VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

ELAYAMPALAYAM, THIRUCHENGODE (Tk.), NAMAKKAL (Dt.) - 637 205

(Affiliated to Periyar University, Approved by AICTE & Re-Accredited with "A" by NAAC)

DEPARTMENT OF BOTANY

BACHELOR OF SCIENCE

SYLLABUS & REGULATIONS

CANDIDATES ADMITTED FROM 2017 -18 ONWARDS
UNDER AUTONOMOUS AND CBCS PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS

ANGAMMAL EDUCATIONAL TRUST

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COLLEGE OF ARTS AND SCIENCES FOR WOMEN

(AUTONOMOUS – 2017-2018)

ELAYAMPALAYAM, TIRUCHENGODE

Accredited By NAAC, ISO 9001:2008 Affiliated to Periyar University - Salem 11

B.Sc., Botany – Branch V

For Candidates Admitted from 2017 – 2018 Onwards Under CBCS Pattern

1. Scope of the Department

Botany is a classical science dealing with not merely the morphology of plants but also their functional aspects and economic importance. Further, the study helps us to understand the role of plants in maintaining the environment besides, saving as a renewable energy sources. Plants are most valuable in treating the ailments of mankind. It has several branches such as Plant Morphology, Taxonomy, Anatomy, Embryology, Plant Pathology, Physiology, Ecology, Plant Diversity, Ethnobotany, Genetics, Biotechnology, Plant Physiology, Biochemistry, Horticulture, Medicinal Plants, Organic Farming, etc., besides serving as the basis for several other biosciences. It is a basic science with several research disciplines like modern transgenic biology.

2. Objectives of the course

This course enables the students

- To gain knowledge of the importance of plants in sustaining life on earth.
- To acquire skills in drawing by actual observation at its original and natural condition.
- To know the nutritive value of food and maintain 'Health Care Problems'.
- To create awareness in understanding the extinction plants.
- To create awareness of natural resources and methods of conservation.
- To create environmental awareness to overcome pollution.
- To develop skills in students in growing various horticultural plants thereby to raise a nursery.
- To motivate self-employment by knowledging and practicing in the preparation of bio-fertilizers.
- 'Earn while learn' can be done with the acquirement of basic knowledge in growing some medicinal plants & mushrooms.
- To gain knowledge for exploration of new plants their unknown values and unknown values of known plants.

- To gain a knowledge for the techniques of producing desirable plants through the study of molecular biology and genetic engineering.
- The syllabus content is mainly revised based on the TRB Syllabus.

3. Conditions for Admission:

A candidate who has passed Higher Secondary Examination in academic or vocational stream with Botany under Higher Secondary Board of Examinations, Tamil Nadu or an examination accepted as equivalent there to or as per norms said by the Government of Tamil Nadu are permitted to appear and qualify for B.Sc., Degree examination of this university after a course of study of three academic years.

4. Duration of the Course:

The course for the degree of Bachelor of Science in Botany shall consist of three academic years divided into six semesters.

5. Course of Study:

The course of study shall comprise of instruction in the following subjects according to the syllabus and books prescribed from time to time.

Semester I

1. Foundation Tamil - I
2. Foundation English - I
3. Core Course I – Plant Diversity –I
4. Core Course II Practical I - Carried over to II Semester
5. First Allied Paper I - Zoology
6. First Allied II --Practical - Carried over to II Semester
7. Value Education - Yoga

Semester II

8. Foundation Tamil – II
9. Foundation English - II
10. Core Course III – Plant Diversity -II

14. Core Course II- Practical –I Comprising Core Course I & III
15. First Allied Paper II - Zoology

13. First Allied II Practical - Cont. from I Semester

14. Value Education – Environmental Studies.

Semester III

15. Foundation Tamil - III
16. Foundation English - III
17. Core Course IV – Mushroom Cultivation Technology
18. Core Course V - Practical II - Carried over to IV Semester
19. Second Allied Paper I - Chemistry
20. Second Allied II Practical - Chemistry
21. SBEC I – Economic Botany/Biodiversity Conservation
22. NMEC I - Sericulture

Semester IV

23. Foundation Tamil - IV
24. Foundation English - IV
25. Core Course VI - Anatomy, Embryology and Seed Science
26. Core Course V - Practical II. Comprising Core Course IV & VI.
27. Second Allied Paper II - Chemistry
28. Second Allied Practical II Chemistry. Cont. from III Semester
29. SBEC II – Fundamentals of Microbiology and Plant pathology/ Post Harvest Technology of Crops
30. NMEC II - Apiculture

Semester V

31. Core Course VII – Morphology and Taxonomy of Angiosperms.
32. Core Course VIII - Cell Biology and Genetics
33. Core Course IX – Plant Ecology, Phytogeography and Conservation Biology
34. Core Course X - Practical III.*
35. Core Course XI - Practical IV.*
36. Elective I - Plant Breeding and Evolution/ Intellectual Property Rights
37. SBEC III - Horticulture and Nursery Management/ Silviculture
38. SBEC IV - Forest Botany/Fundamentals of Computer Application

Semester VI

39. Core Course XII - Plant Physiology and Biochemistry
40. Core Course XIII – Group Project (Minor)

41. Core Course X - Practical III (For Core Course VII – Morphology and Taxonomy of Angiosperms, Core Course VIII - Cell Biology and Genetics and from V Semester)

42. Core Course XI - Practical IV (For Core Course XII - Plant Physiology and Biochemistry & Core Course IX - Plant Ecology, Phyto-geography and Conservation Biology)

43. Elective II – Ethnobotany, Medicinal Plants and their Utilization/ Analytical Techniques in Plant Science

44. Elective III - Plant Biotechnology, Microscopy and Micro-technique/ Bioinformatics

45. SBEC V – Biofertilizers/ Organic Farming

46. SBEC VI – Herbal Home Remedies/Green House Technology

47. Extension Activities.

6. Examination:

The theory examination shall be of three hours duration to each paper at the end of the semester. The candidates failed in any subject will be permitted to appear for each failed subject or subjects in the subsequent examination. The practical examination is also of three hours duration at the end of even semester. However in the final semester examination if the failure one or two subjects they can appear for a supplementary exam within a month.

The examination consists of Continuous Internal Assessment (CIA) and External Assessment (EA).

Internal Assessment Marks for Theory papers are as follows

Attendance	- 5 Marks
Assignment	- 5 Marks
Test	- 5 Marks
Model	- 10 Marks
Total	- 25 Marks

Internal Assessment Marks for Practical papers are as follows

Attendance -10 Marks

Observation -10 Marks

Test - 20 Marks

Total - 40 Marks

Distribution of Marks for Attendance:

Percentage	Marks	
	Theory	Practical
75 - 80	1	2
81 - 85	2	4
86 - 90	3	6
91 - 95	4	8
96 - 100	5	10

Note:

Minimum 75 % of attendance is compulsory to sit for the exam. A Condonation can be permitted between 65 % to 74.9 %.

7. Scheme of Examination:

The scheme of Examinations for different semesters shall be as follows

Sem	Part	Course	Code	Title	Inst. Hrs.	Credits	Exam Hrs.	Marks		
								CIA	EA	Total
I	I	Tamil I	17U1LT01	Foundation Tamil I	6	3	3	25	75	100
	II	English I	17U1LE01	Foundation English I	6	3	3	25	75	100
	III	Core Course I	17U1BOC01	Plant diversity –I (Algae, Fungi and Lichens)	6	5	3	25	75	100
		Core Course II (Practical)	17U2BOCP01	Algae, Fungi and Lichens (Examination at the end of II Semester)	3	-	-	-	-	-
		First Allied I	17U1ZOA01	Zoology I	4	4	3	25	75	100
		First Allied II (Practical)	17U2ZOAP01	Zoology	3	-	-	-	-	-
	IV	Value Education	17U1VE01	Yoga	2	2	3	25	75	100
				Total	**30**	**17**	**-**	**125**	**375**	**500**
II	I	Tamil II	17U2LT02	Foundation Tamil II	6	3	3	25	75	100
	II	English II	17U2LE02	Foundation English II	6	3	3	25	75	100
	III	Core Course III	17U2BOC02	Plant diversity – II (Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)	4	5	3	25	75	100
		Core Course II (Practical)	17U2BOCP01	Cont. From I Semester Comprising Core Course I – Algae, Fungi and Lichens & Core Course III - Bryophytes, Pteridophytes, Gymnosperms and Paleeobotany	3	3	3	40	60	100
		First Allied III	17U2ZOA02	Zoology II	4	4	3	25	75	100
		First Allied II (Practical)	17U2ZOAP01	Allied Zoology practical Cont. From I Semester	3	3	3	40	60	100
	IV	Value Education	17U2ES01	Environmental Studies	4	4	3	25	75	100
				Total	**30**	**25**	**-**	**205**	**495**	**700**

III	I	Tamil III	17U3LT03	Foundation Tamil III	6	3	3	25	75	100
	II	English III	17U3LE03	Foundation English III	6	3	3	25	75	100
	III	Core Course IV	17U3BOC03	Mushroom cultivation Technology	4	5	3	25	75	100
		Core Course V (Practical)	17U3BOCP02	Core Course IV Mushroom cultivation Technology (Examination at the end of IV Semester)	3	-	-	-	-	-
		Second Allied I	17U3CHA01	Chemistry I	4	4	3	25	75	100
		Second Allied II Practical	17U3CHAP01	Chemistry	3	-	-	-	-	-
	IV	SBEC I	17U3BOS01A/B	Elected by students	2	2	3	25	75	100
		NMEC I	17U3ZON01	Sericulture	2	2	3	25	75	100
				Total	**30**	**19**	**-**	**150**	**450**	**600**
IV	I	Tamil IV	17U4LT04	Foundation Tamil IV	6	3	3	25	75	100
	II	English IV	17U4LE04	Foundation English IV	6	3	3	25	75	100
	III	Core Course VI	17U4BOC04	Anatomy, Embryology and Seed Science	4	5	3	25	75	100
		Core Course V (Practical)	17U4BOCP02	Comprising Core Course IV Mushroom cultivation Technology & Core Course VI - Anatomy, Embryology and Seed Science Carried From III Semester	3	3	3	40	60	100
		Second Allied III	17U4CHA02	Chemistry II	4	4	3	25	75	100
		Second Allied II Practical	17U4CHAP01	Chemistry	3	3	3	40	60	100
	IV	SBEC II	17U4BOS02A/B	Elected by students	2	2	3	25	75	100
		NMEC II	17U4ZON02	Apiculture	2	2	3	25	75	100
				Total	**30**	**25**	**-**	**230**	**570**	**800**
V	III	Core Course VII	17U5BOC05	Morphology and Taxonomy of Angiosperms	5	5	3	25	75	100

		Core Course VIII	17U5BOC06	Cell Biology and Genetics	5	5	3	25	75	100
		Core Course IX	17U5BOC07	Plant Ecology, Phytogeography and Conservation Biology	4	5	3	25	75	100
		Core Course X (Practical)	17U6BOCP03	For Core Course VII- Morphology and Taxonomy of Angiosperms (Examination at the end of VI Semester)	3	-	-	-	-	-
		Core Course X (Practical)	17U6BOCP03	For Core Course VIII - Cell Biology and Genetics (Examination at the end of VI Semester)	3	-	-	-	-	-
		Core Course X (Practical)	17U6BOCP03	For Core Course IX - Plant Ecology, Phytogeography and Conservation Biology (Examination at the end of VI Semester)	3	-	-	-	-	-
		Elective I	17U5BOE01A/B	Elected by students	5	3	3	25	75	100
		SBEC III	17U5BOS03A/B	Elected by students	2	2	3	25	75	100
		SBEC IV	17U5BOS04A/B	Elected by students	2	2	3	25	75	100
				Total	**30**	**22**	**-**	**150**	**450**	**600**
VI	III	Core Course XI	17U6BOC08	Plant Physiology and Biochemistry	6	5	3	25	75	100
		Core Course XII	17U6BOPR01	Group project	5	5	3	25	75	100
		Core Course X (Practical)	17U6BOCP03	For Core Course VII- Morphology and Taxonomy of Angiosperms, Core Course VIII- Cell Biology and Genetics.	-	6	3	40	60	100
		Core Course XIII (Practical)	17U6BOCP04	For Core Course XI - Plant Physiology and Biochemistry& Core Course XII - Plant Ecology, Phytogeography and Conservation Biology	6	5	3	40	60	100

