

**ETHIRAJ COLLEGE FOR WOMEN
(AUTONOMOUS) Chennai**

**DEPARTMENT OF PLANT BIOLOGY AND
PLANT BIOTECHNOLOGY
B.Sc. (AIDED)**

**SYLLABUS
(FOR CANDIDATES ADMITTED DURING THE
ACADEMIC YEAR 2018 -2019 ONWARDS)**

ETHIRAJ COLLEGE FOR WOMEN(AUTONOMOUS) CHENNAI-600 008

DEPARTMENT OF PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Revised syllabus for UG 2018-2019

Department of Plant biology and Plant Biotechnology is revising syllabi with effect from the academic year 2018-2019 with CBCS and Part IV and Part V components as specified by the Government of Tamil Nadu. Part IV and V components will seek to build the capacity of the students and provide inputs for their social service and social analysis capabilities.

Every academic year is divided into two semester sessions. Each semester will have a minimum of 90 working days and each day will have five working hours. Teaching is organized into a modular pattern of credit courses. Credit is normally related to the number of hours a teacher teaches a particular subject. It is also related to the number of hours a student spends learning a subject or carrying out an activity.

REGULATIONS

1. Eligibility for Admission

Candidates for admission to the first year of the Bachelor of Science Course in Plant Biology and Plant Biotechnology course shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an examination accepted as equivalent thereof by the Syndicate of the University of Madras.

2. Eligibility for the Award of Degree

A candidate shall be eligible for the award of the Degree only if she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than three academic years, passed the examinations of all the six semesters prescribed.

3. Course of Study

The main subject of study for Bachelor Degree shall consist of the following:

Part I	Foundation courses exclusive for languages.
Part II	English
Part III	Core subjects, Allied subjects and Project/elective with three courses
Part IV	1. 1(a) – Those who have not studied Tamil up to XII std and taken a non-Tamil language under Part – 1 shall take Tamil comprising of two courses (level will be at 6 th standard). 1 (b) – Those who have studied Tamil up to XII std and taken a non-Tamil language under Part-1 shall take advanced Tamil comprising of two courses. 1(c) – Others who do not come under a + b can choose non – major elective comprising of two courses offered by the major departments.
	2. Soft Skills
	3. Environmental Studies
	4. Value education
Part V	Extension activities/Sports/NCC

4. Passing Minimum

A candidate shall be declared to have passed in each paper / practical of the main subject of study wherever prescribed, if she secured NOT LESS THAN 40% of the marks prescribed for the examination.

5. Classification of successful candidates

Part I, II, III & IV

Successful candidates passing the examination & securing i) 60% and above and ii) 50% and above but below 60% in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class respectively. All other successful candidates shall be declared passed in THIRD class.

Candidates who pass all the examinations (Part I, II, III and IV) prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for ranking.

6. Template for evaluation Pattern

Unless and otherwise specified in the syllabus for each paper, the pattern of question paper for theory shall be as follows:

Component	Nature of the Question	Maximum Marks
Part - A	Definition:	20 Marks (10x2)
Part - B	Understanding / Description/Problems	40 Marks (5x8)
Part - C	Application / Analysis / Synthesis / Evaluation	40 Marks (2 x 20)

Part A: **Definition 10 questions only two from each unit (No Choice)**

Part B : **8 questions of which 5 questions should be answered. First 5 questions each from one unit and the last three from any 2 vast units.**

Part C : **2 questions to be answered out of 4 questions of which not more than 1 question can be chosen per unit.**

7. Pattern for Continuous Assessment (Theory)

Sem	Course code	Course title	Continuous Assessment				
			Test I	Test II	Quiz/Assignment/ Seminar/ Field Visit	Participatory Learning	Total
Core and Allied papers			10	10	10	10	40

8. Template for Practical papers (External) is as follows:

Record : 10 Marks

Practicals : 90 Marks

Total : 100 Marks

Marks obtained for 100 will be converted into 60 Marks.

Total Marks = External 60 Marks + Internal 40 Marks =100 Marks

9. Rubrics for continuous Assessment Evaluation

Test-50 Marks

Short answers-10 Marks (5x2)

Descriptive answers-20 Marks (4 x 5)

Essay type answers-20 Marks (1 x20)

Assignment (10 Marks)

Content-3 Marks

Presentation-2Marks

Diagrams and supportive materials-3 Marks

Reference-2 Marks

Quiz (10 Marks)

Understanding subject-4 Marks

Analysis-4 Marks

Spontaneity in answering-2 Marks

Participatory learning (10 Marks)

Observation in the class -5 Marks

Understanding subject-3 Marks

Analytical skill-2 Marks

10. Pattern for Continuous Assessment (Practicals)

Paper Code	Model Exam	Class work	Record	Herbarium	Field Visit	Total
PB18/2C/PR1	10	25	5	-	-	40
PB18/4C/PR2	10	25	5	-	-	40
PB18/6C/PR3	10	20	5	5	-	40
PB18/6C/PR4	10	20	5	-	5	40
PB18/A/ABP	10	25	5	-	-	40
PB18/A/PYP	10	25	5	-	-	40

11. Structure of skill based papers

Sem	Code	Course Title
I	PB18/1N/NLS	Nursery and Landscaping
II	PB18/2N/MRC	Mushroom Cultivation

CBCS - COURSE PROFILE FOR UG
UG - PLANT BIOLOGY AND PLANT BIOTECHNOLOGY SYLLABUS
(For Students Joining the Course from 2018 – 2019 Onwards)

SEMESTER	COURSE CODE	TITLE OF THE PAPER	INST Hr / Week	CREDIT	MARKS			LTP
					CIA	EXT.	TOTAL	
I		Part -I - Language – Paper I	5	3	40	60	100	-
		Part - II - English – Paper I	5	3	40	60	100	-
Core 1	PB18/1C/AFL	Part - III - Core Main – Plant Diversity I – Algae, Fungi And Lichen	7	5	40	60	100	4 3 0
Core 2		Plant Diversity I - Practical	3	-	-	-	-	0 0 3
ALLIED	PB18/1A/AB1	Part -III – Allied Botany Paper – I	4	3	40	60	100	3 1 0
		Allied Botany Practical	2	-	-	-	-	0 0 2
	PB18/1N/NLS	Part – IV- NME- Nursery And Landscaping	2	3	-	-	50	2 0 0
		Part - IV - Soft Skill	2	3	-	-	50	2 0 0
-----	-----	-----	30	20	-	-	-----	
II		Part - I - Language – Paper II	5	3	40	60	100	-
		Part - II - English – Paper II	5	3	40	60	100	-
Core 3	PB18/2C/BMP	Part - III - Core Main- Basics In Microbiology and Plant Pathology	7	5	40	60	100	4 3 0
Core 4	PB18/2C/PR1	Core Practical I (covering core 1 & 3)	3	4	40	60	100	0 0 3
ALLIED	PB18/2A/AB2	Part -III - Allied Botany Paper – II	4	3	40	60	100	3 1 0
	PB18/A/ABP	Allied Botany Practical	2	2	40	60	100	0 0 2
	PB18/2N/MRC	Part - IV – NME- Mushroom Cultivation	2	2	-	-	50	2 0 0
		Part - IV - Soft Skill	2	3	-	-	50	2 0 0
-----	-----	-----	30	25	-	-	-----	
III		Part – I – Language – Paper III	5	3	40	60	100	-
		Part – II – English – Paper III	5	3	40	60	100	-
Core 5	PB18/3C/BPT	Part – III – Core Main –Bryophytes & Pteridophytes	7	5	40	60	100	4 3 0
Core 6		Part – III – Core Main –Bryophytes & Pteridophytes – Practical –II	3	-	-	-	-	0 0 3
ALLIED	PB18/3A/APC	Part -III – Allied Phytochemistry Paper – I	4	3	40	60	100	3 1 0
		Allied Phytochemistry Practical	2	-	-	-	-	0 0 2
		Part – IV Environmental Studies	2	2	-	-	50	2 0 0
		Part-IV- Soft Skill	2	3	-	-	50	2 0 0
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IV		Part -I - Language – Paper IV	5	3	40	60	100	-
		Part - II - English – Paper IV	5	3	40	60	100	-
Core 7	PB18/4C/GPE	Part - III - Core Main - Gymnosperms, Paleobotany And Evolution	7	5	40	60	100	4 3 0
Core 8	PB18/4C/PR2	Part - III - Core Practical II (covering core 5 & 7)	3	4	40	60	100	0 0 3
ALLIED	PB18/4A/APC	Part -III – Allied Phytochemistry Paper – II	4	3	40	60	100	3 1 0

	PB18/A/PYP	Allied Phytochemistry Practical	2	2	40	60	100	0 0 2
	UG18/4/VED	Part - IV – Value Education	2	2	-	-	50	2 0 0
		Part IV-Soft Skill	2	3	-	-	50	2 0 0
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V Core 9	PB18/5C/MTE	Part - III - Core - Plant Morphology, Taxonomy and Economic Botany	6	5	40	60	100	4 2 0
Core 10		Part - III - Core -Plant Morphology, Taxonomy And Economic Botany - Practical	4	-	-	-	-	0 0 4
Core 11	PB18/5C/AAE	Part - III - Core - Plant Anatomy and Embryology	6	5	40	60	100	4 2 0
Core 12	PB18/5C/CGP	Part - III - Core - Cell Biology, Genetics And Plant Breeding	6	5	40	60	100	4 2 0
Core 13		Practical covering – Core 11 and 12 - Practical III	3	-	-	-	-	0 0 3
Elective I	PB18/5E/BIS	Bioinstrumentation and Biostatistics	5	5	40	60	100	4 1 0
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VI Core 14	PB18/6C/PEP	Part - III - Core Main – Plant Ecology And Phytogeography	4	4	40	60	100	3 1 0
Core 15	PB18/6C/MPB	Part - III - Core Main - Molecular Biology and Plant Biotechnology	4	4	40	60	100	3 1 0
Core 16	PB18/6C/PPB	Part - III - Core Main -Plant Physiology And Plant Biochemistry	4	4	40	60	100	3 1 0
	PB18/6C/PR3	Practical covering – Core 9,11 and 12 - Practical III	-	4	40	60	100	-
Core 17	PB18/6C/PR4	Practical covering – Core 14,15 and 16 - Practical IV	7	4	40	60	100	0 0 7
Elective II	PB18/6E/HMC	Horticulture and Mushroom cultivation	5	5	40	60	100	4 1 0
Elective III	PB18/6E/HBS	Herbal Science	5	5	40	60	100	4 1 0
		Extension Activities	1	1	-	-	-	-
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		TOTAL CREDITS	---	140	-	-	-----	

*Core Practical Exams will be conducted at the end of every year

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
(For the candidates admitted during the year 2018-2019 onwards)

I B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY
SEMESTER – I

Title of the Paper: CORE 1- PLANT DIVERSITY -1 (ALGAE, FUNGI AND LICHEN)

Teaching Hours- 7 Hrs/Week (105 Hrs/semester)

Course code: PB18/1C/AFL

Credits: 5 LTP: 4 3 0

Objectives:

To enable students to

Have knowledge on the structure and reproduction of certain selected forms of Algae, Fungi and Lichen

ALGAE

UNIT – I

(20 Hrs)

Introduction, general characteristics, major classes, range of thallus structure, life cycle patterns and economic importance-food, medicine, agriculture, Bioremediation and biofuel. Classification of algae - Fritsch (1945) system.

UNIT- II

(25 Hrs)

Range of structure, reproduction and life histories of the following genera: *Oscillatoria*, *Nostoc*, *Spirulina*, *Chlorella*, *Ulva*, *Chara*, *Navicula*, *Sargassum* and *Gracilaria*

FUNGI

UNIT – III

(20 Hrs)

Occurrence, characteristics, thallus organization, nutrition and reproduction in fungi. Classification by Alexopolus and economic importance-Food, medicine, industry and agriculture.

UNIT – IV

(25 Hrs)

Structure, reproduction and life histories of the following genera.:
Pilobolus, *Albugo*, *Aspergillus*, *Peziza*, *Agaricus*

LICHENS

UNIT – V

(15 Hrs)

Thallus organization-types-Crustose, Foliose and fruticose-reproduction with reference to *Usnea*.
Economic and ecological importance of Lichens.

Recommended books:

1. Vasishta. B. R. Botany for degree students- Algae. S. Chand & Co., 2014.
2. Pandey, B.P. College Botany, Vol I, S. Chand and Co., 2010.
3. Vasishta. B. R. Botany for degree students- Fungi, S. Chand & Co., 2011.
4. Sharma, O.P. A text book of fungi. Tata-McGraw hill Publications Ltd, 1989.

