromatographic technique.

Plant Physiology

1. Determination of Osmotic potential by plasmolytic method.
2. Determination of water potential by gravimetric method.
3. Effect of light intensity on photosynthesis
4. Effect of monochromatic light on photosynthesis
5. 5.To determine rate of photosynthesis under variable carbon dioxide concentration.
6. 6.Separation of Chloroplast pigments using Paper Chromatographic technique.
7. To compare the rate of respiration of various plant parts.
8. Differentiation of C3 and C4 plants by starch test.
9. Demonstration of fermentation using Kuhne's flask

Plant Biotechnology

1. Study of secondary metabolites production.
2. MS medium preparation and sterilization.
3. Callus culture- demonstration, Anther, Ovary culture.
4. Solving the problems related to gene manipulation (restriction enzyme recognition sites).
5. Micropropagation (axillary bud or terminal bud).
6. Protoplast isolation and culture.
7. Identification of figures/slides pertaining to chapters mentioned in the theory.

Computer Applications in Biology, Bioinformatics and Biostatistics

1. Familiarization with components of computer.
2. Working with MS Word, MS Excel and MS Powerpoint.
3. Searching biological information (Texts and images) using internet.
4. Biological sequence searching using BLAST software.
5. Demonstration of sequence alignment.
6. Computation of T- test and Chi-square test

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany Main Practical Examination, Semester VI
Main Practical Paper VI – Covering theory papers Plant Biochemistry, Plant Physiology, Plant Biotechnology and Computer Applications in Biology, Bioinformatics and Biostatistics
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0473
Duration 3 hrs

1. Outline the procedure for the given experiment A. List the material required. Set up the experiment and draw. Tabulate the data recorded. Report the result and leave the set up for valuation.

(Set up-3, List of materials-1, Procedure-3, Sketch/ Graph-1, Tabulation-l, Results-1)
(l x 10 = 10 marks)

2.Outline the procedure for given experiment B. List the materials required. Complete the experiment as per the question. Tabulate the recorded data and report the results. Leave the Preparation for valuation.

(Preparation-3, List of materials-1, Procedure-3, Sketch /Graph-1, Tabulation-l, Result - 1)
(1 x 10 = 10 marks)

3.Write on the procedure and application of set up C.

(Identification-1, List of materials-1, Procedure-4, Diagram-2, Applications-2)
(1 x 10 = 10 marks)

4.Plot graph / Bar diagram / Histogram of the given data D by using Computer
.

(Plotting in computer -5, Diagram-3) (l x 10 = 10 marks)

5.Identify, draw and write critical comments on E, F, G, H & I.

(Identification-1, Diagram-1, Comments-2) (5 x 4 = 20 marks)

Practical - 60
Record - 10
Viva voce - 05

Total 75

Key for Main Practical VI

A- Physiology experiment
B- Biochemistry experiment
C- Biotechnology experiment
D- Computer application / Biostatistics
E- Biochemistry spotter
F- Physiology Botany
G- Biotechnology spotter
H- Biotechnology spotter
I- Computer application spotter / Biostatistics

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Choice Based Credit System, III B.Sc. Botany (Main), Semester VI
Paper- XVIII- Generic Elective Paper-II: Analytical Techniques in Botany
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Paper Code – D0474
Theory - 4 hrs (4Credits)
Max. marks - 100
CIA (including Practical)- 25
ESE - 75

Objective

- To understand the principle, working and applications of instruments used in biology

Unit I

Microscopy: Principle, construction and applications of simple, compound and electron microscopes (SEM and TEM). Use of Camera lucida (mirror type and prism type). Brief notes on Phase contrast microscopy.

Unit II

Principle, usage and applications of spectrophotometry – UV and visible; Chromatography- principle, working and applications, paper, column, TLC, HPLC. Gel electrophoresis- Protein separation – SDS-PAGE; Nucleic acid separation - Agarose gel electrophoresis. Blotting techniques.

Unit III

Principles and applications of pH meter, buffers (Phosphate buffer). Laminar air flow chamber – Principles and applications.

Unit IV

Centrifugation: Ultra centrifuge, density gradient – principle, working and applications. Dialysis, Ultrafiltration, Lyophilization. Centrifugal vacuum concentration.

Unit V

Radio isotopic techniques: radioisotopes – alpha, beta and gamma rays, half-life period. Detection and measurement of radioactivity – Geiger Muller counter, Liquid Scintillation counting, Autoradiography.

Suggesting Readings

1. Bajpai, P.K. 2006. Biological Instrumentation and Methodology. S. Chank and Co. Ltd., New Delhi.
2. Chawla H.C. 2003. Plant Biotechnology- Laboratory Manual for Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Pelczar, M.J., Chan, E.C.S and Krieg, N.R. 1993. Microbiology – Concepts and Applications, McGraw-Hill, New York.
4. Skoog, D.A. 1985. Principles of instrumental analysis. Saunders College Pub., Oxford.
5. Sass, J.E. 1958. Botanical Microtechnique. State College Press, Amer, IOWA.
6. Wilson, K. and Walker, J. 2010. 7th Ed.. Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press, Cambridge

Bharathidasan Govt. College for Women (Autonomous), Puducherry
Structure of Question paper (Theory)
B.Sc., Botany (Main)
Revised from 29/01/2018 - Corrected version
(Syllabus effective from the academic year 2020-2021)

Max. Marks = 75

No. of Questions	No. of Questions to be asked	No. of Questions to be answered	Marks for each answer	Total	Special instructions for the paper-setter
Section A (Each answer in few sentences)	12	10	2	20	A minimum of ONE question from each unit
Section B	8	5	5	25	A minimum of TWO question from each unit
Section C (Each answer in a long paragraph)	3	3	10	30	A minimum of ONE question from each unit

B.Sc. Allied Botany – Papers I and II with a maximum of 60 marks each

No. of Questions	No. of Questions to be asked	No. of Questions to be answered	Marks for each answer	Total	Special instructions for the paper-setter
Section A (Each answer in few sentences)	10	8	2	16	A minimum of ONE question from each unit
Section B (Multiple choice questions with four choices per question)	8	5	4	20	A minimum of TWO question from each unit
Section C (Each answer in a long paragraph)	5	3	8	24	A minimum of ONE question from each unit