	VI	Elective II	17U6BOE02A/B	Elected by students	5	3	3	25	75	100
		Elective III	17U6BOE03A/B	Elected by students	5	3	3	25	75	100
		SBEC V	17U6BOS05A/B	Elected by students	3	2	3	25	75	100
		SBEC VI	17U6BOS06A/B	Elected by students	3	2	3	25	75	100
		Extn. Activities	17U6EX01	-	-	1	-	-	-	-
				Total	**30**	**32**	**-**	**230**	**570**	**800**
Total No. of Hours and Credits					**170**	**140**	**-**	**4000**		

Skill Based Elective Courses:

SBEC – I – Economic Botany/Biodiversity Conservation

SBEC – II – Fundamentals of Microbiology and Plant Pathology/Post Harvest Technology of Crops

SBEC – III – Horticulture and Nursery Management/Silviculture

SBEC – IV – Forest Botany/Fundamentals of Computer Application

SBEC – V – Biofertilizers/Organic Farming

SBEC – VI – Herbal Home Remedies/Green House Technology

Elective Courses:

Elective – I – Plant Breeding and Evolution/Intellectual Property Rights

Elective – II – Ethnobotany, Medicinal Plants and their Utilization/Analytical Techniques in Plant Science

Elective – III – Plant Biotechnology, Microscopy and Microtechniques/Bioinformatics

8. Question Paper Pattern for B.Sc., Botany Course

Time: 3 Hrs **Max. Marks: 75**

PART – A (20 x 1 = 20 Marks)
(*Answer all questions*)

PART – B (5 x 5 = 25 Marks)
(*Answer all questions*)
(One question from each unit with internal choice)

PART – C (3 x 10 = 30 Marks)
(*Answer any three questions)*
(One question from each unit)

9. Passing Minimum:

The Candidate shall be declared to have passed the examination if the candidate secures not less than 30 marks out of 75 marks in the university examination in each theory paper. There is no passing minimum for internal assessment.

For the practical paper, a minimum of 24 marks out of 60 marks in the University practical examination and the record notebook taken together. There is no passing minimum for internal assessment and record note book. However submission of a record note book is a must.

Candidate who does not obtain the required minimum marks for a pass in a paper shall be required to appear and pass the same at a subsequent appearance.

10. Classification of successful candidates

Candidates who secure not less than **60%** of the aggregate marks in the whole examination shall be declared to have passed the examination in **First class**.

All other successful candidates shall be declared to have passed in the **Second class.**

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First class with Distinction** provided they pass all the examinations prescribed for the course at the first appearance.

11. Maximum duration for the completion of the UG Programme

The maximum duration for completion of the UG Programme shall not exceed 6 semesters.

12. Commencement of this regulation

These regulations shall take effect from the academic year 2017- 18, i.e., for students who are to be admitted to the first year of the course during the academic year 2017-18.

13. Transitory Provision

Candidates who were admitted to the UG course of study before 2017-18 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April / May 2018. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

B.Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester I - Core Course I (Paper Code: 17U1BOC01)

Plant Diversity-I (Algae, Fungi and Lichens)

Credits: 5
Total hrs.: 60

Aim:

- To enable students to understand the diversity of lower group non flowering plants.

Objectives:

- To study the general characters, classification and economic importance of algae, fungi and lichens.

Algae

Unit- I **(12 hrs)**

General characters, thallus organisation, reproduction and life cycle patterns of algae. Outline of classification of algae by F. E. Fritsch (1935). Economic importance of algae. Algae as indicators of pollution.

Unit -II **(16 hrs)**

Study on the thallus structure, reproduction and life cycle of the following genera: *Oscillatoria, Chlamydomonas, Oedogonium, Caulerpa*, *Sargassum* and *Polysiphonia*.

Fungi

Unit -III **(10 hrs)**

Outline of classification of fungi by Alexopoulos and Mims, 1979. A systematic study of the range of structure, reproduction, life cycles and economic importance of fungi.

Unit- IV **(17 hrs)**

A study of the occurrence, structure, reproduction and life cycle of the following genera – *Albugo, Saccharomyces, Peziza, Puccinia* and *Cercospora.*

Unit- V

Lichens **(8 hrs)**

General characters, occurrence, classification, structure, reproduction and economic importance of lichens.

Learning outcome:

- Acquiring knowledge on the algal, fungal and lichen diversity.

Text Books

1. Text Book of Algae. 2015. K. S. Bilgrami and L. C. Saha. Ist Edition, CBS Publishers, New Delhi.
2. Text Book of Algae. 2011. O. P. Sharma. Tata McGraw-Hill Publications, New Delhi.
3. Advances in Mycology. 2012. Sohan Sharma. Random Publications Publishers and Distributors, New Delhi.
4. A Text Book of Algae. 1976. Kumar H. D. and Singh H. N. East West Press Private Limited, New Delhi.
5. Lichens - A Preliminary Text Book. 1970. Mishra A. and Agarwal R. P. Oxford and IBH Publishing Company, Mumbai.
6. An Introduction to Fungi. 1970. Srivastava J. P. Central book Depot, Allahabad.
7. A Text Book of Fungi, Bacteria and Viruses. 1978. Dubey H. C. Vikas Publishing House Private Limited, New Delhi.

Reference Book

1. Introductory Mycology. 2007. C. J. Alexopoulos, C. W. Mims, M. Blackwell. John Wiley, New York.
2. Botany for Degree student – Algae. 2010. Vashishta B. R. and A. K. Sinha, V. P. Singh. S. Chand and Company, New Delhi.

Allied Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester I – First Allied Paper - I (Paper Code – 17U1BOA01)

Thallophyta, Bryophyta, Pteridophyta, Gymnosperms, Plant Physiology and Plant Ecology

Credits: 4

Total hrs.: 60

Aim:

- To enable students to understand the diversity of plants, plant physiology and plant ecology.

Objectives:

- To study the general characters, thallus structure, reproduction and life cycle of algae and fungi.
- To study the morphology, internal structure, reproduction and life cycle of *Marchantia*, *Lycopodium* and *Cycas*.
- To study the absorption of water, photosynthesis and respiration.
- To study the climatic factors, morphological and anatomical adaptations of hydrophytes and xerophytes.

Unit I **(12 hrs)**

Thallophyta:

Algae - General characters. Study on the thallus structure, reproduction and life cycle of the following genera- *Oscillatoria, Oedogonium* and *Polysiphonia*.

Unit II **(12 hrs)**

Fungi - General characters. Study on the thallus structure, reproduction and life cycle of the following genera- *Albugo, Penicillium and Agaricus*. Economic importance of Fungi.

Unit III

Bryophytes, Pteridophytes and Gymnosperms **(12 hrs)**

Study on the morphology, internal structure, reproduction and life cycle of the following genera- *Marchantia*, *Lycopodium* and *Cycas*.

Unit IV **(12 hrs)**

Plant physiology:

Absorption of water (Active and Passive. Photosynthesis – Light reaction (Cyclic and Non-cyclic phosphorylation) and Calvin cycle. Respiration – Aerobic – Glycolysis and Kreb's cycle.

Unit V **(12 hrs)**

Plant ecology:

Climatic factors. Morphological and anatomical adaptations in hydrophytes and xerophytes.

Learning outcome:

- ❖ Acquiring knowledge on the plant diversity, plant physiology and plant ecology.

Text Books:

1. Text book of Algae. 2015. K. S. Bilgrami and L. C. Saha, Ist Edition, CBS Publishers.
2. Algae O. P. Sharma. 2011. Tata McGraw-Hill Education.
3. Advances in Mycology, 2012. Sohan Sharma. , Random Publications Publishers and Distributors, New Delhi.
4. B. P. Pandey. 2011. A Textbook of Botany: Angiosperms - Taxonomy, Anatomy, Embryology and Economic Botany, S. Chand Limited
5. Pandey, B. P. 1986. Text book of Botany, Vol. I & II. S. Chand & Co. New Delhi.
6. Fuller, H. J. and Tippo. O. 1949. College Botany, Henry Holt & Company.
7. Ganguly, A. K. 1975. General Botany Vol. I (1971) and Vol. II. The new book stall, Calcutta.

References:

1. Vashishta B. R. A. K. Sinha. 2010. Botany for Degree student – Fungi. S. Chand & Co. New Delhi.
2. Pandey. S. N., Mishra. S. P. and Trivedi, P. S. 2009. A text book of Botany, Volume II, Vikas Publishing House Pvt. Ltd., Delhi.
3. Rao, K. N., Krishnamoorthy, K. V. and Rao, G. S. 1979. Ancillary Botany. S. Visvanathan Pvt., Chennai.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester II - Core Course III (Paper Code: 17U1BOC02)

Plant Diversity-II

(Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)

Credit : 5

Total Hrs.: 60

Aim:

- To enable students to understand the diversity of cryptogams and gymnosperms and fossils.

Objectives:

- To study the morphology, internal structure, reproduction and life cycle of bryophytes, pteridophytes and gymnosperms.
- To acquire knowledge on fossils.

Unit I

Bryophytes: (12 hrs)

General characters of Bryophytes. Classification of Bryophytes proposed by Rothmaler 1951. A detailed study of the structure, reproduction and life cycle of the following genera (Excluding developmental stages of sex organs and sporophyte). *Riccia*, *Anthoceros* and *Polytrichum*.

Unit II

Pteridophytes: (12 hrs)

General characters, classification (Reimer's 1954) and life cycle of Pteridophytes. Stelar evolution in Pteridophytes. Homospory and Heterospory.

Unit III (12 hrs)

Morphology, Anatomy, Reproduction and life cycle of the following genera *Lycopodium, Selaginella* and *Marsilea.*

Unit IV

Gymnosperms: (12 hrs)

General characters and classification of gymnosperms (Pilger and Melchior, 1954). Morphology, structure, mode of reproduction and life history of the following genera: *Cycas*, *Pinus* and *Gnetum*.

Unit V

Palaeobotany: (12 hrs)

Fossils and fossilization. Geological time scale. Brief study of the following fossils - *Rhynia, Lepidodendron, Lepidocarpon, Calamites* and *Williamsonia.*

Learning outcome:

- ❖ Acquiring knowledge on the diversity of bryophytes, pteridophytes and gymnosperms and fossils.

Text books:

1. S. N. Pandey, S. P. Mishra, P. S. Trivedi 2009. A text book of Botany Volume- II, Vikas Publishing House Pvt. Ltd., Delhi.
2. Vashishta, P. C., Sinha. A. and Anil Kumar. 2009. Botany for Degree Students,- Pteridophyta, S. Chand & Co. Pvt. Ltd.,
3. Vashishta B. R. 1983. Botany for Degree student – Bryophyta. S. Chand & Co. New Delhi.
4. Vashishta, P.C.1972 Botany for Degree Students, Vol. IV- Vascular Cryptogams (Pteridophyta), S. Chand & Co. Pvt. Ltd.,
5. Vashishta, P.C. 1976 Gymnosperms, S. Chand & Co. Pvt. Ltd.
6. Pandey, B.P.1997. A text book of Bryophyta, Pteridophyta and Gymnosperms. K. Nanth and Co., Meerut.
7. Parihar, N. S. 1997. An introduction to Embryology. Vol. - II. Pteridophyta and Gymnosperms. K. Nanth and Co., Meerut.
8. Shukla, A.C. and Mishra, S. P. 1982. Essentials Palaeobotany, Vikas Publishing House Pvt. Ltd., Delhi.

Reference Books:

1. Smith, G.M.1935. Cryptogamic Botany. Vol. - III, Tata McGraw Hill Publishing Co.
2. Arnolds, C.A. 1947. An Introduction to Palaeobotany, McGraw Hill Book Co., Newyork.
3. Sporne. K.R. 1991. The Morphology of Gymnosperms. B.I. Publications Pvt., Mumbai.
4. Shukla, A. C. and Sharma, M. 1992. Plant fossils. A link with the past, Birbal Shani Institute Palaeobotany, Lucknow, India.