Reference Books:

1. Vashista Sinha B.R., Singh, V.P., 2002, Botany for Degree students, Algae 9th revised edition, S. Chand & Company Ltd., New Delhi.
2. Pandey B.P., 2000 Revised edition, Text Book of Botany Algae, S.Chand & Company, New Delhi.
3. Sharma O.P., 1992, Text Book of Algae, Tata McGraw Hill Publication Company Ltd., New Delhi
4. Chopra G.L., A Textbook of Fungi, S.Nagin & Co. Meerut, India
5. Pandey B.P., 1997 College Botany Vol. I Fungi & Pathology.
6. Mehrotra, R,S and Aneja, K.R.2003. An introduction to mycology. New age International (P) Ltd, Publishers, New Delhi.
7. Chapman. V. J and Chapman. D. J .The Algae. Mac Millan Educational Ltd., London.
8. Fritsch. F. E. Structure and reproduction of algae Vol I and II, Cambridge University Press, 1945.
9. Smith. G. M. Cryptogamic Botany Vol I, Mc Grawhill 1955.
10. Alexopoulos. C. J and Mims. C. V. Introductory mycology. John Willey and sons,1988.
11. Sharma P.D. The fungi. Rastogi, Merrut, 1989.
12. Webster J. An introduction to fungi. Cambridge university Press, 1970.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
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B. Sc DEGREE EXAMINATION

I B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 1- PLANT DIVERSITY1 (ALGAE, FUNGI AND LICHENS)

Max. Marks: 100

Paper Code : PB18/1C/AFL

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q. No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
(For the candidates admitted during the year 2018-2019 onwards)
I B. Sc Advanced Zoology and Biotechnology
SEMESTER I

Title of the Paper: ALLIED BOTANY PAPER I

Teaching Hours: 4 Hrs/week (60 Hrs/ semester)

Course code : PB18/1A/AB1

Credits : 3 LTP: 3 1 0

Objectives

To enable the students to give an insight of different fields of Plant Biology.

UNIT - I: ALGAE (10 Hrs)

Broad classification of plants - general characters of Algae - Structure, Life history of the following genera - *Nostoc*, *Chlorella*, *Sargassum* and *Polysiphonia* and Economic importance of Algae.

UNIT - II: FUNGI, BACTERIA & VIRUS (10 Hrs)

General characters of fungi, structure and life history of the following genera - *Yeast*, *Mucor* *Agaricus* and Economic importance of fungi.

Bacteria - general characters, structure and reproduction of *E.coli* and Economic importance

Virus - general characters.

UNIT - III: BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS (10 Hrs)

General characters of Bryophytes, Structure and life history of *Funaria*. Economic importance of Bryophytes.

General characters of Pteridophytes, Structure and life history of *Lycopodium*. Economic importance of Pteridophytes.

General characters of Gymnosperms, Structure and life history of *Cycas*. Economic importance of Gymnosperms.

UNIT - IV: CELL BIOLOGY (10 Hrs)

Prokaryotic and Eukaryotic cell. Cell organelles - ultrastructure and function of chloroplast, mitochondria and nucleus. Cell division - mitosis and meiosis.

UNIT - V: GENETICS AND PLANT BIOTECHNOLOGY (20 Hrs)

Mendelism - Monohybrid & dihybrid cross - Test cross - Back cross. Law of dominance, Law of Segregation, Incomplete dominance. Law of independent assortment.

Plant tissue culture - sterilization procedure and *in vitro* culture methods. Callus regenerations.

Applications of Biotechnology.

Recommended books:

1. Narayanaswami. R.V. and K.N. Rao., Outlines of Botany, 1984.
2. Vasishta.B.R., Algae. S. Chand and Co. Pvt. Ltd. New Delhi, 2014.
3. Vasishta.B.R., Fungi. S. Chand and Co. Pvt. Ltd. New Delhi, 2011.
4. Vasishta.B.R., Bryophyta. S. Chand and Co. Pvt. Ltd. New Delhi, 2004.
5. Vasishta.B.R., Pteridophyta. S.chand and Co. Pvt. Ltd. New Delhi.2004.
6. Vasishta.B.R., Gymnosperms. S.chand and Co. Pvt. Ltd. New Delhi.2004.
7. Stanier, Y.R. General Microbiology. 4th edition, McMillan Educational Ltd. London. 1987.
8. Verma P.S.A and V.K. Agarwal. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Co. Pvt. Ltd., 2004.
9. Dubey R.C. A text book of biotechnology, S.Chand & Co., Ltd., New Delhi, 1993.
10. Ignacimuthu S. Basic Bio-technology, Tata Mc Graw Hill, Publishing Co., Ltd., New Delhi, 1996.
11. Kumar H.D. A text book of Biotechnology, East West Affiliated Press Ltd., New Delhi, 1993.

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B.Sc. DEGREE EXAMINATION

I B. Sc Advanced Zoology and Biotechnology

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ALLIED BOTANY PAPER I
Course code : PB18/1A/AB1

Max Marks: 100
Time: 3 hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
(For the candidates admitted during the year 2018-2019 onwards)
SEMESTER – II

I B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 3- BASICS IN MICROBIOLOGY AND PLANT PATHOLOGY

Teaching Hours- 7 Hrs/Week (105 Hrs/Semester)

Course code: PB18/2C/BMP

Credits: 5 LTP: 4 3 0

Objectives:

To enable the students

- To Provide knowledge on the basics of microbiology.
- To give information relating to principles of pathology, plant diseases with special references to South India- highlighting the disease symptom, causal organism, etiology of the diseases and control measures.

UNIT – I

(20 Hrs)

History and scopes of microbiology – introduction to microbial world - Protozoa, Bacteria their general structure and multiplication. Viruses – Bacteriophages, Mycophages, Cyanophages. Viroids and prions their general structure and multiplication. Mycoplasma structure and multiplication. Economic importance of Bacteria.

UNIT - II

(15 Hrs)

Cleaning and sterilization of glassware, media. Isolation techniques- Pour plate – Spread plate – Streak plate – Serial dilution – Types of culture media- staining techniques – simple and differential staining. Control of microbes – physical, chemical and biological methods.

UNIT – III

(15 Hrs)

Fermentation and antibiotic production – Streptomycin and Penicillin. Microbiology of air - Microbiology of potable water - MPN – technique - Microbiological analysis of dairy products. Food preservation methods.

UNIT – IV

(25 Hrs)

A brief history of plant pathology; Principles of Plant pathology. Symptomology – Study of infection – entry of fungal, bacterial & viral pathogens. Role of toxins (Wild fire toxin & Victorin) & Enzymes (cellulases and chitinases) Host defense – Structural (Formation of cork and abscission layers) and biochemical (Phytoalexins) Control – biological (*Trichoderma* & *Pseudomonas*)

UNIT – V

(30 Hrs)

Causative organisms, symptoms, disease cycle and control measures of the following diseases

- | | |
|------------------------------------|---------------------------|
| 1) Blast of Paddy | 7) Little leaf of brinjal |
| 2) Wilt of cotton | 8) Bunchy top of banana |
| 3) Citrus canker | 9) Early blight of potato |
| 4) Powdery mildew of Grapes | 10) Rust of Wheat |
| 5) Red rot of sugar cane | 11) Root knot of tomato |
| 6) Leaf spot disease of ground nut | |

Recommended books:

1. R.C.Dubey and D.K. Maheswari. A Text Book of Microbiology. S.Chand&Company Ltd. 2013.
2. M.J. Pelczar, R.D.Reid . Microbiology. McGraw Hill, Inc. 1977.
3. P. Tauro, K.K. Kapoor and K.S. Yadav. An Introduction to Microbiology. Wiley Eastern Ltd.1986.
4. V.Singh, P.C.Pandey and D.K. Jain. A text Book of Botany. Rastogi Publications.2009.
5. Bilgrami Dube, K.S. and Dube, H.C. A text book of Modern Plant Pathology, Vikas Publishing House, Pvt. Ltd.1976.
6. Mehrotra .R.S. Plant Pathology. Tata Mc-Graw Hill Publishing Co. Ltd, 2017.
7. Pandey B.P. –Plant Pathology-Pathogen & Plant Disease, 2011.
8. A.V.S.S. Sambamurthy-A text book of Plant Pathology, 2006
8. Rangaswamy .G & Mahadevan .A. –Diseases of crop plants in India, IV Edition, Prentice Hall. 1999.
- 9.Singh.R.S. Plant diseases. Oxford and IBH Publishing Co., 2009.
- 10.Singh.R.S. –Introduction to Principles of Plant Pathology, Oxford and IBH Publishing Co., 1982.

Reference Books:

- 1.Agrios. 2008. Plant Pathology. Elsevier
2. Adams, M.R. and M.O. Moss. 1995.Food microbiology . New Age International (p) Ltd., Chennai.
3. Agarwal, 2006. Industrial Microbiology: Fundamentals and Application, IBD publishers,, New Delhi.
- 4.. Ananthanarayanan, R and C.K.J. Panikar. 2000. Text book of Microbiology, 6th Edition, Orient Longman.
5. Atlas, R.M. 1989. Microbiology- Fundamental and Applications. McMillan Publishing Company. New York.
- 6.. Cruger F. and Anneliese Crueger, 2000. Biotechnology: Industrial Microbiology. Panima Publications.
7. O.P Sharma, 2011. Fungi and Allied microbes. Tata McGraw Hill Pvt. Co.
8. P.D. Sharma, 2005. Fungi and Allied organisms. Narosa Publishing house Ltd.
9. P.D. Sharma, 2006. Plant pathology. Narosa Publishing house Ltd.
11. Madigan, M.T. and J.N. Martinko. 2006. Brock Biology of Microorganisms.11th edition,Pearson Education, inc.Upper Saddle River, USA
12. Mackane, L. and J. kandel, 1996. Microbiolgy-Essential and applications.

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B.Sc. DEGREE EXAMINATION

I B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 3- BASICS IN MICROBIOLOGY AND PLANT PATHOLOGY

Course Code: PB18/2C/BMP

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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SEMESTER II

I B. Sc Advanced Zoology and Biotechnology

Title of the Paper: ALLIED BOTANY PAPER II

Teaching Hours: 4 Hrs/week (60 Hrs/Semester)

Course code : PB18/2A/AB2

Credits : 3 LTP: 3 1 0

Objectives

To enable the students to give an insight of different fields of Plant Biology.

UNIT - I: MORPHOLOGY OF FLOWERING PLANTS (10 Hrs)

Morphology - Modifications- root, stem. Leaf – types, venation, phyllotaxy. Inflorescence – racemose and cymose. Fruits: Types – Fleshy and dry.

UNIT - II: TAXONOMY (10 Hrs)

General outline of Bentham and Hooker's system of classification study of the range of characters and plants of economic importance in the following families: Annonaceae, Cucurbitaceae, Rubiaceae, Apocynaceae, Amarantaceae and Liliaceae.

UNIT - III: ANATOMY (10 Hrs)

Primary structure of dicot stem and dicot leaf. Normal secondary thickening of dicot stem. Lenticels - annual rings. Monocot stem and root.

UNIT - IV: EMBRYOLOGY (10 Hrs)

Structure of mature anther and ovule - Types of ovules – Orthotropous and Anatropous . Structure of embryo sac, double fertilization, structure of dicotyledonous and monocotyledonous seeds.

UNIT - V: PLANT PHYSIOLOGY (20 Hrs)

Absorption of water – Active and passive transport. Photosynthesis - light reaction - Calvin cycle, Respiration - Glycolysis - Kreb's cycle . Nitrogen cycle.

Recommended books

1. Narayanaswami. R.V. and K.N. Rao., Outlines of Botany, 1984.
2. Pandey. B.P. , Taxonomy Of Angiosperms. S.Chand and Co. Pvt Ltd. New Delhi, 2001.
3. Pandey B.P. Plant Anatomy. S. Chand and Co. Pvt Ltd. New Delhi, 2012.
4. Bhojwani.S.S. and Bhatnagar . S.P., The Embryology Of Angiosperms, Vikas Publications House Private ltd., 1981.
5. Jain. V. K. Fundamentals of Plant Physiology. S. Chand and Co. Pvt. Ltd. New Delhi, 2017.

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I B. Sc Advanced Zoology and Biotechnology

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ALLIED BOTANY PAPER II
Course code : PB18/2A/AB2

Max Marks: 100
Time : 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All questions carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
(For the candidates admitted during the year 2018-2019 onwards)

SEMESTER – II

I B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE PRACTICAL I (COVERING CORE 1 & 3)

Teaching Hours: 2Hrs/week

Course code : PB18/2C/PR1

Credits : 4 LTP: 0 0 2

1. Micro preparation of the types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types of algal mixture.
4. Morphological study of Algae, Fungi and Lichens.

Microbiology

- 1) Cleaning and sterilization of glassware.
- 2) Preparation of different types of culture media.
- 3) Isolation of pure culture – streak, spread and pour plate methods.
- 4) Staining of bacteria – Simple staining, Gram staining.
- 5) Potability of Drinking water – MPN.
- 6) MBRT of milk.
- 7) Isolation of microbes from spoiled food items.
- 8) Photographs of micro organisms prescribed in the syllabus.