B.Sc., Allied Botany

For Students Admitted from the academic year 2017 – 2018

Semester II – First Allied Paper - II (Paper Code – 17U2BOA02)

Morphology, Taxonomy of Angiosperms, Cytology, Genetics, Anatomy of Angiosperms and Embryology of Angiosperms.

Credits: 3

Total hrs: 60

Aim:

- To enable students to understand the morphology, taxonomy, anatomy and embryology of angiosperms, structure and function of cellular organelles and Mendel's laws.

Objectives:

- To study external morphology, taxonomy, anatomy and embryology of angiosperms.
- To study the cell organelles and their functions.
- To study Mendel's law.

Unit I **(15 hrs)**

External morphology:

Phyllotaxy. Types of leaf - simple and compound. Inflorescence - Racemose, Cymose and Special types (Head and Cyathium). Terminology with reference to flower description**.**

Unit II **(15 hrs)**

Taxonomy:

Bentham and Hookers system of classification. Study the following families and their economic importance: Annonaceae, Rubiaceae, Cucurbitaceae, Asteraceae and Poaceae.

Unit III **(15 hrs)**

Cytology and Genetics:

Structure of plant cell and brief outline of the following cell organelles: Endoplasmic Reticulum, Mitochondria, Chloroplast and Nucleus. Cell division: mitosis and meiosis. Genetics- Mendel's mono and dihybrid cross. Back cross and Test cross.

Unit IV **(15 hrs)**

Anatomy:

Simple and permanent tissues: Parenchyma, Collenchyma and Sclerenchyma. Complex permanent tissues: Xylem and Phloem. Primary structure of dicot root and stem and monocot root and stem.

Unit V **(15 hrs)**

Embryology:

Structure of anther and male gametophyte. Types of ovule and female gametophyte (Polygonum type). Fertilization. Structure and development of dicot embryo (Capsella type – *Bursa pastoris*).

Learning outcome:

- ❖ Acquiring knowledge on morphology, taxonomy, anatomy and embryology of angiosperms, structure and function of cellular organelles and Mendel's laws.

Text Books:

1. Textbook of Botany: Angiosperms - Taxonomy, Anatomy, Embryology and Economic Botany. 2011. B.P. Pandey. S. Chand Publishing, New Delhi.
2. Plant anatomy. 2001. Pandey, B. P. S. Chand & Company, New Delhi.
3. Cytology and Genetics. 2006. Sumitra Sen, Dipak Kumar Kar. Narosa Publishing House Private Limited, New Delhi.
4. Cytogenetics. 2000. Sundararajan, S. Anmol Publications Private Limited, New Delhi.
5. Cytology. 2008. Verma, P. S. and Agarwal, V. K. Chand and Company Limited, New Delhi.

References:

1. The Embryology of Angiosperms. 2009. Bhojwani, S. S. and Bhatnagar, S. P. Vikas Publishing House Private Limited, New Delhi.
2. Davis, P.H. and Heywood, V.M. 1965. Principles of Angiosperm Taxonomy. Oliver and Boyd Edinburgh.
3. Genetics. 1999. Sambamurthy, A. V. S. S. Narosa Publishing House, New Delhi.

Core Practical

For students admitted from the academic year 2017 – 2018

Core Major Practical I (Core Course II) 17U2BOCP01

Plant Diversity-I (Algae, Fungi and Lichens)

Algae:

1. Study the vegetative and reproductive structures of *Oscillatoria, Chlamydomonas, Oedogonium, Caulerpa, Sargassum* and *Polysiphonia.*

2. Economic importance of algae related to food, SCP, medicine and Biofertilizers.

Fungi:

1. Study the vegetative and reproductive structures of *Albugo, Saccharomyces, Peziza, Puccinia* and *Cercospora*.

2. Economic importance of fungi related to food and industry

Lichens:

1. Study the morphology and internal structure of lichens.

Core Practical

For students admitted from the academic year 2017 – 2018

Core Major Practical I (Core Course III) 17U2BOCP01

Plant Diversity - II

(Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)

Bryophytes:

Study the vegetative and reproductive organs of *Riccia, Anthoceros* and *Polytrichum.*

Pteridophytes:

Study the vegetative and reproductive organs of *Lycopodium, Selaginella* and *Marsilea*.

Gymnosperms:

Study the vegetative and reproductive organs of *Cycas, Pinus* and *Gnetum*.

Palaeobotany:

Study of the fossil – *Rhynia, Lepidodendron, Lepidocarpon, Calamites* and *Williamsonia.*

Field Visit:

Botanical tour for minimum of two days to acquire knowledge on Plant Diversity – I and II.

Core Practical

Model Practical Question Paper B.Sc., Botany Degree Examination

For Students Admitted from the academic year 2017 – 2018

Core Major Practical I (For Core Course I & III)

Plant Diversity-I &II

(Algae, Fungi and Lichens, Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany)

Time: 3 Hrs. **Maximum: 60 Marks**

Practical : 50 Marks

Record : 10 Marks

1. Perform the micropreparations for the given specimen **A, B** and **C.** **(8×3=24)**

(Slide – 3, Reasons – 3 and Diagram – 2)

2. Comment on **D, E** and **F**. **(4×3=12)**

(Identification – 2, Notes – 1 and Diagram – 1)

3. Mention the Genus, Group and Morphology of given specimen **G, H** and **I.** **(4×3=12)**

(Genus – 1, Group – 1 and Morphology – 2)

4. Identify and write notes on the economic importance of **J**. **(2×1=2)**

(Identification – 1 and Uses – 1)

Key:

1. Sectioning:

A – Algae or Fungi
B – Bryophytes or Pteridophytes
C – Gymnosperms

2. Spotters - Permanent slides

D – Algae or Fungi
E – Bryophytes or Pteridophytes
F – Gymnosperms or Lichens

3. Spotters – Morphology

G– Algae or Fungi
H – Bryophytes or Pteridophytes
I – Gymnosperms or Palaeobotany

4. Spotters – Economic importance

J - Algae or Fungi

Practical Syllabus B.Sc., (Allied Botany) Degree Examination

For Students Admitted from the academic year 2017 – 2018

First Allied Practical - I (For Allied Course I & III)

Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms:

Study the vegetative and reproductive organs of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms prescribed in the syllabus.

Plant physiology:

Experimental setup – Respiroscope and Wilmott's bubbler.

Plant Ecology:

Anatomy of T. S. of *Hydrilla* stem and T. S. of *Nerium* leaf.

Morphology and Taxonomy:

To describe the salient features of families prescribed in the syllabus.

Economic Importance:

To identify the genus, family and morphology of the parts used for the following plant specimens

Annona – Fruit	Black Gram – Seed
Tamarind – Fruit	Sunflower – Seed
Cucumber – Fruit	Areca – Nut
Dates – Fruit	Cinchona – Bark
Green Gram –Seed	Coconut – Kernel

Cytology:

Observation of cellular structures.

Genetics

To Study the Monohybrid, Dihybrid, Back cross and Test cross.

Anatomy:

Study the anatomical characters of dicot root and stem and monocot root and stem.

Embryology:

Observation of T. S. of Anther and types of ovules.

Allied Practical

Model Practical Question Paper B.Sc., Allied Botany - Examination

For Students Admitted from the academic year 2017 – 2015

First Allied Practical I (For Allied Course I & III)

Time: 3 Hrs. **Maximum: 60 Marks**
Practical : 50 Marks
Record : 10 Marks

1. Identify the specimen **A** and **B** to the respective families giving reasons. **(5×2=10)**

(Identification – 1 and Reasons -4)

2. Mention the genus, family and morphology of the useful part of **C, D, E, F** and **G.** **(3×5=15)**

(Genus – 1, Family -1 and Morphology of useful part -1)

3. Take the transverse sections of given specimen **H** and **I.** **(5×2=10)**

(Slide – 2, Reasons – 2 and Diagram – 1)

4. Write critical notes on **J, K, L** and **M.** **(3×4=12)**

(Identification -1 and Notes – 2)

5. Comment on the setup **N** **(3×1=3)**

Key:

Family Identification:

A and **B** – Any plants prescribed in the syllabus

Spotters – Economic Importance:

C, D, E, F and **G** – Prescribed in the syllabus

Section:

H – Anatomy

I – Gymnosperms

Spotters – Permanent slides:

J – Algae or Fungi

K – Bryophytes or Pteridophytes

L – Cytology or Genetics

M – Embryology or Plant Ecology

Physiology experimental setup:

N – Physiology Experiment.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester III - Core Course IV (Paper Code: 17U3BOC03)

Mushroom Cultivation Technology

Credit : 5

Total Hrs.: 60

Aim:

- Acquiring knowledge on morphology of mushrooms, spawn and compost preparation and cultivation of button, oyster and straw mushroom.

Objectives:

- To study the morphology, habitats and differentiation of mushrooms.
- To acquire knowledge on compost preparation, spawn preparation and storage of spawn.
- To study the cultivation of button, oyster and straw mushroom.

Unit - I **(12 Hours)**

Mushroom morphology: Different parts of a typical mushroom and variations in mushroom morphology. Key to differentiate edible from poisonous mushrooms. Common Indian mushrooms. Based on occurrence - Epigenous and Hypogenous, Natural Habitats - Humicolous, Lignicolous and Coprophilous. Structure and texture of fruit bodies - gilled fungal and pore fungal and spores.

Unit - II **(12 Hours)**

Fundamentals of cultivation system- small village unit and larger commercial unit. Principles of mushroom farm layout - location of building plot, design of farm, bulk chamber, composting platform, equipments and facilities, sterilization room and growing rooms.

Unit - III **(12 Hours)**

Principles of composting, machinery required for compost making, materials for compost preparation. Methods of Composting – Long Term and Short Term method.

Unit - IV **(12 Hours)**

Facilities required for spawn preparation, preparation of spawn substrate, preparation of pure culture, media used in raising pure culture, culture maintenance and storage of spawn. Importance of casing mixture, quality parameters of casing soil, different types of casing mixtures, commonly used materials.

Unit - V **(12 Hours)**

Cultivation of button, oyster and straw mushroom - collection of raw materials, compost and composting, spawn and spawning, casing and case run, cropping and crop management, picking and packing. Production technology and post-harvest handling of fresh and processed products and their marketing. Nutrient profile and health benefits of mushroom.

Text Books:

1. Pandey, R. K. and S. K. Ghosh. 2012. A Hand book of Mushroom cultivation. Emkay Publications, New Delhi.

2. Tripathi, D. P. 2005 Mushroom Cultivation, Oxford and IBH Publishing Company Private Limited, New Delhi.

3. Verma, R.N. and B. Vijay. 2006. Recent advances in the cultivation technology of edible mushrooms.

Reference Books:

1. Pathak Yadav Gour. 2010. Mushroom Production and Processing Technology. Agrobios (India).

2. Kannaiyan, S. and K. Ramasamy. 1980. A hand book of edible mushroom, Today and Tomorrows Printers and Publishers, New Delhi

3. Nita Bahl. 2002. Handbook on Mushrooms, Oxford and IBH Publishing Company, New Delhi.

Core Practical

For Students Admitted from the academic year 2017 – 2017

Mushroom Cultivation Technology Practical (17U4BOCP02)

1. Identification of edible and poisonous mushrooms.
2. Microscopic observations of mushrooms.
3. Pure culture of mushroom-preparation and maintenance.
4. Spawn- media preparation, inoculation, and incubation.
5. Substrate formulations, composting, and pasteurization.
6. Spawning, casing and maintenance of optimum.
7. Cultural conditions, hygiene, and management of pest and diseases.
8. Harvesting, processing and value addition.
9. Qualitative determination of nutritional values.
10. Field visit to mushroom cultivation farm.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester III – Skill Based Elective Course - I

(Paper Code: 17U3BOS01A)

Mushroom Cultivation Technology

Credit : 2

Total Hrs.: 36

Aim:

- To study the botanical description, cultivation, harvesting and uses of cereals, pulses, vegetables, fruits, spices, beverages and fatty oil yielding plants.