Plant Pathology

Study of the following diseases

- 9) Blast of Paddy.
- 10) Wilt of Cotton.
- 11) Citrus canker.
- 12) Red rot of sugar cane.
- 13) Leaf spot disease of ground nut - section
- 14) Bunchy top of Banana.
- 15) Early blight of potato - section
- 16) Isolation of fungal pathogen – *Cercospora* Sp.
- 17) Biological pesticides.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
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SEMESTER – II

I B. Sc Plant Biology and Plant Biotechnology

QUESTION PAPER TEMPLATE- PRACTICAL

Title of the Paper: CORE PRACTICAL I (COVERING CORE 1 &3) Max marks -100

Course Code- PB18/2C/PR1

Time- 3 hours

I. Cut transverse sections of A, B, C & D stain and mount in glycerine. Identify giving reasons. Draw diagrams. Leave the slide for valuation. **(4 x 6 = 24 marks)**

II. Make suitable micropreparation of E. Identify giving reasons. Draw labeled sketches. Submit the slide for valuation. **(5 marks)**

III. Identify any 2 specimens given in the algal mixture F. Draw labeled diagrams. Notes not necessary. **(4 marks)**

IV. Name the genus, group, morphology of the given part of G, H, I, J, & K. **(15 marks)**

V. Cut transverse of L and leave the slide for valuation. Identify the causal organism and disease. Write about the symptoms and control measures. **(12 marks)**

VI. Write critical notes on M, N, O, P, Q & R. Draw labelled diagrams. **(6 x 5 = 30 marks)**

Practical - 90 Marks
Record - 10 Marks
Total - 100 Marks

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SEMESTER – II

I B. Sc Plant Biology and Plant Biotechnology

Title of the Paper: ALLIED BOTANY PRACTICAL

Course Code- PB18/A/ABP

Teaching Hours: 2 Hrs/week

Credits: 2 LTP: 0 0 2

1. To make suitable micro preparation, describe and identify materials of Algae, Fungi, Bryophyte, Pteridophyte and Gymnosperm prescribed.
2. Micro photographs of cell organelles ultra structure.
3. Simple genetic problems
4. To describe in technical terms, plants belonging to any of the family prescribed and to identify the family.
5. To dissect a flower, construct floral diagram and write floral formula
6. Demonstration experiments
 1. Effect of varying wavelength of light on the rate of photosynthesis of an aquatic plant by using wilmott's bubble counter. (Two colour papers only – red and blue).
 2. Comparison of rate of Respiration of different respiratory substrate by using by Ganong's respiroscope.
7. To make suitable micro preparations of anatomy materials prescribed in the syllabus.
8. Spotters- Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm anatomy, Embryology, Cell biology and Biotechnology.

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SEMESTER – II

I B.Sc. Advance Zoology and Biotechnology

QUESTION PAPER TEMPLATE- PRACTICAL

Title of the Paper: ALLIED BOTANY PRACTICAL
(COVERING ALLIED BOTANY PAPER 1 & 2)

Max Marks : 100

Course Code : PB18/A/ABP

Time : 3 HRS

I) Cut transverse section of **A and B** . Stain and mount in glycerine. Identify giving reasons. Draw diagrams. Submit the slide for valuation. **(2 x 9 = 18 Marks)**

II) Refer **C and D** to their respective families giving reasons and describe in technical terms. Draw diagrams of Longitudinal section of flower and transverse section of Ovary only. **(2x 10= 20 Marks)**

III) Solve the given problem in Genetics **E and F**. **(2 x 4 = 8 Marks)**

IV) Comment on the set up **G**. **(8 Marks)**

V) Write critical notes on **H, I, J,K, L and M**. **(6 x 5 = 30 Marks)**

VI) Name the Genus, Species and Family of **N and O**. **(2 x 3 = 6 Marks)**

Practicals – 100 Marks
Record - 10 Marks
Total - 100 Marks

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
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SEMESTER – III

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 5- BRYOPHYTES AND PTERIDOPHYTES

Teaching Hours- 7 Hrs/Week (105 Hrs/Semester)

Course code: PB18/3C/BPT

Credits: 5 LTP: 4 3 0

Objectives:

To enable students to

- Have knowledge on the structure and reproduction of certain selected forms of Bryophytes and Pteridophytes.

UNIT- I (20 Hrs)

General characters of Bryophytes, classification (Watson), life cycle, origin and evolution of Bryophytes. Spore dispersal mechanisms in bryophytes.

UNIT- II (20 Hrs)

General characters of Hepaticopsida, Anthocerotopsida and Bryopsida.

Detailed study of structure and reproduction of

- a) *Riccia* b) *Anthoceros*, c) *Polytrichum* (no developmental studies)

UNIT- III (20 Hrs)

General characters, classification (Reimer, 1954), apogamy, apospory, homosporous and heterosporous. Origin and evolution of Pteridophytes.

UNIT- IV (30 Hrs)

Detailed study of morphology, anatomy, reproduction and life cycle of following genera:-

- a) *Lycopodium*, b) *Equisetum*, c) *Dicranopteris*, d) *Marsilea* (no developmental studies)

UNIT- V (15 Hrs)

Stele- Types and evolution, Sporangia in Pteridophytes -organization -cone, sori and sporocarp – evolution.

Recommended books:

1. Vasishta. B. R. Botany for degree students- Bryophyta, S. Chand and Co, 2010.
2. Vasishta. P. C. Botany for degree students- Pteridophyta, S. Chand and Co, 2010.

Reference Books

1. Eames.A, 1963 – Morphology of lower vascular plant, McGraw Hill
2. Forster and Gifford, 1959 – Comparative morphology of vascular plants.
3. Pandey B.R., 1977 – A text book of Botany, Pteridophytes and Gymnosperms, K. Nath & Meerut.
4. Parihar. N.S., 1967 – An introduction to Embryophyta, Vol.III – Pteridophyta, Central book depot, Allahabad.
5. Smith.G.M., 1955- Cryptogamic Botany, Volume-II– McGraw Hill
6. Sporne.K.R., 1976 – Morphology of Pteridophytes, 4th edition, B.I.Publication.
7. Watson, E.V. The structure and Life of Bryophytes
8. Prem Puri. 1973. Bryophytes-A broad perspective, Atma Ram & Sons, New Delhi
10. Parihar, N.S. 2013. An introduction to Embryophyta, Vol.I– Bryophyta. Central Book Depot, Allahabad.
11. Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
12. Puri, P. 1980. Bryophytes. Atma Ram & Sons, New Delhi.

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B.Sc.DEGREE EXAMINATION

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 5- BRYOPHYTES AND PTERIDOPHYTES

Course Code: PB18/3C/BPT

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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(For the candidates admitted during the year 2018-2019 onwards)

SEMESTER –III
II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: ALLIED PHYTOCHEMISTRY PAPER I

Teaching Hours: 4 hrs/ week (60 Hrs/ Semester)

Course code: PB18/3A/APC

Credits: 3 LTP: 3 1 0

Objectives:

To enable the students to

- get exposed to a comprehensive introduction to various natural products present in plants and to understand their structure and properties.

UNIT 1: (10 Hrs)

Phytochemistry – Definition, scope and its importance. pH- Definition and determination, Preparation of solutions- normality, molarity and molality, Buffer and Electrolytes. Structure of atom, Bond- Hydrogen Bond- Chemical Bond- Types -Electrovalent, Covalent and Co- ordinate.

UNIT 2: (10 Hrs)

Plant metabolites- Primary and Secondary (Definition & Examples),
Carbohydrates- Definition and Classification, Structure and Properties of the following:
a) Monosaccharides- Glucose and Fructose
b) Disaccharides- Lactose and Sucrose
c) Polysaccharides- Starch and Cellulose

UNIT 3: (10 Hrs)

Lipids- Definition and Classification, Structure and Properties of the following:
a) Simple Lipid (Saturated and Unsaturated)
b) Compound Lipid (Phospholipids)
c) Derived Lipid (Ergosterol and stigmasterol)

UNIT 4: (20 Hrs)

Natural Products- Alkaloids- Definition and Classification eg. Colchicine- Source, extraction and uses. Glycosides-Definition and Classification eg. Andrographolide- Source, extraction and uses.

UNIT 5: (10 Hrs)

Natural products – Steroids - Definition and Classification eg. Digitoxin - Source, extraction and uses. Terpenoids- Definition and Classification eg. Camphor - Source, extraction and uses.

Recommended books:

1. Jain.J.L. Fundamentals of Biochemistry, Vijaya Printers, Chennai, 2016
2. Agarwal O.P. Chemistry of Organic products. Volume 1, Goel Publishing house, 2014.
3. Gurdeep R. Chatwal, Organic Chemistry of Natural Products Volume 2, Himalaya Publishing House, 1997.
4. Mathew George, Lincy Joseph. Textbook of Pharmaceutical Chemistry. VivaBooks Pvt.Ltd. 2009

Reference Books:

1. Lehninger.A.L. Biochemistry. CBS Publications, 2012.
2. Stryer.J. Biochemistry. W.H. Freeman and Co. 2015.
3. Sujata.V. Bhat et al. Natural Products Chemistry and Applications. Narosa Publishing House Pvt Ltd. 2009.
4. Roseline. P. Pharmacognosy. MJP Publishers 2011.
5. Kokate.C.K., Purohit, Gokhale. Pharmacognosy. Nirali Prakashan Publication. 2007.
6. Rumi M. Shah, Rupesh T. Nayak. Pharmacognosy. Global Academic Publishers and Distributors 2012.

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B.Sc. DEGREE EXAMINATION

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ALLIED PHYTOCHEMISTRY PAPER I **Max. Marks: 100**
Course Code: PB18/3A/APC **Time: 3 Hours**

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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(For the candidates admitted during the year 2018-2019 onwards)

SEMESTER –IV

II B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 7- GYMNOSPERMS, PALEOBOTANY AND EVOLUTION

Teaching Hours- 7 Hrs/Week (105 Hrs/Semester)

Course code: PB18/4C/GPE

Credits: 5 LTP: 4 3 0

Objectives:

To enable students to

- Have knowledge on the structure and reproduction of certain selected forms of Gymnosperms.
- To provide knowledge on the basics of Paleobotany and evolution.

UNIT – I

(20 Hrs)

General characters and Classification of Gymnosperms (Sporne,1954). Wood structure and economic importance in Gymnosperms.

UNIT – II

(25 Hrs)

Morphology, structure and reproduction of *Cycas* , *Pinus* and *Gnetum* (No developmental studies) – Comparative study.

Unit – III

(25 Hrs)

Geological time scale – era, period, epoch. Fossilization method- Fossil types impression, casts, mold and coal ball, Radio carbon dating. Contribution of Birbal Sahni.

Unit – IV

(20 Hrs)

Study of the following fossil form genera *Rhynia*, *Williamsonia*, *Lepidodendron*, *Lepidocarpon*, *Calamites* and *Cordaites*.

Unit – V

(15 Hrs)

Evolution – origin of life, theories of evolution Darwin, Lamark and De vries, modern synthetic theory. Variation – Adaptation and selection.

Recommended books:

1. Vasishta. P. C. Botany for degree students- Gymnosperms, S. Chand and Co, 2003.
2. B. P. Pandey, College Botany Vol II , S. Chand and Co, 1979.
3. Verma P.S. and Agarwal V.K. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand and Co. Pvt. Ltd. 2007.
4. Shukla, R.S. and Chandel P.S. Cytogenetics, Evolution and Plant Breeding , 2016.

Reference books:

1. Gupta. M. N., 1972, - The Gymnosperms (2nd Edition) Shiva Lal Agarwala & Co., Agra.
2. Sporne, K.R.1991. The Morphology of Gymnosperms. B.I. Publications, New Delhi.
3. Bhatnagar, S.P. and Moitra, A. 2018. Gymnosperms, New Age Int. Pvt. Ltd., New Delhi.
4. Stewart, W.N. and Rathwell, G.W. 1993. Paleobotany and the Evolution of Plants. Cambridge University Press.
5. Sinha and Sunitha Sinha, Cytogenetics, Plant Breeding and Evolution.
6. Arnold . C. A. Introduction to paleobotany, Mc Graw Hill,1947.
7. Shukla. A and Mishra. S. P. Essential of Paleobotany, Vikas Publishing house private limited, 1982.

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B.Sc. DEGREE EXAMINATION

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 7- GYMNOSPERMS, PALEOBOTANY AND EVOLUTION

Course Code: PB18/4C/GPE

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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SEMESTER –IV

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: ALLIED PHYTOCHEMISTRY PAPER II

Teaching Hours- 4 hrs/week (60 hrs /Semester) Course code: PB18/4A/APC

Credits: 3 LPT 3 1 0

Objectives:

To enable the students to

- get exposed to a comprehensive introduction to various natural products present in plants and to understand their structure and properties.

UNIT 1:

(20 Hrs)

Amino acids – Structure, Classification and function.

Proteins- Structure –A brief account of Primary, Secondary, Tertiary and Quaternary structure, Classification, properties and functions.

UNIT 2:

(10 Hrs)

Vitamins – Definition and Classification. Occurrence, Structure, role and deficiency diseases of

Water soluble vitamins- B1, B2, B6, B12 and C

Fat Soluble Vitamins- A, D, E and K

UNIT 3:

(10 Hrs)

Natural Products- Carotenoids – Definition and classification eg. Lycopene- Source, Extraction and Uses. Flavanoids- Definition and classification eg. *Citrus* flavonoids – Source, Extraction and Uses.

UNIT 4:

(10 Hrs)

Natural Products – Tannins- Definition and classification eg. Catechol – Source, Extraction and Uses. Resins- Definition and classification. Resin from *Asafoetida*-Extraction and uses.

UNIT 5:

(10 Hrs)

Natural Product from sea weeds – Agar Agar, Alginic acid, Kieselghur

Natural plant Dyes-Classification based on application -Dyes obtained from root and tuber, wood, leaves and flowers.

Recommended books:

1. Jain.J.L. Fundamentals of Biochemistry, Vijaya Printers, Chennai, 2016
2. Agarwal O.P. Chemistry of Organic products. Volume 1, Goel Publishing house, 2014.
3. Gurdeep R. Chatwal, Organic Chemistry of Natural Products Volume 2, Himalaya Publishing House, 1997.
4. Mathew George, Lincy Joseph. Textbook of Pharmaceutical Chemistry. VivaBooks Pvt.Ltd. 2009

Reference Books:

1. Lehninger.A.L. Biochemistry. CBS Publications, 2012.
2. Stryer.J. Biochemistry. W.H. Freeman and Co. 2015.
3. Sujata.V. Bhat et al. Natural Products Chemistry and Applications. Narosa Publishing House Pvt Ltd. 2009.
4. Roseline. P. Pharmacognosy. MJP Publishers 2011.
5. Kokate.C.K., Purohit, Gokhale. Pharmacognosy. Nirali Prakashan Publication. 2007.
6. Runit M. Shah, Rupesh T. Nayak. Pharmacognosy. Global Academic Publishers and Distributors 2012.

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B.Sc. DEGREE EXAMINATION

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ALLIED PHYTOCHEMISTRY PAPER II
Course Code: PB18/4A/APC

Max. Marks: 100
Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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(For the candidates admitted during the year 2018-2019 onwards)
SEMESTER –IV

II B. Sc Plant Biology and Plant Biotechnology

Title of the Paper: CORE PRACTICAL II (COVERING CORE 5 & 7)

Teaching Hours: 3 Hrs/week

Course Code- PB18/4C/PR2

Credits: 4 LTP: 0 0 3

BRYOPHYTES AND PTERIDOPHYTES

Study of morphology, anatomy and structure of the vegetative and reproductive organs of Bryophyte genera and fossils included in the theory syllabus .

Study of morphology, anatomy and structure of the vegetative and reproductive organs of Pteridophyte genera included in the theory syllabus.

GYMNOSPERMS, PALEOBOTANY AND EVOLUTION

Study of morphology, anatomy and structure of the vegetative and reproductive organs of *Cycas* and *Gnetum*.

Study of morphology, anatomy and structure of the vegetative and reproductive organs of *Pinus* and Fossil slides of *Rhynia*, *Williamsonia*, *Lepidodendron*, *Lepidocarpon*, *Calamites* and *Cordaites*. Photograph of evolution scientists-Darwin, Hugo de vries and Lamarck.

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(For the candidates admitted during the year 2018-2019 onwards)

II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-PRACTICAL

Title of the Paper: CORE PRACTICAL II (COVERING CORE 5 & 7) Max Marks : 100
Course Code : PB18/4C/PR2 Time : 3 HRS

I. Cut transverse sections of **A, B** and **C**. Stain and mount in glycerine. Identify giving reasons. Draw diagrams. Leave the slides for valuation.

(3 x 9 = 27 Marks)

II. Make suitable micropreparation of **D** and **E**. Identify giving reasons. Draw labeled sketches. Submit the slide for Valuation.

(2 x 6= 12 Marks)

III. Identify the Genus, Group and morphology of **F, G, H, I** and **J** Diagrams and notes not necessary.

(5 x 3 = 15 Marks)

IV. Write critical notes on **K, L, M, N, O** and **P**.

(6 x 5 = 30 Marks)

V. Identify the scientist and write critical notes for **Q**.

(1 x 6 = 6 Marks)

Practicals –	90 Marks
Record -	10 Marks

Total -	100 Marks

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
(For the candidates admitted during the year 2018-2019 onwards)
SEMESTER –IV

II B. Sc Plant Biology and Plant Biotechnology

SEMESTER IV

Title of the Paper: ALLIED PHYTOCHEMISTRY PRACTICAL (COVERING ALLIED 3 & 4)

Teaching Hours: 2 hrs/week

Course Code- PB18/A/PYP

Credit: 2 LTP: 0 0 2

I. Volumetric Analysis

- a) Estimation of Potassium dichromate
- b) Estimation of Iron
- c) Estimation of Glycine
- d) Estimation of oxalic acid

II. Qualitative Analysis

Carbohydrates- Glucose, Fructose, Lactose, Sucrose, Starch

Aminoacids-Arginine, Cystine, Tyrosine, Tryptophan

Qualitative test for lipids

III. Phytochemical Tests

Identification test for

- a) Alkaloids
- b) Glycosides
- c) Terpenoids
- d) Flavanoids
- e) Tannins

IV. Natural plant products and vitamins – Spotters (prescribed in the Syllabus)

Product from sea weeds

Natural plant dyes

Water soluble vitamins-B1, B2, B6, B12 and C.

Fat Soluble vitamins- A,D, E and K.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
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II B.Sc. Plant Biology and Plant Biotechnology

QUESTION PAPER TEMPLATE-PRACTICAL

Title of the Paper: ALLIED PHYTOCHEMISTRY PRACTICAL
Course Code : PB18/A/PYP

Max marks : 60
Time : 3 HRS

I Estimate the amount of given solution **A** present in the whole of the given solution. You are provided with the standard solution (-----g/l) and a decinormal link solution. Submit the procedure and record your readings.

(25 Marks)

II Analyse the given sample **B** qualitatively. Record your observation and inference.

(25 Marks)

III Analyse the Phytochemical constituent present in the given sample **C** and **D**.

(20 Marks)

IV Give the chemical name, source and deficiency for **E, F, G** and **H**.

(4 x 3 = 12 Marks)

V Write notes on **I** and **J**.

(2 x 4 = 8 Marks)

Practicals – 90 Marks
Record - 10 Marks

Total - 100 Marks

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(For the candidates admitted during the year 2018-2019 onwards)

SEMESTER –V

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 9-PLANT MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY
Teaching Hours- 6 Hrs/Week (90 Hrs/Semester) Course code: PB18/5C/MTE
Credits: 5 LTP: 4 2 0

Objectives:

To enable students to

- Have knowledge on the structure and reproduction of certain selected families
- Provide knowledge on the basics of Economic Botany.

UNIT - I

(25 Hrs)

Morphology – root system – modifications. Shoot system – modifications – (Aerial, sub-aerial and underground). Leaf-simple and compound- phyllotaxy, modifications, (phyllode, pitcher) tendrils, stipules. Inflorescences – definition and types – racemose, cymose, mixed and special types. Fruits - classification.

UNIT - II

(20 Hrs)

History of Angiosperm classification – Artificial, Natural and Phylogenetic system of classification. An outline of Bentham & Hooker system of classification, an overview of APG Classification. Herbarium technique – collection, pressing, drying, mounting and preservation of plant specimens. Botanical Survey of India. Botanical Nomenclature – rules, typification and author citation.

UNIT- III

(15 Hrs)

Study of the following families based on the Natural system and their economic importance: Annonaceae, Nymphaeaceae, Capparidaceae, Rutaceae, Caesalpinaceae, Cucurbitaceae, Asteraceae, Apocynaceae.

UNIT – IV

(15 Hrs)

Study of the following families based on the Natural system and their economic importance: Asclepiadaceae, Solanaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Liliaceae and Poaceae.

UNIT – V

(15 Hrs)

Source, cultivation method (brief) and the extraction/processing of the economically important products of the following – cereal (Rice), Sugar (Sugarcane), Fibre (Cotton), Beverage (Tea), Oil (Groundnut).

Recommended books:

- 1.Chopra.G.L., Angiosperms. Nagin and Co.1984
- 2.Pandey, B.P. Taxonomy of Angiosperms, K.Nath and Co., 2001.
- 3.Singh.V.P., Pande, P.C., Jain. D.K. A text book of botany-Angiosperms,
- 4.Dutta, S.E. Systematic Botany, Wiley Eastern, 2009
- 5.Sambamurthy et al., Economic Botany of crop plants, 1989.
- 6.Beryl and Molly. Economic Botany, McGraw Hill Publishing Co., 2000.
- 7.Hill A.W. Economic Botany. 1951.
- 8.Pandey. B. P. Economic Botany, Chand and Co. Pvt. Ltd, 1999.
- 9.Ashok Bendre and Ashok Kumar. Economic Botany. Rastogi Publications. 2009.
10. Govindprakash and Sharma S.K. Introductory Economic Botany, 1979
11. Gurucharan Singh. Plant Systematics: An integrated approach. 1999.

Reference Books:

1. Lawrence.G.H.M, 1985 – An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Porter.C.L., 1982 – Taxonomy of Flowering Plants, Eurasia Publications House, New Delhi
3. Rendle.A.B., 1980 – The Classification of Flowering Plants (Vol. I & II), Vikas Students Education.
4. Clive AS.1989. Plant Taxonomy and Biosystematics, Chapman and Hall Inc. New York.
5. Harborne, JB & Turner, BL. 1984. Plant Chemosystematics, Acad. Press, London.
6. Lawrence, GH. 1955. Taxonomy of Vascular Plants, MacMillan Co., USA.
7. Samuel, BJ & Arlene, EL. 1987. Plant Systematics, Mc Graw Hill Inc. New York
8. Bhatnagar, S.P. and Moitra, A. 1996. Gymnosperms. New Age International Pvt. Ltd., New Delhi
9. Grant, W.E. 1984. Plant Biosystematics. Academic Press London.
10. Harrison, H.J. 1971. New Concepts in Flowering Plant Taxonomy. Rieman Educational Book Ltd., London.
11. Heslop-Harrison, J. 1967. Plant Taxonomy -English Language Book Soc. & Edward Arnold Pub. Ltd. U.K.
12. Heywood, V.H. and Moore, D.M. 1984. Current Concepts in Plant Taxonomy. Academic Press, London.
13. Jones, A.D. and Wilbins, A.D. 1971. Variations and Adaptations in Plant Species. Hiemand & Co. Educational Books Ltd. London.
14. Jones, S.B. Jr. and Luchsinger, A.E. 1986. Plant Systematics (2nd edition). McGraw-Hill Book Co., New York.
15. Nordenstam, B., EI Gazaly, G. and Kassas, M. 2000 Plant Systematics for 21st Century. Portlant Press Ltd., London.
16. Radford, A.E. 1986. Fundamentals of Plant Systematics. Harper & Row Publications, USA.
17. Singh, H. 1978, Embryology of Gymnosperms, Encyclopaedia of Plant Anatomy X. Gebruder Bortraeger, Berlin.

18. Solbrig, O.T. 1970. Principles and Methods of Plant Biosystematics. The MacMillan Co-collier-MacMillan Ltd., London.
19. Solbrig, O.T. and Solbrig, D.J. 1979. Population Biology and Evolution, Addison-Wesley Publishing Co. Ind USA.
20. Stebbings, G.L. 1974. Flowering Plant - Evolution Above Species Level. Edward Arnold Ltd. London.
21. Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd edition) Edward Arnold Ltd., London.
22. Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia University Press, New York.
23. Woodland, D.W. 1991. Contemporary Plant Systematics. Prentice Hall. New Jersey.

25. Hutchinson, J. The families of Flowering Plants. Vol I & II 3rd edition , Oxford University Press, UK, 1973.

26. Benson, L. Plant Taxonomy-Methods and Principles.
27. Jeffrey, C. An introduction to Plant Taxonomy. J&A Churchill Ltd., London.
28. Sivarajan, V.V. An Introduction to Principles of Plant Taxonomy. Oxford IBH, New Delhi, 1989.

29. Takhtajan, A. Flowering Plants: Origin and Dispersal, Oliver and Boyd Ltd, Edinburgh. 1969

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B.Sc. DEGREE EXAMINATION

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 9-PLANT MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

Course Code:PB18/5C/MTE

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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SEMESTER –V

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE11- PLANT ANATOMY AND EMBRYOLOGY

Teaching Hours- 6 Hrs/Week (90 Hrs/Semester)

Course code: PB18/5C/AAE

Credits: 5 LTP: 4 2 0

Objectives: To enable students to

- Have knowledge on the structure and anatomy of plants cells and plant parts.
- Provide knowledge on the embryology of plants.