Objectives:

- To study the botanical description, cultivation, harvesting and uses of cereals, pulses, vegetables, fruits, spices, beverages and fatty oil yielding plants.

Unit - I **(7 Hours)**

Botanical description, cultivation, harvesting and uses of cereals (Wheat, Rice, Maize and Sorghum) and legumes (Black gram, Red gram and Chick pea).

Unit - II **(7 Hours)**

Botanical description and economic importance of vegetables (Potato, Cassava and Tomato) and fruits (Banana, Grapes, Citrus and Mango).

Unit - III **(7 Hours)**

Botanical description, cultivation and uses of spices (Ginger, Pepper, Cardamom and Clove) and condiments (Chilly, Coriandrum and Turmeric).

Unit - IV **(7 Hours)**

Botanical description, cultivation, processing and uses of beverage plants: Tea, Coffee and Cocoa. Sugars and Starch: Sugarcane and Manihot. Fibers and Timber: Cotton and Teak.

Unit - V **(8 Hours)**

Botanical description, harvesting, extraction and uses of fatty oils and vegetable fats: Sun flower, Peanut, Palm Oil, Coconut and Gingelly. Medicinal Plants: Rauwolfia, Aconitum, Saraca and Neem.

Text Books:

1. Pandey, B. P. Economic Botany. 2012. S. Chand and Company Limited, New Delhi. Fourth Edition.

2. Rashtra Vardhana. Economic Botany. 2009. Arup Book Publishers Private Limited, New Delhi, First Edition.

3. Verma, V. A. Textbook of Economic Botany. 1980. Emkay Publications, New Delhi, Third Edition.

4. Maheshwari, P. and U. Singh. 1965. Dictionary of Economic plants in India. ICAR, New Delhi.

References:

1. Hill, A. F. Economic Botany. 1952. Textbook of useful plants and plant products. McGraw-Hill Book Company, New York, Second Edition.

2. Thompson, H. C. 1949. Vegetable Crops. McGraw-Hill Book Company, New York, Fourth Edition.

3. Wallis, T. E. 1946. Text book of pharmacognosy. J. and A. Churchill Limited, London.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester III – Skill Based Elective Course - I

Biodiversity Conservation

(Paper Code: 17U3BOS01B)

Credits: 2
Total hrs.: 36

Aim:

- Analyse the biogeography, status and loss of biodiversity, initiatives for biodiversity conservation.

Objective:

- Acquiring knowledge on biodiversity management, role of biotechnology, organization involved and biopiracy.

Unit – I **(7 Hours)**

Biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. Conservation Biology: Principles of conservation, major approaches on management.

Unit – II **(7 Hours)**

Indian case studies on conservation and management strategies (Project Tiger, Biosphere reserves). Environmental pollution and global environmental change.

Unit – III **(7 Hours)**

Biogeography of India; Biodiversity of India: Species diversity, Genetic diversity and Ecosystem diversity; Loss of biodiversity; IUCN red list categories; International and Indian initiatives on Biodiversity Conservation.

Unit – IV **(7 Hours)**

Phytogeography: Range - Dispersal and migration barriers hypothesis, Continental drift. Hypothesis and Age and Area hypothesis, Endemism, Hotspots. Continuous and discontinuous Distribution of Plants. Phytogeographical regions in India. Vegetations of India.

Unit – V **(8 Hours)**

Conservation of Biodiversity: Current practices of biodiversity conservation - *In situ* conservation (Biosphere reserve, Wildlife sanctuaries, and National parks); *Ex situ* conservation (Botanic garden, Gene banks, Agroforestry, Pollen bank, Seed bank, Cryopreservation); Role of biotechnology in the

conservation of biodiversity; Biodiversity information and communication, Indigenous knowledge systems, Biopiracy,IPR.

Text Books:

1. Bawa K. S., Primack, R. V. and Oommen, M. A. 2011. Conservation biology: APrimer for South Asia, ATREE, Bangalore.
2. Krishnamurthy, K.V. 2003. An advanced Text Book on Biodiversity, Oxford and IBHPublishing Co. Private Limited, New Delhi.
3. Swaminathan, M. S. and Cocchar S. L. (Eds) 1999. Plants and S ociety. Mac MillenPublications Limited, London.

Reference Book:

1. Frankel, O. H. Brown and Burdon, J.J. 1995. The Conservation of plant diversity, Cambridge University Press, Cambridge.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester III – Non Major Elective Course - I

Mushroom Cultivation

(Paper Code: 17U3BON01)

Credits: 2
Total hrs.: 36

Aim:

- To study the cultivation technology of edible mushroom, types of nutrient content in edible mushrooms, mushroom food preparation and research centres of mushroom.

Objectives:

- Acquiring knowledge on cultivation technology of edible mushroom, types of nutrient content in edible mushrooms, mushroom food preparation and research centres of mushroom.

Unit - I (7 Hours)

Introduction – history – scope of edible mushroom cultivation – types and nutrient content of edible mushrooms available in India – *Volvariella volvacea*, *Pleurotus citrinopileatus* and *Agaricus bisporus*. Poisonous mushrooms.

Unit - II (7 Hours)

Pure culture – preparation of medium (PDA and Oatmeal agar medium), sterilization – preparation of test tube slants to store mother culture – culturing of *Pleurotus* mycelium on petri plates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

Unit - III (7 hours)

Cultivation Technology : Tools and requirements: substrates (locally available), polythene bag, vessels, inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Mushroom bed preparation – paddy straw, maize straw, sugarcane trash, and banana leaves. Factors affecting the mushroom bed preparation – Low cost technology, composting in mushroom production. Methods of mushroom production. Harvesting of mushrooms.

Unit - IV (7 Hours)

Storage and nutrition: Short term storage (Refrigeration – up to 24 hours), Long term Storage (Canning, pickles, papads), drying, storage in salt solution. Nutrition – proteins – amino acids, mineral elements nutrition – carbohydrates, crude fiber content – vitamins.

Unit - V **(8 Hours)**

Food preparation: Types of foods prepared from mushroom – soup, cutlet, omelette, samosa, pickles and curry. Research centers – National level and Regional level. Cost benefit ratio – marketing in India and abroad and export value.

Text Books:

1. Pandey, B. P. Economic Botany. 2012. S. Chand and Company Limited, New Delhi. Fourth Edition.

2. Rashtra Vardhana. Economic Botany. 2009. Arup Book Publishers Private Limited, New Delhi, First Edition.

3. Verma, V. A. Textbook of Economic Botany. 1980. Emkay Publications, New Delhi, Third Edition.

4. Maheshwari, P. and U. Singh. 1965. Dictionary of Economic plants in India. ICAR, New Delhi.

Reference Books:

1. Hill, A. F. Economic Botany. 1952. Textbook of useful plants and plant products. McGraw-Hill Book Company, New York, Second Edition.

2. Thompson, H. C. 1949. Vegetable Crops. McGraw-Hill Book Company, New York, Fourth Edition.

3. Wallis, T. E. 1946. Text book of pharmacognosy. J. and A. Churchill Limited, London.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester IV – Core Course - V

Anatomy, Embryology and Seed Science

(Paper Code: 17U4BOC04)

Credits: 5
Total hrs.: 60

Aim:

- Acquiring knowledge on simple and permanent tissues, primary structure of dicot and monocot stem and root, isobilateral and dorsiventral leaf and secondary growth.

Objectives:

- To understand the meristematic tissues, permanent tissues and ergastic substances.
- To study the primary structures of stem in dicots and monocots and isobilateral and dorsiventral leaf.
- To understand the secondary growth and nodal anatomy of dicots and monocots.
- To understand the embryology of angiosperms.
- To study the general principle, seed quality, seed viability and field and seed inspection.

Unit - I **(12 Hours)**

Anatomy - Introduction. Meristems, definition, differentiation, redifferentiation and dedifferentiation, totipotency. Ergastic substances (Cystolith, Raphides, Sphaeroraphides and Tannins). Classification of meristems – apical meristems, lateral meristems and intercalary meristems and various concepts of apical meristems. Epidermal tissue system – trichomes and stomata. Laticifers.

Unit - II **(12 Hours)**

Plant tissues - Classification – simple tissues and permanent tissues - Parenchyma, Collenchyma, Sclerenchyma. Complex tissues - Xylem and Phloem. Annual rings – heart wood, sap wood. Primary structure of root and stem in dicots and monocots. Isobilateral and dorsiventral leaf.

Unit - III **(12 Hours)**

Secondary growth - Anomalous secondary growth in dicot stems –*Bignonia*, *Nyctanthus* and *Boerhaavia* and monocot stem -*Dracaena*. Nodal anatomy – uni, tri and multilacunar node. Root stem transition.

Unit - IV **(12 Hours)**

Embryology - Structure and development of anther. Development of male gametophyte. Ultra structure of pollen grains. Types of ovules. Development of female gametophyte: Monosporic (Polygonum), Pollination, fertilization, double fertilization and triple fusion. Endosperm: Nuclear, Cellular, Helobial and Ruminate. Development of Embryo in Dicot (*Capsella – bursa pastoris*) and monocot. Polyembryony. Apomixis.

Unit - V **(12 Hours)**

Introduction – role and goal of seed technology. General principle of seed production – seed quality – purity of seed production, seed viability – seed germination test, Tetrazolium test. Types of seed germination – hypogeal and epigeal. Field and seed inspection - seed certification- seed legislation.

Text Books:

1. Pandey, B. P. 2014. Plant Anatomy, S. Chand and Company, New Delhi.
2. Vashishta, P. C. 2000. A Text Book of Plant Anatomy. S. Chand and Company, New Delhi.
3. Bhojwani, S. S. and Bhatnagar, S. P. 2009. The Embryology of Angiosperms, Vikas Publishing House Private Limited, New Delhi.
4. Dwivedi, J. N. 1988. Embryology of Angiosperms. Rastogi and Company, Meerut.
5. Rattan Lal Agarwal. 2004. Seed Technology. Oxford and IBH Publishing Company Private Limited, New Delhi.

Reference Books:

1. Fahn, A. 1982. Plant Anatomy (3rd Edition). Pergoman Press, Oxford.
2. Esau, K. 1960. Plant Anatomy, Wiley Eastern Private Limited, New Delhi.
3. Maheswari, P. 1971. An Introduction to the Embryology of Angiosperms. Tata McGraw Hill Publishing Company Limited, New Delhi.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Anatomy, Embryology and Seed Science-17U4BOCP02

Anatomy:

1. Study of Ergastic substances (Cystolith, Raphides, Sphaeroraphides&Tannins)
2. Study of simple and complex tissues by using permanent slides.
3. Study of dorsiventral and isobilateral leaf.
4. Study of primary structure of dicot root, stem.
5. Study of primary structure of monocot root and stem.
6. Normal secondary structure in dicot stem and root.
7. Anomalous secondary structure in dicot plants – *Aristolochia, Bignonia, Nycthanthus* and *Boerhaavia* (Permanent slides)
8. Anomalous secondary growth in monocot plant - *Dracaena* (Permanent slide)
9. Study the anatomical structure of types of node
10. T.S. of anther (Permanent slide).
11. Types of ovules (Permanent slides).
12. Types of embryo mounting.
13. Types of seed germination – hypogeal and epigeal.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester IV – Skill Based Elective Course - II

Fundamentals of Microbiology and Plant Pathology

(Paper Code: 17U4BOS02A)

Credits: 2
Total hrs.: 36

Aim:

- Acquiring knowledge on classification and nomenclature of microbes and culture media.

Objectives:

- To understand the classification and nomenclature of microbes.
- To study about the sterilization and disinfective agents.
- To understand the classification bacteria, viruses and culture media and types.
- To understand the classification, causes and control measures of plant diseases.
- To study the symptoms, etiology and control measures of some important plant diseases.