UNIT – I

(20 Hrs)

Meristems - Classification, vegetative shoot apex and root apex, theories of shoot apex and root apex organization. Tissues - Definition, types - Simple permanent - Parenchyma, Collenchyma and Sclerenchyma (fibers and sclereids). Complex permanent tissues - xylem and phloem.

UNIT – II

(20 Hrs)

Tissue systems - Dermal tissue system - fundamental or ground tissue system, Vascular tissue system and types of vascular bundles - Vascular cambium. Stem - primary anatomical structure of dicotyledonous and monocotyledonous stem. Secondary growth in dicotyledonous stems. Anomalous secondary growth in *Nyctanthes*, *Boerhaavia* and *Dracaena*.

UNIT – III

(15 Hrs)

Root - primary anatomical structure of dicotyledonous and monocotyledonous roots. Secondary growth in dicot roots and stem. Leaf - anatomy of dicot and monocot leaf. Leaf abscission. Nodal Anatomy. Stomatal types. Kranz anatomy, Laticifers. Ergastic substances.

UNIT – IV

(15 Hrs)

Microsporangium, microsporogenesis and development of male gametophyte. Megasporangium (ovule) different types, megasporogenesis, development of female gametophyte - Monosporic *Polygonum* and *Oenothera*, Bisporic - *Allium*, Tetrasporic - *Penaea* and *Peperomia*.

UNIT – V

(20 Hrs)

Double fertilization and triple fusion. Heterofertilization. Development of dicot embryo - *Capsella*. Development of monocot embryo - *Najas*. Endosperm and its types - free nuclear, cellular, helobial. Endosperm haustoria. Apomixis – definition and types. Polyembryony - types Parthenogenesis and Parthenocarpy.

Recommended books:

1. Pandey.B.P., Plant Anatomy. S.Chand & Co., Pvt. Ltd. New Delhi. 2002.
2. Tayal, M.S. –Plant Anatomy.
3. Singh, Pande, P.C., Jain. D.K. –Anatomy of Seed Plants.
4. Pandey B.P. Plant Anatomy. S. Chand and Co. Pvt Ltd. New Delhi, 200.
5. Bhojwani.S.S. and Bhatnagar . S.P., The Embryology Of Angiosperms, Vikas Publications House Private Ltd., 2015.
6. Bhojwani.S.S. and Bhatnagar . S.P. The Embryology Of Angiosperms, Vikas Publications House Private Ltd., 1981.
7. Bhojwani.S.S. and Bhatnagar . S.P., Dantu P.K. The Embryology Of Angiosperms, Vikas Publications House Private Ltd., 2015.

Reference Books:

1. Esau.K. (1985) – Anatomy of Seed Plants –John Willey
2. Cutter.E.G (1989) – Plant Anatomy – Part I – Addison – Wesley Publishing Co..
3. Vashista.P.C. (1988) – A Text Book of Plant Anatomy. S.Nagin & Co.
4. Maheswari.P. (1991) – An Introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co. Ltd.,
5. Swamy B.G.L. and Krishnamoorthy. K.V. (1990) – From Flower to Fruits, Tata McGraw Hill Publishing Co. Ltd.
6. Bhojwani S.S. and Bhatnagar.S.P. (1987) – Embryology of Angiosperms, Vikas Publishing House Pvt. Ltd.,
7. Bhojwani, S.S. & Bhatnagar, SP. 1994. Embryology of Angiosperms, Vikas
8. Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Deihi.
9. Singh V. Pande, P.C. Jain D.K. Anatomy of seed plants Rastogi Publications, 1998.
10. Burgess, J. 1985. An Introduction to Plant Cell Development. Cambridge University Press, Cambridge.
11. Fageri, K. and Van der Pijl, L. 1979. The Principle of Pollination Ecology. Pergamon Press, Oxford.
12. Fahn, A. 1982. Plant Anatomy. (3rd edition). Pergamon Press, Oxford.
13. Fosker, D.E. 1994. Plant Growth and Development. A Molecular Approach. Academic Press, San Diego.
14. Howell, S.H. 1998. Molecular Genetics of Plant Development. Cambridge University press, Cambridge.
15. Leins, P., TucKer, S.C. and Endress, P.K. 1988. Aspects of Floral Development, J. Cramer, Germany.
16. Lyndon, R.F. 1990. Plant Development. The Cellular Basis, Unnin Byman, London.
17. Murphy, T.M. and Thompson, W.E, 1988. Molecular Plant Development. Prentice Hall, New Jersey.
18. Proctor, M. and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
19. Raghavan, V. 1997. Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.
20. Raghavan, V. 1999. Developmental Biology of Flowering Plants. Springer-Verlag, New York.

21. Raven, P.H., Evert, R.F. and Eichhorn, S. 1992. *Biology of Plants* (5th edition). Worth, New York.
22. Steeves, T.A. and Sussex, I.M., 1989. *Patterns in Plant Development* (2nd edition). Cambridge University Press, Cambridge.
23. Waisel, Y., Eshel, A. and Kafkaki, U. (eds.). 1996. *Plant Roots : The Hidden Hall* (2nd edition). Marcel Dekker, New York.
24. Shivanna, K.R. and Sawhney, V.K. (eds.) 1997. *Pollen Biotechnology for Crop Production and Improvement*. Cambridge University Press, Cambridge.
25. Shivanna, K.R. and Rangaswamy, N.S. 1992. *Pollen Biology : A Laboratory Manual*. Springer-Verlag. Berlin.
26. Shivanna, K.R. and Johri, B.M. 1995. *The Angiosperm Pollen : Structure and Function*. Wiley Eastern Ltd.. New York.
27. Eames J.A., MacDaniels, H. and Lawrence. *An introduction to Plant Anatomy*. McGraw Hill, 1978.

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III B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 11- PLANT ANATOMY AND EMBRYOLOGY

Course Code: PB18/5C/AAE

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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SEMESTER –V

III B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: Core 12- CELL BIOLOGY, GENETICS AND PLANT BREEDING

Teaching Hours- 6 Hrs/Week (90Hrs/Semester) Course code: PB18/5C/CGP

Credits: 5 LTP: 4 2 0

Objectives:To enable students to

- Understand the organization of the cell and function of organelles.
- Know the principles of heredity.
- Understand the mechanism of gene expression and its regulation
- Understand the process of crop improvement.

UNIT- I

(10 Hrs)

Introduction – definition, scope, cell organization – Prokaryotic and Eukaryotic. Cell wall-structure and function. Plasma membrane, occurrence, structure (Fluid mosaic model), chemistry, function and origin. Cell cycle, cell division-mitosis and meiosis and cytokinesis.

UNIT- II

(30 Hrs)

Occurrence, structure, function and origin of endoplasmic reticulum, golgi bodies, lysosomes, ribosomes, peroxisomes, mitochondria and chloroplast. Semi genetic autonomy of Mitochondrial and plastid DNA. Nucleus, nuclear membrane, chromosomes, euchromatin, heterochromatin, giant chromosomes – polytene and lampbrush.

UNIT- III

(20 Hrs)

Mendelian genetics – monohybrid, dihybrid crosses. Laws of Mendel, Reciprocal cross - Back cross and Test cross. Incomplete dominance - *Mirabilis jalapa*. Interaction of factors – Complementary genes, epistasis (dominant and recessive), duplicate genes. Multiple alleles. ABO Blood grouping in Human. Chromosome theory of linkage, crossing over, recombinations and mapping of genes on chromosomes. Sex determination in plants.

UNIT- IV

(10 Hrs)

Sex linked inheritance – Haemophilia and colour blindness. Chromosome number and structure- Polyploid origin, types and significance. Mutation-types and significance. Extra nuclear inheritance and its significance - Male sterility in corn ,Maternal inheritance – Plastid Inheritance in *Mirabilis jalapa*. Genetics of *Neurospora*. Population genetics – Hardy – Weinberg principle.

UNIT- V

(20 Hrs)

Principles involved in plant breeding and its importance in green revolution with reference to wheat, rice, sugarcane, maize and cotton. Methods of crop improvement : selection (pure line, mass and clonal), hybridization, introduction and acclimatization. Heterosis – causes and effects. Polyploidy in plant breeding. Breeding for disease resistance. Improved seed production and seed testing techniques.

Recommended books:

1. Roy.S.C. & K. De. Cell Biology New Central Book Agency (P) Ltd Calcutta, 2011.
2. Verma P.S & V.K. Agarwal, Cytology, S. Chand & Co New Delhi, 2006.
3. Verma P.S.A and V.K. Agarwal. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Co. Pvt. Ltd., 2005.
4. Chaudhry R.K. A text Book of Plant Breeding,
5. Rangaswami.R.A. A Text book of Agricultural Statistics., 1995.
6. Shukla, R.S. and Chandel P.S. Cytogenetics, Evolution and Plant Breeding , 2004.

Reference Books:

1. Verma, P.S. & V.K. Agarwal, 2003, Genetics. S. Chand & Co.Ltd., New Delhi-55.
Freifelder, D.1987. Essentials of Molecular Biology, Jones & Bartlett, Boston.
2. Mithra Sandhya-Genetics-Blueprint of life, 1994, Tata McGraw hill Publications.
3. Gardner, E.J., Simmons, M.J. & Snustad, D. 2005. Principles of Genetics, John Wiley Sons Inc., 8th Edn., New York.
4. Sinnott, E.W., Dunn, L.L. & Dobzhansky, T. 1997. Principles of Genetics, Tata Mc Graw Hill Publishing Co., New Delhi.
5. Brown W.V. and Bertke.E.M., 1974, A text book of Cytology C.V.Mosley Co.,St. Louis.
6. Cohn.N.S., 1979, Elements of Cytology, Freeman Book Co.,
7. De Robritis E.D.P. and DeRobritis. E.M.F.jr 1987 – Cell and Molecular biology Lea and Febiger..
8. Freifelder.D., Essentials of Molecular Biology, Narosa. Publication, 2008.
9. Watson. J.D., et.al Molecular biology of the Gene The Benjamin/ Cummings,2013
10. De Robertis & De Robertis. 1990. Cell and Molecular Biology, Saunders College, Philadelphia, USA.
11. Glick, B.R. and Thompson, J.E. 1993. Methods in Plant Molecular, Biology and Biotechnology. CRC Press, Boca Raton, Florida.
12. Hackett, P.B., Fuchs, J.A. and Messing, J.W. 1988. An Introduction to Recombinant. DNA Techniques : Basic Experiments in Gene Manipulation. The Benjamin/Cummings Publishing Co. Inc., Menlo Park, California.

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III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 12-CELL BIOLOGY, GENETICS AND PLANT BREEDING

Course Code: PB18/5C/CGP

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit

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SEMESTER –V

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY
(For the candidates admitted during the year 2018-2019 onwards)

Title of the Paper: ELECTIVE 1-BIOINSTRUMENTATION AND BIOSTATISTICS

Teaching Hours- 5 Hrs/Week (75Hrs/ week)

Course code: PB18/5E/BIS

Credits: 5 LTP: 4 1 0

Objectives:

To enable students to

- Get a good exposure to the basic knowledge of handling the instruments and to learn the special techniques necessary for their course.
- Give a basic knowledge of biostatistics.

UNIT - I (Microscopy)

(20 Hrs)

Principle, construction, operation and uses of bright field microscope, dark field microscope, phase-contrast microscope and fluorescent microscope, transmission electron microscope (TEM) and scanning electron microscope (SEM). Microscopic measurements – micrometry, hemocytometer. Microscopy drawing: Camera Lucida

UNIT - II (Chromatographic Principles and Applications)

(20 Hrs)

Paper chromatography, Thin Layer Chromatography (TLC), Column chromatography, Gas chromatography – Mass spectrometry (GCMS – outline only), High Performance Liquid Chromatography (HPLC)

UNIT - III (Electrophoresis and pH Meter)

(10 Hrs)

Gel Electrophoresis -Agarose gel electrophoresis , Polyacrylamide gel electrophoresis (PAGE) , Basic principle, construction, operation of pH meter.

UNIT - IV (Spectrophotometry and Centrifugation Technique)

(15 Hrs)

Principle and law of absorption, construction, operation and uses of colorimeter and UV – Visible spectrophotometer, Principles, methods of centrifugation – Analytical and preparative, types of centrifuge and applications

UNIT – V (Biostatistics)

(10 Hrs)

Sampling methods, measures of central tendency – Mean – Median and Mode – Graphical representation of data – Histogram – frequency curve – Bar diagram – Standard deviation – Standard error – Chi - square test and goodness of fit – t – test.

Recommended books :

- 1.Veerakumari, Bioinstrumentation, MYP Publishers, 2006.
- 2.Keith Wilson & H.Goulding. A Biologist 's guide to Principles and techniques of Practical Bio-Chemistry.Cambridge University Press, 1993.
- 3.Raman, N. Phytochemical Techniques. New India Publishing Agency, New Delhi, 2006.
- 4.Rangaswami.R.A. A Text book of Agricultural Statistics., 2010

Reference Books:

1. Sharma VK (1991). Techniques in microscopy and cell biology, Tata McGraw Hill, New Delhi.
2. N. Gurumani, Research Methodology, MJP Publishers, 2011.
3. Sawhney SK and Randhir Singh (2000). Introductory practical biochemistry, Narosa Publishing House.
4. Asokan P (2001). Basics of analytical biochemistry. Chinna Publications.
5. Bajpai PK (2006) Biological instrumentation and methodology. S. Chand & Company, New Delhi.
6. Rana SVS (2009). Biotechniques: Theory and Practice. Rastogi Publications.
7. Veerakumari L (2009). Bioinstrumentation. MJP Publications.

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III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ELECTIVE 1-BIOINSTRUMENTATION AND BIOSTATISTICS

Course Code: PB18/5E/BIS

Max. Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). **Any three questions from Bioinstrumentation and one from Biostatistics** from the prescribed syllabus not more than one from each unit

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY
(For the candidates admitted during the year 2018-2019 onwards)

Title of the Paper: CORE 14-PLANT ECOLOGY AND PHYTOGEOGRAPHY

Teaching Hours- 4 Hrs/Week (60 Hrs / Semester)

Course code: PB18/6C/PEP

Credits: 4 LTP: 3 1 0

Objective:

To enable the students to

- Provide information on the major plant communities and Bio-diversity of India
- Understand the importance of the management of conservation of natural resources for a sustainable development

UNIT - I

(10 Hrs)

Biotic and abiotic factors and their influence on vegetation – a brief account of microbes, plants, animals, soil, wind, light, temperature, rain fall and fire. Plant succession – primary and secondary – xerosere, hydrosere. Ecological adaptation in xerophytes, hydrophytes and epiphytes.

UNIT – II

(10 Hrs)

Ecosystem – concept processes and components. Food chain, food web, energy flow in ecosystem. Types of Ecosystems : Fresh water (Pond), Coastal (estuary) and Terrestrial (grassland). Ecological pyramids and nutrient cycling (Carbon, Phosphorus and Sulphur).

UNIT – III

(20 Hrs)

Biodiversity : Ecological species and genetic species diversity, Raunkiaer's life forms, Concept :- classical and modern. Inter and intra specific species diversity. Allopatric and sympatric speciation. Endemism and Hotspots. Natural resources and its conservation (*In situ* and *ex-situ*). A brief account of national and international agencies of conservation. Afforestation.

UNIT- IV

(10 Hrs)

Pollution – Air, Water, soil-causes and consequences. Types of pollution: Primary and Secondary. Green house effect, Global warming, ozone depletion, acid rain and their impacts. Remedial measures – Green building.

UNIT – V

(10 Hrs)

Phytogeography : principles - vegetation types of India – tropical evergreen forest, deciduous forest, mangrove vegetation and scrub jungle with reference to Tamil Nadu.

Recommended books:

1. Krishnamurthy. K.V., An advanced Text book on Biodiversity. Principles and practice. Oxford and IBH publishing Co. Pvt. Ltd., 2008.
2. Shukla, R.S. and Chandel, P.S. Ecology and Utility of Plants, S. Chand and Co. Pvt. Ltd. 2008.
3. Shrivatsava. M.B. Introduction to forestry, 1998
4. Sharma .P.D. Ecology and Environment, Rastogi Publications, 2005.
5. Grand W. Sharpe, Clare W. Hendee, Wenonah F. Sharpe, Introduction to forestry, McGraw-Hill Book Company, 1986.
6. Tejwani, K.G, Agroforestry in India, Oxford and IBH Publishing Co. Pvt. Ltd, 1994.
7. Dadhich, L.K. and Sharma, A.P. Biodiversity- strategies for conservation. APH publishing Corporation, New Delhi, 2002.

Reference Books :

1. Atlas. R.M. and Bartha.R. (1987) – Microbial Ecology : Fundamentals and applications. The Benjamin/ Cummings Publishing Co. Inc.
2. Colinvaux.P. (1986) – Ecology, John Wiley and Sons.
3. Kumar.H.D. (1994) – Modern concepts of Ecology, Vikas Publishing House Pvt. Ltd.,
4. Krishna Iyer.V.R (1992) Environmental protection and legal defence. Sterling Publishers Pvt. Ltd.,
5. Mabberley.D.J. (1983) – Tropical Rain forest \ecology, Blackie and Son Ltd.,
6. Odum.E.P. (1983) – Basic Ecology, Holt-Saunders International Editions.
7. Smith.W.H. (1981) – Air pollution and forest : Interactions between air contaminants and forest ecosystems.
8. Vickery.M.L. (1984) – Ecology of Tropical plants, John Wiley and Sons.
9. Melchias, G., 2001. Biodiversity and Conservation, Science Publishers Inc. USA.
10. Asthana, DK & Meera Asthana. 2006. A text book of Environmental studies. S.Chand & Company Ltd. New Delhi.
11. Brian Groombridge. 1992. Global Biodiversity, Chapman and Hall, UK.
12. IUCN, 1985. The World Conservation Strategy, IUCN, Switzerland.
13. Odum, EP. Fundamentals of Ecology, 3rd edn, Cengage, 2004
14. Antony Joseph Raj and S.B. Lal- Forestry, Principles and Applications, Scientific Publishers, 2012.
15. Simmons et al., 1980, Conservation of Threatened Plants, NATO Scientific affairs, New York.

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III B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 14-PLANT ECOLOGY AND PHYTOGEOGRAPHY

Course code: PB18/6C/PEP

Max Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 15-MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

Teaching Hours- 4 Hrs/Week (60 Hrs/ Semester)

Course code: PB18/6C/MPB

Credits: 4 LTP: 3 1 0

Objective: To enable students to

- Provide knowledge on the basics and recent trends in plant biotechnology.
- Understand the molecular aspects of genetic material.

UNIT – I

(10 Hrs)

Nature and function of genetic materials Nucleic acid – base pairing – Chargaff's rule, DNA – structure. Types of DNA, denaturation - renaturation. DNA replication in prokaryotes. RNA structure and types. DNA repair mechanism – mismatch repair- thymidine dimer repair- light induced and light independent repair.

UNIT – II

(10 Hrs)

Transcription – Enzymology – RNA polymerase – classes of RNA molecules – transcription in prokaryotes. Protein synthesis – Genetic code – characters – codons and anticodons. Gene regulation in Prokaryotes – lac operon.

UNIT - III

(10 Hrs)

Vectors- plasmid, bacteriophage, viral vectors, cosmids, Restriction enzymes. Recombinant DNA technology, gene transfer – indirect method, *Agrobacterium* mediated gene transfer. Direct method – Biolistic method. Development of transgenic plants with reference to insect resistance, edible vaccine. GM crops - Pros and cons.

UNIT – IV

(20 Hrs)

Biotechnology – definition, history and scope Application of plant biotechnology in various fields. Agriculture - Biofertilizers, Biopesticides. Medicine – Antibiotics (Penicillin), recombinant vaccines, insulin and interferons. Environment – Bioremediation and Biofuel. Industry – Ethanol production (yeast), Citric acid production (*Aspergillus niger*) & Proteases production (*Bacillus sp.*).

UNIT – V

(10 Hrs)

Introduction – plant tissue culture, concept of totipotency, aseptic techniques in plant tissue culture. Media preparation, callus culture, micropropagation, anther culture and embryo culture. Application of plant tissue culture in Agriculture, Horticulture and Forestry. Synthetic seed.

Recommended Books:

1. Verma P.S.A and V.K. Agarwal. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Co. Pvt. Ltd., 2004.
2. David Friefielder. Molecular Biology. Narosa Publishers House, 1987.
3. Dubey R.C. Advanced biotechnology, S.Chand & Co., Ltd., New Delhi, 2014.
4. Ignacimuthu S. Basic Bio-technology, Tata Mc Graw Hill, Publishing Co., Ltd., New Delhi, 2007.
6. Kumar H.D. A text book of Biotechnology, East West Affiliated Press Ltd., New Delhi, 1993.

Reference Books:

1. Bernard R Glick & Jack J Pasternak. 2001. Molecular biotechnology-principles and applications of recombinant DNA, (2nd Edition), ASM Press, Washington, D.C.
2. Jogdand, SN. 2016. Gene biotechnology, Himalaya Publishig House, New Delhi. Books for Reference
3. Ernst L. Winnaccker, 2002. From Genes to Clones-introduction to gene technology, VCR Pub., Weintein.
4. James D Watson et al., 1992. Recombinant DNA (2nd Edition), WH Freeman and Co., New York.
5. Maniatis & Sambrook. 2003. Molecular Cloning- A lab manual Vol.I, II & III, Coldspring Harbor Laboratory Press, New York.
6. Old, RW & Primrose, SB. 2001. Principles of Gene Manipulation-an introduction to genetic engineering, Black Well Science Ltd., New York.
7. Bajaj, Y.P.S. Plant, cell and organ culture. Springer – Verlag.
8. Bajaj, Y.P.S. (1987). Biotechnology in agriculture and forestry. Springer – Verlag
9. Halder, T. and Gadgil, V.N., 1981. Plant cell culture in crop improvement. Plenum, New York.
10. Neuman, K.H., Barz, W., and E.Reinhard, 1985. Primary and secondary metabolism of plant cell cultures – Springer – Verlag, Berlin.
11. Mantell, S.H., and Hedsmith, 1983. Plant biotechnology, SEB Seminar series 18, Cambridge University Press, Cambridge.
12. Barz, W., Reinhard, E., and Zenk, M.H., 1977. Plant tissue culture and its biotechnology application – Springer – Verlag, Berlin.
13. Mizrahi, A., (1988). Biotechnology in agriculture, advances in biotechnological processes, Vol. 9, Alen R. Liss Loc; New York.
14. Hu, C.Y. and P.J.Wang, 1984. Hand book of plant cell culture Vol.1. Mac millan, New York.
15. Reinert, J. and Y.P.S.Bajaj, 1977. Applied and fundamental aspects of plant cell – tissue culture and organ culture – Springer – Verlag, Heidelberg, Berlin.
16. Gleba, Y.Y. and Sytnik, K.M. (1984). Genetic engineering in higher plants – Springer – Verlag, Heidelberg.
17. Bhajwani. S., and Razdan, 1984. Plant tissue culture. Theory and practice.

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 15- MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

Course code: PB18/6C/MPB

Max Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: CORE 16- PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Teaching Hours- 4 Hrs/Week (60 Hrs/ week)

Course code: PB18/6C/PPB

Credits: 4 LTP: 3 1 0

Objective : To enable students to

- Understand the organization of the cell and function of organelles.
- Know the physicochemical organization and the functional aspects of plants.
- To facilitate the learners to understand effectively the concepts on photomorphogenesis.
- The structure and properties of biomolecules.

UNIT – I

(10 Hrs)

Water relations – Imbibition, diffusion, permeability, osmosis, water potential and its components. Absorption of water, apoplast and symplast, mechanism – passive and active. Transpiration – types and factors affecting transpiration and significance. Opening and closing of stomata- mechanisms. Guttation.

UNIT – II

(15 Hrs)

Photosynthesis :- Radiant energy, absorption spectrum and action spectrum of chlorophyll molecules. Interaction between photosynthetic pigments and radiant energy. Red drop phenomenon, Emerson's enhancement effect, pigment systems I and II. Electron transport system in the chloroplast (Z scheme), cyclic and non-cyclic photo phosphorylation. Calvin cycle, Hatch and Slack pathway and photorespiration- mechanism and significance. Factors affecting photosynthesis

UNIT – III

(10 Hrs)

Respiration and Nitrogen metabolism:-

Respiration Aerobic, Anaerobic – Glycolysis, Krebs's Cycle, electron transport system, oxidative phosphorylation, respiratory quotient, factors affecting respiration.

Nitrogen metabolism

Importance of nitrogen in plant life, conversion of nitrate to ammonia by plants, biological nitrogen fixation – nitrogen fixing organisms, legume – *Rhizobium* symbiosis.

UNIT – IV

(10 Hrs)

Growth and stress physiology

Growth – plant growth regulators (auxins, gibberellins, cytokinins, ethylene and abscisic acid) - Practical applications - Photomorphogenesis – photoperiodism – vernalization – dormancy-phytochromes.

Types of biological strain – water deficit and drought resistance – salt stress – temperature stress. Mechanism of salt and temperature stress tolerance.

UNIT – V

(15 Hrs)

Plant Biochemistry

Elementary concept of bioenergetics – entropy and free energy. Carbohydrates – classification, Enzyme – properties – classification – nomenclature of enzymes – mode of enzyme action – Lock and Key mechanism-Enzyme kinetics-Michaelis Menten hypothesis-enzyme inhibition-competitive, non-competitive and allosteric – factors affecting enzyme action.