UNIT - I **(7 Hours)**

Definition, scope, history and recent developments of microbiology. Classification of microbial kingdom- Whitakers system of classification. Binomial nomenclature of microbes. Classification of microbes.

UNIT - II **(7 Hours)**

Sterilization- Principles - dry and moist heat - Tyndallisation, Pasteurization and Autoclaving, Radiation and Filtration - Disinfection and Disinfective agents – Sterility control for dry heat, moist heat and radiation.

UNIT - III **(7 Hours)**

Bergey's classification of bacteria, viral classification, virions and viroids, culture media – culture and its types - Batch, Fed-batch, Continuous, Industrial use of Microbes – substrates, growth parameters and recovery of products (organic acids – Citric acid, antibiotics –Penicillin and enzymes - Amylase).

UNIT - IV **(8 Hours)**

A general account of plant diseases, causal agents and symptoms - bacteria, fungi, viruses, nematodes, insects, pests and rodents. Insect transmission of bacteria and viruses. Disease control - physical, chemical and biological methods.

UNIT - V **(7 Hours)**

Study of symptoms, etiology and control measures of the following diseases – Fungal disease - Red rot of sugarcane, Bacterial disease - Bacterial blight of rice and Citrus canker and Viral disease - Tobacco mosaic disease.

Text Books:

1. Dubey, R. C. and Maheshwari, D. K. 2005. A Text Book of Microbiology S. Chand and Company Limited, New Delhi.
2. Patel, A. H. 2005. Industrial Microbiology. Mac Milan India Limited, Chennai.
3. Pandey, B. P. 2008. A Text Book of Plant Pathology, S. Chand and Company Limited, New Delhi.
4. Sharma, P. D. 2006. Plant Pathology, Narosa Publishing House, New Delhi.
5. Pelzer, T. R., Chan, M. J., and Kreig, N. R. 1993. Microbiology. Mc Graw –Hill Inc, New York.
6. Prescott, L. M.., Harley, J. P. and Klein, D. A. 1993. Microbiology, 2nd Edition, WM. C. Brown Publishers, United States of America.

Reference Books:

1. Sundara Rajan, S. 2003. College Microbiology. Volume I and II Revised Edition, Vardhana Publication, Bangalore.
2. Robert, I. Tate. 1995. Soil Microbiology, First Edition, John Wiley and Sons Inc., New York.
3. Hugo, W. B. and Russell, A. D. 1998. Pharmaceutical Microbiology, Sixth Edition, Black Well Scientific Company Limited, United Kingdom.
4. Rangasami, G. 1994. Diseases of Crop Plants in India, Printice Hall of India Limited, Delhi.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester IV – Skill Based Elective Course - II

Post Harvest Technology of Crops

(Paper Code: 17U4BOS02B)

Credits: 2
Total hrs.: 36

Aim:

- Analyse the various storage methods of fruits and vegetables.

Objectives:

- Acquiring knowledge on importance of post harvest management of fruits and vegetables.

Unit – I (7 Hours)

Scope and importance of post-harvest management of fruits and vegetables. Nature and causes of post harvest losses. Maturity indices and standards for different fruits and vegetables. Methods of assessment of maturity, physiological and biochemical changes during maturity and ripening, enzymatic and textural changes, ethylene evolution and ethylene management, respiration, transpiration, regulation methods.

Unit – II (7 Hours)

Influence of pre-harvest practices and other factors affecting shelf life and post-harvest quality. Harvesting methods, tools, harvesting practices for specific market requirements. Pre cooling methods - grading, washing, pack house operations, pre treatments chemicals, wax coating, edible coating, pre packaging and irradiation, packaging of vegetables, packaging materials.

Unit – III (7 Hours)

Storage methods of vegetables - ventilated, refrigerated, MA, CA storage, hypobaric storage, cold storage, zero energy cool chamber; Storage disorders -chilling injury in vegetables, post-harvest diseases and pests - prevention from infestation; principles of transport; food safety standards and export standards.

Unit – IV (7 Hours)

Harvesting methods of fruits, tools, harvesting practices for specific market requirements; Pre cooling methods; grading, washing, pack house operations, pre treatments treatment prior to shipment. Pre packaging and irradiation, packaging of fruits and packaging materials.

Unit – V **(8 Hours)**

Storage methods of fruits - ventilated, refrigerated, MAS, CA storage. Physical injuries and disorders. Transportation and marketing standards for international markets, quality evaluation, principles and methods of preservation, food processing, canning, fruit juices, beverages, pickles, jam, jellies, candies. Dried and dehydrated products, nutritionally enriched products, fermented fruit beverages, packaging technology, processing waste management, food safety standards and export standards.

Text Books

1. Adams, C.R. and Early, M.P. (2004). Principles of Horticulture. Elsevier, New Delhi.
2. *Chadha,* K.L. (2001). Hand Book of Horticulture, ICAR Publications, New Delhi.
3. *George Acquaah.* (2009). Horticulture Principles and Practices. PHI Learning Private Limited, New Delhi.
4. Kumar, N. (2014). Introduction to Horticulture. Rajalakshmi Publications, Nagercoil.
5. Sheela, V. L. (2011). Horticulture. MJP Publishers, Chennai.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester IV – Non Major Elective Course - II

Herbal Botany

(Paper Code: 17U4BON02)

Credits: 2
Total hrs.: 36

Aim:

- To understand the various Indian systems of medicines.

Objectives:

- To study the tribes and native medicines.
- To understand the cultivation, macro and microscopic characters, chemical constituents and therapeutic uses of selected medicinal plants.
- To understand the various drugs acting on the central nervous system, gastrointestinal tract and cardio vascular system.

Unit - I **(7 Hours)**

Brief history of medicinal plants. Indian systems of Medicine: Siddha. Ayurvedha and Unani. Classification of crude drugs. Chemistry of drugs (Alkaloids, Flavanoids, Glycosides and Tannins).

Unit - II **(7 Hours)**

Ethnobotany – its scope and interdisciplinary approaches. Tribal distribution and life style in Tamilnadu. Native medicine – Malayalis, Irulas and Thodas. Common practice – rituals, mode of preparation, mode of administration and dosage. Folklore medicine.

Unit - III **(7 Hours)**

Cultivation, macro and microscopic characters, chemical constituents and therapeutic uses of drugs from root (*Vinca rosea* and *Rauwolfia serpentina*), drugs from bark (*Cinchona officinalis*), drugs from stem of wood (*Ephedra sp.*) and drugs from underground stem (*Zingiber officinale*).

Unit - IV **(7 Hours)**

Cultivation, micro and macroscopic characters, chemical constituents and therapeutic uses of drugs from leaves (*Aloe vera* and *Ocimum sanctum)*, flower (*Eugenia jambolana)*, fruits (*Feronia elephantum*) and seeds (*Coriandrum sativum*).

Unit - V **(8 Hours)**

A brief account on drugs acting on central nervous system (CNS stimulants, CNS depressants and Hallucinogenics). Drugs used in disorders of gastrointestinal tract (Carminatives, Bulk laxatives and Purgatives) and cardio vascular drugs (Cardiotonics, Cardiac depressants and Antihypertensives).

Text Books:

1. Jain, S. K. 1987. A Manual of Ethnobotany. Scientific Publishers, Jodhpur.
2. Bhattacharjee, S. K. 1988. Hand Book of Medicinal Plants. Pointer Publishers, Jaipur.
3. Wallis, T. E., 1997. Text Book of Pharmacognosy. C.B.S Publishers, Bangalore.
4. Purohit and Vyas, 2004. Medicinal Plants Cultivation, Agrobios Publication, Jodhpur.

Reference Books:

1. Gokhale, S. B., Kokate, C. K. and Purohit, A. P. 2010. Pharmacognosy. Nirali Prakashan, Pune.
2. Jain, 2001. Medicinal Plants. National Book Trust, New Delhi.
3. Handa, S. S. and Kapoor, V. K. 1993. Pharmacognosy. Vallabh Prakshan, New Delhi.
4. Agarwal, 1985. Drug Plants in India. Kalyani Publishers, Ludhiana.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Anatomy, Embryology and Seed Science

(17U4BOCP02)

Anatomy:

1. Study of ergastic substances (Cystolith, Raphides, Sphaeroraphides and Tannins)
2. Study of simple and complex tissues by using permanent slides.
3. Study of dorsiventral and isobilateral leaf.
4. Study of primary structure of dicot root and stem.
5. Study of primary structure of monocot root and stem.
6. Normal secondary structure in dicot stem and root.
7. Anomalous secondary structure in dicot plants – *Aristolochia, Bignonia, Nycthanthus* and *Boerhaavia* (Permanent slides)
8. Anomalous secondary growth in monocot plant - *Dracaena* (Permanent slide)
9. Study the anatomical structure of types of node
10. T.S. of anther (Permanent slide).
11. Types of ovules (Permanent slides).
12. Types of embryo mounting.
13. Types of seed germination – hypogeal and epigeal.

Core Practical

For Students Admitted from the academic year 2017 – 2017

Core Major Practical II (For Core Course IV &VI)

(Mushroom Cultivation Technology, Anatomy, Embryology and Seed Science

17U4BOCP02

Time: 3 Hours **Max. Marks: 60**

Practical: 50

Record: 10

1. Perform the micropreparations for the given specimen **A, B** and **C.** **(8×3=24)**

(Identification – 2, Slide – 2, Reasons – 2and Diagram – 2)

2. Make suitable mushroom bed preparation of **D**. Leave the bed for valuation. **(10×1=10)**

3. Dissect and mount any one of the stages of the given material **E.** (Diagrams and notes not necessary) **(6×1=6**)

4. Name the genus and morphology of given part of **F** and **G.** **(2×2=4)**

(Genus – 1 and Morphology – 1)

5. Write notes on **H, I** and **J.** **(2×3=6)**

Key:

A and B	- Anatomy of Angiosperms – vegetative part
C	- Mushroom – microscopic examination
D	- Mushroom Cultivation—Preparation of Beds
E	- Embryo – Dicot - *Tridax*
F and G	- Macroscopic - Types of mushrooms
H, I and J	- Permanent slides (Anatomy, Embryology and Seed science)

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester – V -Core Course VII

Morphology and Taxonomy of Angiosperms

(Paper Code: 17U5BOC05)

Credit: 5

Hours: 60

Aim:

- To study the morphology, taxonomy and economic importance of angiosperms.

Objectives:

- Understand the morphology of the angiospermic plants.
- Understand the reproductive parts of the angiospermic plants.
- Understand the different types of angiosperms classification.
- Understand the vegetative and reproductive characters and economic importance of selected familie.

UNIT - I (12 Hours)

The parts of Plant, Root- Types and Modifications, Stem- Types, Aerial and Underground Stem Modifications, Leaf- Phyllotaxy, Simple and Compound leaves, Leaf parts - Leaf base, Stipule, Petiole, Lamina- shape, apex, margin, surface, texture, Venation and Modifications of leaf.

UNIT - II (12 Hours)

Inflorescence Types – Racemose, Cymose and special types (Cyathium, Hypanthodium). Flower- essential and non-essential parts and its arrangements (Bract, Bracteoles, calyx and corolla shapes, androecium, gynoecium- placentation, floral diagram and floral formula). Fruit - classification of fruits (Outline only). Seed dispersion and types of germination of seed.

UNIT - III (12 Hours)

History of Taxonomy - Systems of classification - Artificial system (Linnaeus) - Natural system (Bentham & Hooker), Phylogenetic system (Engler & Prantl), Merits and Demerits of their systems. Binomial nomenclature, Author citation. Herbarium Techniques and BSI.

UNIT - IV **(12 Hours)**

Terminology used in Taxonomy. A detailed study of the following families and their economic importance: Annonaceae, Nymphaeaceae, Capparidaceae, Rutaceae, Anacardiaceae, Fabaceae, Caesalpiniaceae, Mimosaceae, Cucurbitaceae, Apiaceae.

UNIT – V **(12 Hours)**

A detailed study of the following families and their economic importance: Rubiaceae, Asteraceae, Asclepiadaceae, Apocynaceae, Acanthaceae, Lamiaceae, Sapotaceae, Verbinaceae, Amarantaceae and Poaceae.

Text Books:

1. Gangulee, H. C., Das, K. S. and Datta, C. T. 1964. – College Botany – Volume I, Basant Panchami, Calcultta.
2. Pandey, S.N. and Misra, S. P. 2008. Taxonomy of Angiosperms. Ane Books Private Limited, New Delhi.
3. Pandey, P. B. 1989. Taxonomy of Angiosperms (Systematic Botany), S. Chand and Co. Ltd., New Delhi.
4. Pandey, B. P. 2000. Economic Botany, S. Chand and Co., New Delhi.
5. Singh. V. and Jain, D. K. 2004. Taxonomy of Angiosperms. Rastogi Publications, Meerut.
6. Sambamurty, A.V.S.S. 2005. Taxonomy of Angiosperms. I.K. International Pvt. Ltd., New Delhi
7. Vashista, P. C. 1997. Taxonomy of Angiosperms. S. Chand and Co., New Delhi.

Reference Books:

1. Lawrence, G. H. M. 1953. Taxonomy of Vascular Plants, Oxford and IBH Publishes, New Delhi.
2. Mathews, K. M. 1987 – 90. Flora of Tamil Nadu and Carnatic (1 – 4 Vols.) Rapinat Herbarium, Trichy.
3. Narayanaswamy, R. V and Rao, K. N. 1976. Outlines of Botany, S. Viswanthan Printers and Publishers, Madras.

PRACTICAL

1. Study of the morphology of angiosperms as mentioned in theory part, with the help of suitable examples.
2. Description of plants in technical terms.
3. Dissection of vegetative and floral parts of plants belonging to the above families.
4. Study of the Botany of the economic plants in the theory part.

5. Field trip to hill stations recommended for three to five days under the guidance of teachers.
6. Herbarium (minimum of 20 Herbarium sheets of weeds and common plants of Angiosperms) with the proper field note book shall be submitted at the Practical Examination.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester – V -Core Course VIII

Cell Biology and Genetics

(Paper Code: 17U5BOC06)

Credit: 5

Hours: 60

Aim:

- To study the structural and functional characters of cell and its organelles.

Objectives:

- To learn the basics of cell and its components.
- To understand the basic concepts of Mendelian genetics, its variations and its applications.
- To familiarize with the various concepts of evolution.

Unit – I **(12 Hours)**

Ultra structure of plant cell and cell theory. Cell wall, Plasma membrane: Chemical composition, Models for structure of membrane, Cell organelles: Structure and functions of Endoplasmic reticulum, Golgi complex, Lysosome, Peroxisome, Glyoxysome, Mitochondria, Chloroplast, Ribosomes and Nucleus.

Unit – II **(12 Hours)**

Nucleic acids: DNA structure, types, replication. RNA structure, types. Chromosome - Molecular structure of gene and chromosome. Types of chromosomes- based on the position of centromere, Polytene chromosome and lamp brush chromosomes. Cell cycle, Amitosis, Mitosis and Meiosis.

UNIT – III **(12 Hours)**

Definition of Genetics, Scope and applications of Genetics. Theories on inheritance : Vapor and fluid theories. Magnetic power theory, Preformation theories, Epigenetic theory, Particulate theories. Chromosome theory of heredity (Sutton - Boveri).

Johann gregor Mendel's experiments and laws of inheritance. Modifications of Mendelian ratios. Atavism, Penetrance, Expressivity, Pleiotropism. Incomplete dominance (in *Mirabilis*

jalapa), Dominant Lethal factors (in Mice), Recessive lethal factors (in *Snapdragon*), Complementary factors (flower colour in *Lathyrus odoratus*), Dominant Epistasis (Friut colour in *Cucurbita*), Recessive Epistasis (Petiole length in Tobacco) Multiple factors (Colour of wheat kernel) and Multiple alleles (Self sterility in *Nicotiana*, Blood groups in man).

UNIT – IV **(12 Hours)**

Linkage: Types- complete linkage and incomplete linkage. Linked groups, Factors affecting linkage. Crossing over: Types, Mechanism of crossing over and theories on crossing over. Cytological evidence for crossing over. Factors affecting crossing over. mapping of genes on chromosomes, sex linkage-Drosophila (eye colour) and humans (Haemophilia), cytoplasmic inheritance (plastid inheritance, male sterility in corn)

UNIT - V **(12 Hours)**

Sex determination in *Melandrium*. Mutation: Types. Chromosome variation in number and structure, Syndromes in man (Klinefelter's syndrome, Turner's syndrome, Down's syndrome, Mongolism). Detection in *Neurospora*, CLB technique to detect mutation. Population genetics: Definition, Hardy - Weinburg principle, significance and its application. Factors affecting gene frequencies, Gene pool, Genetic drift and frequency.

TEXT BOOKS:

1. David Freifelder. (1987). Molecular Biology. N. K. Narosa Publishing House, New Delhi.
2. Monroe W. Stickberger. (1985). Genetics. Rekha Printers Private Ltd., New Delhi.
3. Sambamurty, A. V. S. S. (2008). Molecular Biology. Narosa Publishing House Pvt. Ltd, Chennai.
4. Verma, P. S. and Agarwal, V. K. (2009). Genetics. S. Chand & Company Ltd., New Delhi.

REFERENCE BOOKS:

1. Robert H. Tamarin. (2002). Principles of Genetics. Tata Mcgraw – Hill Publishing Company Ltd., New Delhi.
2. Sumitra Sen, Dipak Kumar Kar, (2006). Cytology and Genetics. Narosa Publishing House Pvt. Ltd, New Delhi.
3. Sundararajan, S. (2000). Cytogenetics. Anmol Publications Pvt. Ltd., New Delhi.
4. Verma, P. S. & Agarwal, V. K. (2008). Cytology. Chand & Company Ltd., New Delhi.

PRACTICAL

Cell biology:

1. Study and Squash and Smear with suitable materials.
2. Study of induced aberrations in onion root tip using chemicals.
3. Observation of electron micrographs of sub-cellular structures.

Genetics:

1. Simple problems about segregation and independent assortment and gene interaction.
2. Chromosome mapping from three point test cross-data [Linkage and Crossing over percentage].
3. To study the population genetics problems applying Hardy-Weinberg law.

Model practical question paper for B.Sc., Botany Degree Examination

Core Major Practical III (For Core Course VII and VIII)

(Morphology and Taxonomy of Angiosperms, Cell Biology and Genetics) - 17U6BOCP03

Time: 3Hrs Maximum : 60 marks

Practical : 40 marks

Herbarium: 10 marks

Record : 10 marks

1. Refer **A** to their respective families. Point out the characters on which the identification is based at each level. (Diagrams not necessary) (5)

2. Describe **B** in technical terms. Draw diagrams of the floral parts only. Construct the floral diagram. Give the floral formula (5)

3. Dissect and mount the given part **C** for valuation**.** (Aestivation/ anther/ Placentation) draw diagrams (4)

4. Make acetocarmine preparations of **D** (squash) (any one stage) draw diagrams. (4)

5. Construct chromosome map with the data provided (5)

6. Solve the given genetic problems **E** and **F**. (6)

7. Write note on **G** (3)

8. Write the name of the Genus, species, Family and morphology of the useful Parts of **H** & **I** (8)

KEY:

A, B & C - Families under Taxonomy

D - Cell biology

E&F - Genetics

G - Cell biology spotters

H & I - Morphology

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester – V -Core Course IX

Plant Ecology, Phytogeography and Conservation Biology

(Paper Code: 17U5BOC07)

Credit: 5
Hours: 60

Aim:

- To bridge the basic concepts of ecosystem and its living forms.

Objectives:

- To acquire knowledge on vegetation, plant adaptation and environmental pollution.
- To understand the basic concepts of Mendelian genetics, its variations and its applications.
- To create awareness on conservation strategies and the importance of environment education.

UNIT – I **(12 Hours)**

Importance of study of Ecology, Concept, Components of Ecosystem – Biotic and Abiotic factors (Light, Temperature, Humidity and Wind). Study of plant communities - Autecology (Life forms, Peridiocity and floristic composition). Quantitative analysis of plant communities (Quadrat method).

UNIT – II **(12 Hours)**

Types of Ecosystem- Natural and artificial ecosystems, study of pond, grassland and forest ecosystem. Energy flow, food chain, food web and ecological pyramids. Biogeochemical cycles – Carbon Cycle, Nitrogen Cycle, Phosphorus cycle and Hydrological Cycle.

UNIT – III **(12 Hours)**

Vegetation - Development of vegetation-migration, ecesis, colonization. Plant succession hydrosere and xerosere. Plant adaptations – morphological and anatomical features – hydrophytes, xerophytes, epiphytes and parasites. Environmental pollution: Atmospheric

pollution- Air pollution, Soil Pollution, Water pollution, Noise pollution and radioactive pollution.

UNIT – IV **(12 Hours)**

Phytogeography: Range - Dispersal and migration barriers hypothesis, Continental drift Hypothesis and Age and Area hypothesis, Endemism, Hotspots. Continuous and discontinuous Distribution of Plants. Phytogeographical regions in India. Vegetations of India.

UNIT – V **(11 Hours)**

Conservation Biology - Introduction – Ecosystem approaches - Social approaches - Chipko movement. *In situ* conservation (Afforestation, Social Forestry, Agro Forestry and National parks and Sanctuaries) and *ex situ* conservation (Cryopreservation, Gene Banks, DNA Banks). Environmental Education.

TEXT BOOKS

1. Sharma, P.D. (2009).Ecology and Environmental, Rastogi Publishers, Meerut.
2. Shukla, R.S. Chande, I.P.S. (2012). Plant Ecology and Soil Science., S. Chand & Co., Chennai.
3. Vasishta, P. C, (1979), Plant Ecology, Vishal Publication. Kolkatta.
4. Verma V.A. (1981), A Text book of plant Ecology, Emkay publication, New Delhi.
5. Sharma, J.P. (2004). Environmental studies, Lakshmi Publications (P) Ltd, New Delhi
6. Kumaresan, V. Arumugam, N. 2015. Plant Ecology & Phytogeography, Saras Publication, Nagercoil.
7. Krishnamurthy, K. V. (2006). An Advanced Textbook on Biodiversity: Principles and Practice. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCES BOOKS

1. Edward J. Kormondy, (1996). Concept of Ecology, Prentice Hill of India Pvt, Ltd. New Delhi.
2. George L. Clarke (1954). Elements of Ecology. John Wiley & sons. Inc., New York.
3. Odum E.P. (1971). Fundamentals of ecology, W.B. Saunders Co., Phiadephia, London.
4. K.N.Bhatia (2005) A Treatise on Plant Ecology, Pradeep Publications , Jalandhar.
5. Robert Smith, (1977). Elements of ecology and field biology, Harper and Raw Publishers, New York, London.

6. Misra, R. (1986). Ecology work book, Oxford and IBH publishing company, New Delhi.

PRACTICALS

Study of Plant Communities – Simple Quadrat.

Study of the Morphological and Structural adaptation of hydrophytes, xerophytes, epiphytes and parasites to correlate to the particular habitat.

Phytogeographical regions in India, Types of forest and Vegetation. Types of Ecosystem.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester – V –Elective Course - II

Plant Breeding and Evolution

(Paper Code: 17U5BOS03A)

Credit: 3
Hours: 60

Aim:

- To study the plant breeding techniques and evolution.

Objectives:

- To learn the selection and methods of plant breeding.
- To acquire knowledge on various hybridization techniques.
- To understand the breeding and theories of evolution.
- To apply the breeding techniques for crop improvement.

Unit - I (12 Hours)

Introduction and objectives of plant breeding, its relationship with other sciences. Plant introduction, domestication and acclimatization. Selection and Methods of Plant Breeding- Pure, Clonal and Mass.

Unit - II (12 Hours)

Hybridization techniques - interspectific and intergeneric hybridization - heterosis. Hybrid vigour and utilization. Mutation in breeding- Spontaneous Mutations, Mutagens and Induced Mutations. Heterosis, Autoploidy, Polyploids in plant breeding. Genetic erosion: reasons and preventive methods.