Recommended books:

1. Jain. V. K. Fundamentals of Plant Physiology. S. Chand and Co. Pvt. Ltd. New Delhi, 2004.
2. Devlin O.P. Plant Physiology ,Affiliated East West Press Pvt.Ltd, 1974.
3. Jain V.K. Fundamentals of plant physiology, Chand and Company Ltd., 1997.
4. J.L. Jain. Fundamentals of Biochemistry, Chand and Company Ltd., 2006.
5. Mukerjee S. and A. K. Ghosh. Plant Physiology, New Central Book agency, 2009.

Reference Books :

1. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologists, Maryland, USA.
2. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. (Eds) 1997. Plant Metabolism (second edition). Longman Essex, England.
3. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
4. Hooykaas, P.J.J., Hall M.A. and Libbenga, K.R. (eds) 1999. Biochemistry and Molecular Biology of Plant Hormones, Elsevier, Amsterdam, The Netherlands.
5. Hopkins, W.G. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA, 2015
6. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (6th edition). W.H. Freeman and Company, New York, USA, 2007
7. Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones (second edition). Springer-Verlag, New York, USA.
8. Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology (second edition), Academic Press, San Diego, USA.
9. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4th edition). Wadsworth Publishing Co., California, USA.

10. Singhal, G.S., Renger, G., Sopory, S.K., Irrgang, K.D. and Govindjee 1999., Concepts in Photobiology : Photosynthesis and Photomorphogenesis. Narosa Publishing House, New Delhi.
11. Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
12. Thomas, B. and Vince-Prue, D. (1997) Photoperiodism in Plants (second edition). Academic Press, San Diego. USA.
13. Westhoff, P. (1998) Molecular Plant Development from Gene to Plant. Oxford University Press, Oxford, UK.
14. Jain, VK. 2006. Fundamentals of Plant Physiology, S.Chand&Company Ltd.,
15. Verma, SK. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi
16. Conn, E & Stumpf, PK. 1979. Outline of Biochemistry Wiley Eastern Ltd., New Delhi
17. Metz, ET. 1960. Elements of Biochemistry. V.F & S (P) Ltd., Bombay
18. Noggle and Fritz, 1976. Introductory Plant Physiology, Prentice Hall, New Delhi
19. Pandey, SN & Sinha, BK. 1989. Plant Physiology, Vikas Publishing House Ltd., New Delhi.

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B.Sc.DEGREE EXAMINATION

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: CORE 16- PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Course code: PB18/6C/PPB

Max Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: PRACTICAL PAPER III (Covering core 9, 11 and 12)

Teaching Hours- 7 Hrs/Week

Course code: PB18/6C/PR3

Credits: 3 LTP: 0 0 7

Plant Morphology, Taxonomy and Economic Botany

- Morphology of leaves, stem, root, and modification, types of inflorescence.
- Plants of local flora included under theory syllabus and family identification and derivation based on reasoning.
- Dissection, identification, observation and sketching the floral parts of the plants belonging to the families included in the syllabus.
- Twenty (20) Herbarium sheets, field note book and bonafide record to be submitted.
- Economic uses of plants and plant parts included under theory syllabus.
- Field trips to places for observation, study and collection of plants prescribed in the syllabus for 2 to 5 days under the guidance of faculties.

Anatomy

Study of simple and complex tissues by maceration. Study of internal structure of primary (young) and secondary (old) stems. Internal structure of Dicot and monocot stem. Anomalous secondary growth in the stems of *Boerhaavia*, *Nyctanthes* and *Dracaena*. Anatomy of aerial roots (monocot and dicot) . T.S. of dicot and monocot leaves. Stomatal types. Nodal anatomy.

Embryology

T.S. of (young and mature) anther (section).

Observation of pollinia (slide only).

Types of ovules.

Types of Endosperm - Nuclear, cellular and helobial.

Dissection and display of any two stages of embryo in *Tridax*.

Cell biology

Squash technique

Ultra structure of plant cell and cell organelles with the help of ultra micrographs

Ergastic substances – starch grains, aleurone grains, crystals – cystolith, raphide and druse

Genetics

Genetic problems –monohybrid cross, dihybrid cross , test cross, incomplete dominance and allelic interaction

Gene mapping – 3 point test cross

Multiple alleles problems

Plant Breeding

Hybridization technique – Bagging and emasculation

To test the viability of seeds using Tetrazolium chloride.(Demonstration)

Genetic models of Heterosis

Phenotype of Heterosis (Maize)

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-PRACTICAL

Title of the Paper: CORE PRACTICAL III (COVERING PAPERS – CORE 9, 11 &12)

Course Code PB18/6C/PR3

Max marks : 100

Time : 3 Hrs

- I Cut a transverse section of **A** and **B**. Stain and mount in glycerine . Identify giving reasons. Draw diagrams. Leave the slides for valuation. **(2 x7 = 14 Marks)**
- II Derive the family of the given plant **C** and **D** based on the diagnostic features (only up to family level). **(2 x 3 = 6 Marks)**
- III Mount the floral parts of **E**. **(5 Marks)**
- IV Identify the family and the binomial name of **F** and **G**. Describe it in technical terms. Draw labeled diagrams of the L.S. of flower, T.S. of ovary, floral diagram and write the floral formula. **(2 x 5 = 10 Marks)**
- IV Mount any one stage of the embryo **H**. Draw neat labeled diagram and submit the slide for Valuation. **(4 Marks)**
- V Make acetocarmine preparation of **I** showing any 2 dividing stages and draw diagrams and leave the slide for valuation.(Notes not necessary) **(6 Marks)**
- VI Solve the genetic problem **J**. **(5 Marks)**
- VII Construct a chromosome map **K** with the data provided. **(5 Marks)**
- VIII Identify the materials **L, M** and **N** and give their economic uses. **(3x3 = 9 Marks)**
- IX Write critical notes on **O, P, Q, R** and **S**. **(5 x 3 = 15 Marks)**

Herbarium – 10 Marks
Record - 10 Marks
Practical – 80 Marks

Total - 100 Marks

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: PRACTICAL PAPER IV(COVERING PAPERS – CORE 14,15 &16)

Teaching Hours- 7 Hrs/Week

Course code: PB18/6C/PR4

Credits: 3 LTP: 0 0 7

Plant Ecology and Phytogeography

1. Study of morphological and structural adaptations of locally available hydrophytes, mesophytes, halophytes and epiphytes and correlate to their particular habitats.

Hydrophyte : *Nymphaea, Hydrilla.* (Any one)

Xerophyte : *Nerium, Casuarina.* (Any one)

Mesophyte : *Tridax, Mango.*(Any one)

Halophyte : *Avicennia, Rhizophora.*(Any one)

2. Map of the phytogeographical regions of India.
3. Quadrature study – line transect.
4. Plan for a green building
5. Field trip to any one scrub jungle or wet land (Guindy National park / Nanmangalam Scrub jungle / Pallikaranai Marsh / Siruthavur Scrub / Vedanthangal Bird Sanctuary / Kelampakkam Marsh / Adyar Poonga).

Molecular Biology and Plant Biotechnology & Plant Physiology and Plant Biochemistry

Molecular Biology – Photographs

1. DNA Structure – Watson and Crick model
2. tRNA
3. DNA – Replication- Semi-conservative
4. DNA – Repair-Mismatch repair, Thymidine dimer repair- Photoreactivation
5. Genetic code

Plant Biotechnology - Demonstration

1. Sterilization techniques in plant tissue culture.
2. MS - Media preparation.
3. Explant sterilization, Callus induction.

Plant Physiology & Plant Biochemistry

1. Determination of OP by plasmolytic method.
2. Determination of DPD by gravimetric method.
3. Effect of chemicals on membrane permeability
4. Effect of temperature on membrane permeability.
5. Study of relative rates of transpiration in different plants.
6. Determination of ratio of water absorption and transpiration by weighing method
7. Separation of plant pigments by paper chromatography.
8. Study of rate of photosynthesis under different light intensities by using willmott's bubble counter
9. Study of rate of photosynthesis under different wavelengths (red & blue) of light.
10. Comparison of rate of respiration of different respiratory substrates.
11. Biochemical test for carbohydrates, proteins and lipids.

Demonstration – Experiments

1. Demonstration of Stomatal movement.
2. Induction of roots in leaves by auxins.
3. Measurement of pH of expressed cell sap and different soils using pH meter
4. Enzyme activity – catalase

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III B.SC. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-PRACTICAL

Title of the Paper: CORE PRACTICAL IV (COVERING PAPERS – CORE 14, 15 &16)

Course Code PB18/6C/PR4

Max marks : 100

Time : 3 Hrs

- I** Cut transverse section of **A** and **B**. Identify its habitat giving suitable reasons. Draw labeled diagrams and submit the slide for valuation. **(2x9 = 18 Marks)**
- II** Record the data and interpret quadrat **C**. **(12 Marks)**
- III** Write the protocol for **D**. **(10 marks)**
- IV** Outline the procedure, apparatus and materials required for investigating physiological problem **E** assigned. Set up the experiment. Tabulate the data observed and report the result. Leave the set up for valuation. **(15 Marks)**
- V** Draw and comment on the set up **F**. **(5 Marks)**
- VI** Write critical notes on **G, H, I and J**. **(4 x 5 = 20 Marks)**
- VII** Identify the compound **K** using a biochemical test. Write the procedure and give the result. **(5 Marks)**

Field Trip - 5 Marks

Record - 10 Marks

Practicals – 85 Marks

Total - 100 Marks

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: ELECTIVE II- HORTICULTURE AND MUSHROOM CULTIVATION

Teaching Hours- 5 Hrs/Week (75Hrs/Semester)

Course code: PB18/6E/HMC

Credits: 5 LTP: 4 1 0

Objective;

To enable students

-To have a Knowledge on Components of Landscaping and Gardening.

-Give knowledge on cultivation of mushroom and its nutritional values.

UNIT- I

(20 Hrs)

Brief history of horticulture and its importance. Classification of horticultural crops. Types of pots and containers , Pot mixtures and potting media for ornamentals . Use of manures and fertilizers in horticultural crop production . Irrigation of horticultural crops.

UNIT- II

(10 Hrs)

General account of Annuals, Biennials and Herbaceous perennials. Nursery structure – Green house. Hydroponics- soil less culture. Floriculture- Cut flowers- Rose, Carnation and Gladiolus-varieties, harvesting and storage. Flower arrangement –Types (Fresh and dry).

UNIT- III

(15 Hrs)

Horticultural crops protection – Biological method, cultural method, mechanical method and chemical method. Plant propagation - cutting, layering, grafting. Indoor gardening – Bonsai, Terrarium and Hanging pots. ornamental gardening – garden components. Landscaping – components and principles.

UNIT- IV

(15 Hrs)

Technology of horticultural crops - harvesting and handling and storage of fruits (general) Preservation of fruits – types – Jam, Jelly, Squash, Syrup, Pickle and Marmalades.

UNIT- V

(15 Hrs)

Prospects and scope of Mushroom cultivation . Cultivation - paddy straw - oyster mushroom. Nutritional value and control of pests and pathogens. Post harvesting techniques and storage methods of mushroom. Marketing.

Recommended Books:

1. Arora.J.S., Introductory Ornamental Horticulture, Kalyan Publishers, 6th edition, 2010.
2. Kumar . N. Introduction to Horticulture, Rohini Agencies, 1986.
3. Handbook of Mushroom Cultivation, 1999, TNAU publication.
4. Nita Bahl, Handbook on Mushroom 4th edition vijayprimlani for oxford & IBH publishing co., Pvt., Ltd., New Delhi. Dr.C. Sebastian Rajesekaran Reader in Botany Bishop Heber College, Trichy – 17, 2017.
5. Suman, 2005, Mushroom Cultivation Processing and Uses, M/s. IBD Publishers and Distributors, New Delhi.
6. Singh, 2005, Modern Mushroom Cultivation, International Book Distributors, Dehradun.