Unit - III (12 Hours)

Plant production and haploid plants in breeding. Apomixes- importance of male sterility, Plant Breeding for Production of high yield varieties, developing Resistance to Insect Pest, Production of disease resistant varieties.

Unit - IV (12 Hours)

Breeding for crop improvement with reference to Paddy, Wheat, Sugarcane and Ground nut.

Unit - V **(12 Hours)**

Evolution -Origin of life-theories of organic evolution: Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Mutation theory and synthetic theory-speciation and isolating mechanisms. Modern synthetic theory of Molecular evolution.

Text Books:

1. Allard, R.W (1960). Principles of Plant Breeding. John Wiley & Sons, New York.
2. Chaudhari, H.K. 1984. Elementary Principles of Plant Breeding. Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.
3. Sharma, J. R. (1994). Principles and Practice of Plant Breeding, Tata McGraw Hill Publishing Co Ltd., New Delhi.
4. Shukla, R. S. and Chandel, P. S. (1977). Cytogenetics, Evolution and Plant Breeding, S. Chand & Co., New Delhi.
5. Verma, P. S. and Agarwal, V. K. (1998). Concepts of Evolution. S. Chand & Co, New Delhi.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester V –Elective Course - I

Intellectual Property Rights

(Paper Code: 17U5BOE01B)

Credits: 3
Total hrs.: 60

Aim:

- To study importance of Intellectual Property Rights, Patent and Copyrights.

Objective:

- Acquiring knowledge on protection of plant varieties, patent and copy rights.

Unit – I **(7 Hours)**

IPR in India and world: Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO). Patents - Objectives, Rights, Patent Act 1970 and its amendments. Procedure of obtaining patents, working of patents.

Unit – II **(7 Hours)**

Copyrights -Introduction, Works protected under copyright law, Rights, Transfer of Copyright, Infringement. Trademarks -Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defences, Domain name.

Unit – III **(7 Hours)**

Geographical indications -Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position. Protection of traditional knowledge - Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Unit – IV **(7 Hours)**

Protection of Plant Varieties Plant Varieties Protection-Objectives, Justification, International Position, Plant varieties protection in India. Rights of farmers, Breeders and Researchers. National gene bank, Benefit sharing. Protection of Plant Varieties and Farmers' Rights Act, 2001.

Unit –V **(7 Hours)**

Computer Software and Intellectual Property, Database and Data Protection, Protection ofSemi-conductor chips, Domain Name Protection.

Text Books:

1. Manjula Guru and Rao, M. B. 2003. Understanding Trips – Managing Knowledge in Developing Countries, Sage Publications.
2. Ganguli. 2001. Intellectual Property Rights: Unleashing the Knowledge Economy, TataMcGraw-Hill.
3. Arthur Raphael Miller, Michael H. Davis. 2000. Intellectual Property: Patents, Trademarksand Copyright in a Nutshell, West Group Publishers.
4. Jayashree Watal, Intellectual property rights in the WTO and developing countries, Oxford University Press, Oxford.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester V – Skill Based Elective Course - III

Horticulture and Nursery Management

(Paper Code: 17U5BOS03A)

Aim:

- To study the methods and gardening of horticultural crops

Objectives:

- To learn the basics and propagation methods of horticultural crops.
- To acquire knowledge on concepts of garden designing.
- To understand the importance of horticulture in human welfare.
- Easy to apply the nursery management techniques for the cultivation of various plants.

Unit - I **(7 hours)**

Horticulture – Definition, Disciplines, Principles, Scope and Importance. Classification of horticultural crops – Fruits and Vegetables. Growth regulators in horticulture. Preservation of fruits and vegetables. Storage of fruits and vegetables.

Unit - II **(7 hours)**

Gardening - Garden tools and implements, types of garden - ornamental gardens, indoor gardens, kitchen gardens, terrestrial and aquatic gardens. Garden adornments, garden designing, garden components- lawns, shrubs and trees, borders, hedges, edges, drives, walks, topiary, trophy, rockery. Famous gardens of India.

Unit – III **(7 hours)**

Vegetative propagation methods of horticultural crops- cutting, layering, budding and grafting. Advantages and disadvantages of vegetative propagation; micropropagation. Stock scion relationship in horticultural crops. Bonsai, Cut flowers. Flower arrangements - basic styles- upright and slanting. Japanese – ikebana and dry flower arrangement.

Unit – IV **(8 hours)**

Production technology – Olericulture - Cultivation of Brinjal and Cauliflower. Pomology - Cultivation of Apple and Pineapple. Commercial floriculture – Cultivation of jasmine and rose. Commercial horticulture - Extraction of Jasmine concrete and Papain.

Unit – V **(7 hours)**

Nursery - definition, types; management strategies- planning, layout, budgeting-production unit, sales unit. Types of soils and preparation of fields – Manures - organic and inorganic. Pots and containers – tools and implements – watering – types. Plant protection measures for horticulture.

Text Books:

1. Adams, C.R. and Early, M.P. (2004). Principles of Horticulture. Elsevier, New Delhi.
2. Barton West, R. (1999). Practical Gardening in India. Discovery Publishing House, New Delhi.
3. Chadha, K.L. (2001). Hand Book of Horticulture, ICAR Publications, New Delhi.
4. George Acquaah. (2009). Horticulture Principles and Practices. PHI Learning Private Limited, New Delhi.
5. Kumar, N. (2014). Introduction to Horticulture. Rajalakshmi Publications, Nagercoil.
6. Mazundar, B.C. and Mukhopadhyay, P.M. (2006). Principles & Practices of Herbal Garden. Daya Publishing House, New Delhi.
7. Percy Lancasher. (2004). Gardening in India. Oxford IBH Publishing Company Private Limited, New Delhi.
8. Sadhu, M.K. (1996). Plant Propagation. New Age International Publishers, New Delhi.

Sheela, V. L. (2011). Horticulture. MJP Publishers, Chennai.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester V – Skill Based Elective Course - III
Silviculture
(Paper Code: 17U5BOS03B)

Crdits:02
Total Hrs:36

Aim:

- To learn silviculture of economically important species.

Objective:

- Acquiring knowledge on principle, importance and agroforestry.

Unit –I **7 Hours**

Silviculture and its place in forestry. Stand establishment, intermediate operations and their effects on growth and yield. Control of understorey and overstorey vegetation. Silviculture of pure and mixed stands.

Unit –II **7 Hours**

Silviculture of economically important tropical species: *Acacia nilotica, A. auriculaeformis, A. mangium, Albizzia lebbek, Azadirachta indica, Melia azadirach, Prosopis juliflora, P. cineraria, Pithecelobium dulce, Bombax ceiba, Ceiba pentandra, Casuarina equisetifolia, Santalum album, Shorea robusta, Tectona grandis, Tamarindus indica, Terminalia arjuna, T. chebula, Dalbergia sissoo, D. latifolia.*

Unit –III **7 Hours**

Silviculture of economically important sub-tropical and temperate species: *Pinus roxburghii, P. kesiya, P. wallichiana, P. gerardiana, Cedrus deodara, Abies pindrow, Picea smithiana, Quercus spp, Rhododendron spp, and Alnus nepalensis.*

Unit –IV **7 Hours**

Scope, importance and units of measurement. Measuring instruments and procedures for tree and stand measurement. Stem form factor and form quotient. Tree and log volume estimation with empirical formulae, tables and forest inventory. Grading of forest products. Stump and stem analysis. Inventory planning, sampling size, frequency and probability proportional to area. Computeranalysis of inventory data.

Unit –V **7 Hours**

Farming systems - monoculture, multiple cropping, agro-and farm-forestry. Agroforestry systems - perspectives, classification, national and global importance, benefits and limitations. Land use systems in shifting cultivation, taungya and plantations. Choice of species and management practices for live fences, hedgerows, protein "banks", alley cropping, windbreaks and shelterbelts, hill-slope and terrace cultivation, watersheds and woodlots. Diagnosis and design of agroforestry systems.

Text Books:

1. Dhiman, A.K. 2003. Sacred plants and their medicinal uses. Daya publishing house, New Delhi.
2. Kollmann, F.F.P. and Cote, W.A. 1988. Wood science and Technology. Vol. I & II Springer Verlag, New York.
3. Mehta, T. 1981. A handbook of forest utilization. Periodical Expert Book Agency, New Delhi.
4. Rao, K.R. and Juneja, J.D. 1971. A handbook for field identification of fifty important timbers of India. The Manager of Publications, Govt. of India, New Delhi.
5. Sagreiya, K.P. 1994. Forests and Forestry (Revised by S.S. Negi). National Book Trust. New Delhi.
6. Sharma, P.D. 2004. Ecology and Environment. Rastogi Publications, Meerut.
7. Singh, M.P. and Vishwakarma, V. 1997. Forest environment and Biodiversity. Daya Publishing House, New Delhi
8. Tiwari, K.M. 1983. Social forestry in India. Nataraj Publishers, Dehra Dun.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester V – Skill Based Elective Course - IV

Forest Botany

(Paper Code: 17U5BOS04A)

Crdits:02

Total Hrs:36

Aim:

- To study the various types of forest and its beneficiary nature.

Learning Outcomes:

- To learn the cultivation methods following in the development of forest.
- To improve the knowledge on importance of forestry for social, ecological, economic cultural and environmental purposes.
- To understand the importance of trees for living beings.
- To participate in the conservation of forest.

UNIT – I (8 Hours)

Forest - Natural and Manmade, Types - Tropical, temperate, evergreen, semi evergreen, deciduous; Monoculture and Polyculture, Uses -multipurpose, social and industrial. Forest and gene conservation; Overview of Forest types in South India.

UNIT– II (7 Hours)

Silviculture: Method and scope of natural and artificial regeneration of forests. Classification of Silviculture system - Clear felling, uniform shelter, wood selection, coppice and conservation system. Silviculture practices in some plant species - *Tectona grandis*, *Eucalyptus*, *Terminalia arjuna*, *Dalbergia sissoo*, *Santalum album*, *Acacia nilotica*, *Hevea brasiliensis*.

UNIT – III (7 Hours)

Social forestry - social attitudes and community participation, Social forestry in India – objectives and mission. Social forestry - Avenue plantation. Agroforestry – objectives, classification and importance. Selection and utilization of trees in various purposes - Food,

fodder and energy. Sacred plants and their importance – *Ficus religiosa, Aegle marmelos, Azadirachta indica.*

UNIT – IV **(7 Hours)**

Trees –types and canopy structure. Seed orchards – types and establishment, seed dormancy - Types of dormancy, Methods of treatment for breaking down dormancy - physical and chemical methods. Forest laws - principles, Indian forest act 1927 and their amendments.

UNIT – V **(7 Hours)**

Forest products – timbers and non-timber forest products (Gums, resins, nuts, rubber and medicinal plants). Forest Protection in Indian Forestry – Injuries caused by agency like humans, animals and plants, and their control measures.

Text Books:

1. Chundawat, B.S. and Gautham, S.K. 1996. Text book of Agroforestry. Oxford and IBH publisher, New Delhi.
2. Dhiman, A.K. 2003. Sacred plants and their medicinal uses. Daya publishing house, New Delhi.
3. Kollmann, F.F.P. and Cote, W.A. 1988. Wood science and Technology. Vol. I & II Springer Verlag, New York.
4. Mehta, T. 1981. A handbook of forest utilization. Periodical Expert Book Agency, New Delhi.
5. Rao, K.R. and Juneja, J.D. 1971. A handbook for field identification of fifty important timbers of India. The Manager of Publications, Govt. of India, New Delhi.
6. Sagreiya, K.P. 1994. Forests and Forestry (Revised by S.S. Negi). National Book Trust. New Delhi.
7. Sharma, P.D. 2004. Ecology and Environment. Rastogi Publications, Meerut.
8. Singh, M.P. and Vishwakarma, V. 1997. Forest environment and Biodiversity. Daya Publishing House, New Delhi
9. Tiwari, K.M. 1983. Social forestry in India. Nataraj Publishers, Dehra Dun.
10. WF. 2007. Timber identification manual. TRAFFIC, New Delhi.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester V – Skill Based Elective Course - IV

Fundamentals of Computer Application

(Paper Code: 17U5BOS04B)

Credit: 2
Hours: 36

Aim:

- To learn various applications of computer.