Reference Books:

1. H.T. Hartmann and D.E. Kester 2002. Plant propagation – principles and practices. Printice Hall.
2. T.K.Bose and Mitra and Sadhu, 1991. propagation of tropical and subtropical horticultural crops. Naya Prakash.
3. Bose, T.K., and Bhattacharjee, S.C., 1980. Orchids of India.
4. Mukherjee, S.K., 1983. Orchids ICAR, New Delhi.
5. Bhattacharjee, B.S., 1959. Rose growing in tropics. Thackarspink and Co., Calcutta.
6. Biswas, T.D., 1984. Rose growing – Principles and Practices – Assoc., Pub., Co., New Delhi.
7. Champneys, H.P., 1956. Pearsons encyclopedia of roses. Arthur Pearsons Ltd., New Delhi.
8. Larsen, R.A., 1981. Introduction to floriculture. Academic Press, New York.
9. Abraham, A. and Vatsala, P., 1981. Introduction to Orchids. Trop. Bot. Garden, Trivendrum.
10. Bose, T.K. and Yadav, L.P., 1989. Commercial flowers. Naya Prakash, Calcutta.
11. Chadha, K.L., 1986. Ornamental horticulture in India ICAR, Krishi Bhavan, New Delhi.
12. Trivedi, P.P., 1983. Home gardening, ICAR, New Delhi.
13. Bose, T.K., and Mukharjee, D., 1977. Gardening in India. Oxford & IBH Pub., Co., Calcutta.
14. Gopalswamy Iyyangar, 1970. Complete gardening in India, Kalyan Printers, Bangalore
15. Rangaswami, G. and Mahadevan, A. 1999. Diseases of Crop Plants in India (4th edition). Prentice Hall of India Pvt. Ltd., New Delhi.
16. Handbook of Edible Mushroom Today and Tomorrows printers and publishers.
17. Mushroom cultivation. Kapoor, J.N., KrishiBhavan, New Delhi.
18. Mushroom Production and Processing Technology. Pathak, V.N., Yadav, N. and Gaur, M., Agrobios (India), Jodhpur.
19. Diseases and pests of Mushroom. Sharma, V.P., 2006, M/S. IBD Publishers and Distributors, New Delhi.
20. Viswa nath Pathak, Nagendra Yadav, Maneesha Gaur. Mushroom Production and Processing Technology, agro botanical publishers, 1998.

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B. Sc. DEGREE EXAMINATION

SEMESTER – VI

III B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ELECTIVE II- HORTICULTURE AND MUSHROOM CULTIVATION

Course code: PB18/6E/HMC

Max Marks: 100

Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

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SEMESTER – VI

III B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the Paper: ELECTIVE III- HERBAL SCIENCE

Teaching Hours- 5 Hrs/Week ((75Hrs/Semester)

Course code: PB18/6E/HBS

Credits: 5 LTP: 4 1 0

Objective: To enable students to

- Understand the significance of medicinal herbs and their uses.

UNIT – I

(20 hrs)

Naturopathy - Historical perspective, Role of plants in Naturopathy.

Importance and usage of Herbal drugs in Indian system of Medicines viz, Siddha, Ayurveda, Homeopathy and Unani (General account)

Classification of crude drugs.

Study of crude drugs derived from

1. Root - *Withania somnifera*

2. Stem – *Acorus calamus*

3. Leaf – *Adathoda vasica*

4. Flower - *Syzygium aromaticum*

5. Fruit – *Terminalia chebula*

6. Seed – *Carum copticum*

7. Whole plant-*Phyllanthus amarus*

UNIT – II

(15 Hrs)

Herbal remedies for common ailments-Acne, common cold, cough and fever, dandruff, dental caris, dysentery and diarrhoea, head lice, sinusitis, sore throat. Medicinal uses and Health hazards of coffee and tea. Raw juice therapy.

UNIT – III

(10 Hrs)

Natural food for human welfare - Antioxidants, plant resources, importance, free radicals, Antiaging foods, Nutritional aspects of sprouts. Food and herbs to prevent and control diabetes, Carcinoma and Cardiac arrest.

UNIT – IV

(15 Hrs)

Pharmacognostic studies of herbal drugs and types of herbal preparations (Chooranam- Thirikadu, Thiripala, Leghiyem- Inji Leghiyem, Kudineer- Thiratchai kudineer, Nilavembu Kudineer, Thailam- Meni, Kaiyan and Cheeraka thailam). Drug adulteration. Fumigatories and Masticatories - Chemical constituents, medicinal uses and deleterious effect to human health: Tobacco, Areca nut, *Cannabis*, *Opium* and Cocaine.

UNIT – V

(15 Hrs)

Study of some common plants of medicinal value – Binomial, common name, and part used active principles and medicinal uses. *Acalypha indica*, *Androgaphis paniculata*, *Azadirachta indica*, *Catharanthus roseus*, *Boerhaavia diffusa*, *Syzygium cumini*.

Recommended Books:

1. Nadkarni K.M. Indian Materia Medica Vol. I and II. Popular Prakasham Pvt. Ltd. 2007.
2. IMCOPS: Formulary Of Siddha Medicine.
3. Murugesu Mudaliar, History of Siddha Medicine.

Reference Books:

1. Text book of Pharmacognosy, Wallis, T.E. 1999. CBS Publishers and Distributors, New Delhi.
2. Practical Pharmacognosy, Kokate. 2000. Vallabh, New Delhi.
3. Herbal cure for common diseases. Acharya Vipul Rao, 2000. Diamond books, Pvt. Ltd.
4. Indian medicinal plants used in Ayurvedic preparations, Dey. A.C. 1998. Bishen Singh Mahendra pal singh.
5. Herbal drug microscopy. Vasudevan, T.N. and Laddha, K.S. 2003. Yucca Pub. House.
6. Kokata, Purohit and Ghokale, 2007. Pharmacognosy, Nirali Prakasham Publishers.

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B. Sc. DEGREE EXAMINATION

III B. Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the Paper: ELECTIVE III- HERBAL SCIENCE
Course code: PB18/6E/HBS

Max Marks: 100
Time: 3 Hours

Draw diagrams wherever necessary

PART A (20 Marks)

Answer ALL the following questions (Two questions only from each unit- Q. No. 1-10) each not exceeding 50 words (2 x 10 = 20 Marks)

PART B (5 x 8 = 40 Marks)

Answer any FIVE questions. All question carry equal marks. Each answer should not exceed 300 words (Q. No. 11-18 - 8 questions). One question only from each unit, the remaining three questions from the bigger units covering all the five units.

PART C (2 x 20 = 40 Marks)

Answer any TWO of the following each not exceeding 1200 words. All questions carry equal marks. (Q.No. 19-22). Any four questions from the prescribed syllabus not more than one from each unit.

ETHIRAJ COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI – 600 008
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SEMESTER – I
I YEAR B. A/B. Sc. /B. Com
NON- MAJOR ELECTIVE

Title of the Paper: PART IV NURSERY AND LANDSCAPING

Teaching Hours- 2 Hrs/Week (30 Hrs/ Semester)

Course code: PB18/1N/NLS

Credits: 2 LTP: 2 0 0

Objective:

To enable the students to

- Have a knowledge on the components of landscaping and gardening.

UNIT - I

(5 Hrs)

Introduction, prospects and scope of Nursery and landscaping.

UNIT – II

(10 Hrs)

Methods of Propagation – cutting, layering, grafting, budding, Floriculture – Rose, Chrysanthemum, Jasmine – cultivation.

UNIT III :

(5 Hrs)

Gardening – formal garden, informal garden, vegetable garden, landscaped layout designing – formation and maintenance of lawn.

UNIT IV :

(5 Hrs)

Nursery structures – Green house – shade house, Mist chamber – topiary, Bonsai culture.

UNIT V :

(5 Hrs)

Manures, composting – vermicomposting.

Recommended Books:

1. Kumar N. Introduction to Horticulture, Raja Lakshimi Publication, Nagercoil, India.
2. Edmond Musser and Andres Fundamentals of Horticulture McGraw Hill Book Co.,
3. Amarnath V., 2006, Nursery and Lanscaping, M/s IBD Publishers, New Delhi.
4. Manibushari Rao K. Text Book of Horticulture, MacMillon India Ltd.

Reference Books:

1. Edmond Muser and Andres. Fundamentals of Horticulture, McGrawHill Book co.,
2. Gardener, Basic Horticulture Mac Millon N.
3. Lex Lauries and victor H. Rise, Floriculture Fundamentals and practices, McGrawhill publishers.
4. Mukherjee D. Gardening in India, Oxford IBH publishing co, New Delhi.
5. Randhawa, Ornamental Horticulture in India Today and Tomorrow Publishers, New Delhi.
6. Sandhu M.K., plant propogation, willey Easter Ltd., New Delhi.
7. Sundararajan, J.S., Muthuswamy J, shanmugavelu, K.G., and Balakrishnan R., A Guide to Horticulture, Thiruvankadam Printers, Coimbatore.

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SEMESTER – II

I YEAR B. A/B. Sc. /B. Com

NON- MAJOR ELECTIVE

Title of the Paper: PART IV- MUSHROOM CULTIVATION

Teaching Hours- 2 Hrs/Week (30 Hrs/Semester)

Course code: PB18/2N/MRC

Credits: 2 LTP: 2 0 0

Objective: To enable students to

- Give a knowledge on cultivation of mushroom and its nutritional values.

UNIT - I

(5 Hrs)

Introduction: Morphology, Types of Mushroom, identification of edible and poisonous mushroom, Nutritive values, lifecycle of common edible mushrooms.

UNIT – II

(5 Hrs)

Mushroom cultivation, prospects and scope of Mushroom cultivation in small scale Industry.

UNIT – III

(5 Hrs)

Life cycle of *Pleurotus* spp., *Agaricus* spp.,

UNIT - IV

(10 Hrs)

Spawn production, growth media, spawn running and harvesting of mushrooms and marketing.

UNIT – V

(5 Hrs)

Diseases and post harvest technology, Insect pests, nematodes, mites, viruses, fungal competitors and other important diseases.

Recommended Books

1. Handbook of Mushroom Cultivation, 1999, TNAU publication.
2. Nita Bahl, 2002, Handbook on Mushroom 4th edition vijayprimlani for oxford & IBH publishing co., Pvt., Ltd., New Delhi. Dr.C. Sebastian Rajesekaran Reader in Botany Bishop Heber College, Trichy – 17.
3. Suman, 2005, Mushroom Cultivation Processing and Uses, M/s. IBD Publishers and Distributors, New Delhi.
4. Sing, 2005, Modern Mushroom Cultivation, International Book Distributors, Dehradun.

Reference Books

1. Bahl, N., Handbook on Mushroom, Oxford and IBM, New Delhi.
2. Dey S.C., Mushroom growing, Agrobios (India), Jodhpur.
3. Handbook of Edible Mushroom Today and Tomorrows printers and publishers.
4. Kapoor J.N., Mushroom cultivation, Krishi Bhavan, New Delhi.
5. Manibushan Rao, K., Text Book of Horticulure, Mac Millan India Ltd.,
6. Parthiban, Malathi and Bala Mohan, Mushroom culture (Tamil).
7. Pathak, V.N., Yadav N. and Gaur, M., Mushroom production and processing Technology Agrobios (India), Jodhpur.
8. Sharma, O.P., Textbook of Fungi, Tata McGrawHill Publishing Co., New Delhi.
9. Sharma V.P., 2006, Diseases and Pests of Mushrooms, M/s. IBD Publishers and Distributors, New Delhi.

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SEMESTER IV
II B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

Title of the paper: ENVIRONMENTAL STUDIES

Teaching Hours: 2 Hrs/ Week (30 Hrs/Semester)

Course code: PB18/4/EVS

Credits: 2 LTP: 2 0 0

Objectives

To enable students to

Acquire basic knowledge about the environment

Understand the associated problems and create awareness on the threats posed to the environment and find possible solutions to conserve it.

UNIT –I

(10 Hrs)

Environmental studies – Definition , Scope and importance.

Pollution – Definition, causes and control measures of

Air pollution – climate change, Global warming, Acid rain, Ozone layer depletion.

Water pollution – Water conservation – rainwater harvesting and watershed management

Soil pollution

Noise pollution

(8 Hrs)

UNIT II

Natural Resources – Renewable and Non – renewable resources – importance and associated problems – forest, Water, Mineral, Food, energy and land resources. Role of an individual in conservation of natural resources.

Unit III

(3 Hrs)

Natural disasters and rehabilitation – earthquake, Cyclone, Flashfloods and Tsunami

(5 Hrs)

Unit IV

Biodiversity – Biological classification of India, Values, Hot spots, Threats to biodiversity, Conservation of Biodiversity –In– situ and Ex- Situ Types. Population – Growth and associated problems.

(4 Hrs)

Unit V

Environmental ethics – Issues and possible solutions.

Legal awareness – Environmental protection act – Issues involved in enforcement of environmental legislation.

Recommended books

Sharma.P.D., Environmental Microbiology, Narosa Publishing House Pvt.Ltd. New Delhi 2005.

Arul.P. A Textbook of Environmental Studies, 2004.

Shukla. R.S. and Chandel.P.S. , Plant Ecology, S. Chand and Co. Pvt. Ltd. 1990.

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B.Sc. DEGREE EXAMINATION

B.Sc. PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

QUESTION PAPER TEMPLATE-THEORY

Title of the paper: Environmental Studies/Non-major Elective

Max. Marks: 50

Course Code: PB18/4/EVS//PB18/1N/NLS//PB18/2N/MRC

Time: 2 Hrs

Answer any 10 questions from the following. Twelve questions should be given of which 10 should be answered. All questions carry equal marks. Five marks for each question and questions should cover all the units.