Objectives:

- Understand the characteristics and types of computer.
- Understand the components and functions of digital computer.
- Understand the objectives and functions of operating system.
- Understand the MS - Excel.
- Understand the MS – Power point.

UNIT-I (7 hrs)

Introduction to computer: Introduction-type of computers-characteristics of computers-five generations of modern computers – classification of digital computer.

System: Introduction – microcomputers – personal computers – workstations – portable computers – minicomputers- mainframes – super computers- network computers.

Number systems: Introduction – decimal, binary, octal, hexadecimal number system.

UNIT-II (7 hrs)

Anatomy of digital computer: Functions and components of a computer- central processing unit- control unit- arithmetic logic unit – memory – register addresses – memory units: types of main memory. Input devices: keyboard- mouse- OCR-OMR-Touch screen. Output devices: Printers- plotter-Auxiliary storage devices.

UNIT-III (7 hrs)

Operating system objectives & functions: MS word – Learning word basics: Typing, Inserting, Selecting and Deleting text and inserting special characters. Formatting a word document: Enhancing text, Working with bulleted of number lists, Arranging text on a page,

Working with tabs, Moving and copying text, drag and drop. Working with longer document: Setting page options, Managing page breaks, working with headers and footers. using keyboard shortcuts to edit a word document.

UNIT-IV **(8 hrs)**

MS-Excel: Creating a simple spread sheet: Exploring the spread sheet, moving around the spread sheet screen, Entering data, editing data. Editing a spreadsheet: Learning selection techniques, inserting, deleting rows and columns. Working with functions and formula: Creating formulas, editing entries, copying formulas, creating an absolute reference in formula, using functions. Formatting worksheets: Formatting numbers, adjusting column width, setting, setting cell alignment, formatting with fonts. Completing your spread sheet- Preparing to print, Creating a chart, modifying a chart, deleting a chart.

UNIT V **(7 hrs)**

MS-Power point: Creating and viewing presentation: Creating a presentation, Adding text to a slide, Adding slides, adding bullet point text. Editing a presentation: Deleting and rearranging slides, Changing presentation designs, changing slide layouts, printing a presentation. Working with presentation special effects: Adding tables, inserting charts. adding transitions. Internet: Introduction, browsing, search engines.

Text books:

1. Diane Koers. (2001). Microsoft Office XP Fast and Easy. Prentice Hall of India Pvt. Ltd., New Delhi.

2. Alexis Leon and Mathews Leon. (2007). Introduction to Computers. Vikas Publishing House Pvt. Ltd., New Delhi

Reference Books:

1. Andrews. (2012). Computer Operating Systems. PHL Learning Pvt. Ltd., New Delhi.

2. Sumitabha Das, (2003) Unix-Concepts and Applications. Tata McGraw Hill Education Pvt. Ltd., New Delhi.

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester VI – Core Course - VIII

Plant Physiology and Biochemistry

(Paper Code: 17U6BOC08)

Credit: 5
Hours: 60

Aim:

- To study an overall perception about various physiological processes occurring in plants.

Objectives:

- To learn about absorption, translocation and utilization of water and other minerals in plants.
- To gain the information on secondary metabolites and phytohormones role in metabolic pathways in plant.
- To understand the energy flow and various metabolic cycles with the integration of plant.

UNIT – I (12 Hours)

Structure and properties of water- Diffusion, osmosis, osmotic pressure, osmotic potential, turgor pressure, imbibition, matric potential. Absorption of water (active and passive).Ascent of sap; concepts of symplast and apoplast. Guttation and transpiration, Macro and Micro nutrients; Role of essential nutrients in plant metabolism and their deficiency symptoms and control measures.

UNIT - II (12 Hours)

Photosynthesis in higher plants-Definition and Significance. Electromagnetic radiation. Photosynthetic apparatus -photosynthesis and its evidences. Red drop and Emerson enhancement effect. Absorption spectrum, Action spectrum, Photosystems I & II, Fluorescence and phosphorescence. Photochemical phase- Electron transport chain, Photophosphorylation- (cyclic and non cyclic), Z - Scheme of Photosynthetic Electron Transfer. Biosynthetic phase-Benson and Calvin cycle, Hatch and Slack pathway. Photorespiration.

UNIT - III **(12 Hours)**

The hormone concept in plants. Physiological effect of Auxins, gibberellins, cytokinins, abscisic acid and ethylene. Physiology of senescence and abscission. Plant movements- Phototropism, gravitropism. Nyctinastic and seismonatic movements. Photomorphogenesis: Phytochrome: chemistry and physiological effects. Photoperiodism Vernalization. Seed dormancy and germination.

UNIT - IV **(12 Hours)**

Biological nitrogen fixation, symbiotic nitrogen fixation in leguminous plants. Classification, Structure and functions of carbohydrates, Amino acids, Proteins and Lipids.

UNIT - V **(12 Hours)**

Respiration: respiratory substrates. Aerobic and anaerobic. Glycolysis. Kreb's Cycle and oxidative phosphorylation, energetics of respiration. Law of limiting factors. Enzymes Classification (IUB), Mechanism of enzyme action, Co-enzymes, inhibition, regulation: allosteric enzymes, Isoenzymes.

Text Books:

1. Devlin, R.M. (1969). Plant Physiology. Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi.
2. Jain, J.L. (1998): Fundamentals of Biochemistry. S. Chand & Co., New Delhi.
3. Jain, V.K. (1990). Fundamentals of Plant Physiology. S. Chand & Co., New Delhi.
4. Pandey, S.N. (1991). Plant Physiology. Vikas Publishing House (P) Ltd., New Delhi.
5. Sinha, R. K. (2007). Modern Plant Physiology. 2nd Edition, Tata McGraw Hill Publishing Co Ltd., New Delhi.
6. Verma, S.K. (1999). Plant Physiology & Biochemistry. S. Chand & Co., New Delhi.
7. Verma, V. (2001). A Text Book of Plant Physiology. Emkay Publications, New Delhi.

Reference Books:

1. Frank B. Salisbury and Cleon W. Ross (2002). Plant Physiology 3rd Edition. CBS Publishers and Distributors, New Delhi.
2. Harborne, J.B. (Eds.,) (2000). Plant Biochemistrty. Harcourt Asia (P) Ltd., India & Academic Press, Singapore.

3. Lincoln Taiz and Eduardo Zeiger (2002). Plant Physiology. 2nd Edition. Sinauer Associates, Inc. Publishers. Sunderland, Massachusetts.
4. Ray Noggle, G. and George J. Fritz (2004). Introductory Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi.

PRACTICALS

PLANT PHYSIOLOGY AND BIOCHEMISTRY

For demonstration only

1. Anaerobic respiration (Mercury experiment)
2. Demonstration of Hill reaction.
3. Effect of scarification on seed germination.
4. Demonstration of gravitropism using Klinostat.

To be performed by each student.

1. Effect of temperature and chemicals on membrane permeability.
2. Determination of DPD by plasmolytic method using onion/Rheo leaf.
3. Separation of plant pigments by paper chromatography
4. Determination of absorption and transpiration ratio of twigs.
5. Measurement of respiration rate using germinating seeds and flower Buds with simple respiroscope.
6. Determination of photosynthetic rate in water plants under different CO_2 Concentrations using Wilmott's bubbler.
7. Measurement of oxygen evolution under different coloured lights using Wilmott's bubbler.
8. Effect of light intensity on transpiration using Ganong's photometer.

Model practical question paper for B.Sc., Botany Degree Examination
Core Major Practical IV (For Core Course IX &XI)
(Plant Ecology, Phyto-geography, Conservation Biology, Plant Physiology and Biochemistry) - 176BOCP04

Time: 3 Hrs

Maximum : 60 marks
Practical : 50 marks
Record :10 marks

1. Outline the procedure, apparatus and materials required for investigating the physiological problem **A** assigned. Set up the experiment. Tabulate the data obtained and report the results. Leave the set up for valuation. (15)
2. Construct a simple quadrat **B.** Study the plant community and analyse the vegetation. (7)
3. Based on morphological and anatomical characters, assign **C** and **D** to their respective probable habitats. Draw suitable diagrams. Submit slides for valuation. (12)
4. Draw and comment on the set up **E.** (4)
5. Write a comment on **F**, **G**, **H** and **I**. (12)

Key:

A	**-** Plant physiology individual experiments
B	**-** Plant Ecology
C & D	**-** Plant Ecology
E	**-** Plant physiology demonstration
F, G, H & I	**-** Plant physiology/ Biochemistry/ Plant Ecology/ Phyto-geographical regions/Conservation Biology

Semester VI

Core course XII - Mini - Group - Project Work – 17U6BOPR01

4 Credits /6hrs/week

Project is a component of the active learning module that teaches approach and research techniques. Students would have a hand on experience in investigating a selected research problem where he/she shall be trained in framing and testing hypothesis through suitable research design. Students are required to select their research topic in the one of the following domain.

Allocation

- Students may select their broad research area during the end of the fourth semester and will be guided by a suitable research supervisor in the area allotted by the HOD.
- Each research supervisor may be allotted based on the number of students.
- Summer vacation may be used by the students to initiate their project work.

Objective of the study

- Topic investigated will have defined area of study.
- Project students will have hands on experience in all the basic instruments and techniques to conduct his/her original research.
- Minimum of 3 yrs of literature will be added in the review with recent publication of the year.

Evaluation

- Interim reports should be submitted by the students during the mid of sixth semester to the Head of the Department. This interim report should form the basis for the final project report. (Change in project work after the submission of interim report may be carried out only with prior permission of the HOD).
- Even research is carried out as a group, individual students will be evaluated.
- Evaluation will be based on the norms that will look into nature of the project work, the content of the dissertation, presentation duly summed up by a viva-voce examination.
- Attendance of the student for presentation and viva-voce is a must.

Dissertation format

- Introduction
- Review of literature
- Materials and methods
- Results
- Discussion
- Summary
- Bibliography

B. Sc., Botany

For Students Admitted from the academic year 2017 – 2018

Semester VI – Elective Course - II

Ethnobotany, Medicinal Plants and their Utilization

(Paper Code: 17U6BOE02A)

Credits: 03

Hours:60

Aim:

- To study the ethnobotany, various systems of Indian medicines, drug classification, drug adulteration, drug evaluation, cultivation of selected medicinal plants and certain important drugs.

Objectives:

- To acquire knowledge on ethnobotany, ethnic communities and application of ethnobotany.
- To understand the various Indian system of medicines and classification, adulteration and evaluation of drugs.
- To develop the skill of cultivation and utilization of medicinal plants.

Unit - I **(12 Hours)**

Ethnobotany: Definition; Ethnobotany in India, Ethnic communities of India and Tamil Nadu. Methods to study ethnobotany; Applications of Ethnobotany: Palaeo-ethnobotany. Folk medicines of ethnobotany, ethnomedicine and ethnoecology. Application of ethnomedicine to certain diseases- jaundice, diabetics, blood pressure and skin diseases.

Unit - II **(12 Hours)**

History, Scope and Importance of Medicinal Plants. Indian systems of Medicine: Siddha. Ayurvedha and Unani. Classification of crude drugs (Alphabetical, morphological, chemical, biological, pharmacological and chemotaxonomical).

Unit - III **(12 Hours)**

Breeding methods of medicinal plants – vegetative, asexual, sexual and tissue culture techniques. Drug adulteration. Drug evaluation – morphological or organoleptic, microscopic physical and chemical methods.

Unit - IV **(12 Hours)**

Cultivation, macro and microscopic characters, chemical constitutions and therapeutic uses of drugs from root (*Rauwolfia*), drugs from bark (*Cinchona*), drugs from stem of wood (*Ephedra*), drugs from underground stem (*Zingiber*), drugs from leaf (*Aloe*), drugs from flower (*Eugenia*), drugs from fruit (*Feronia*) and drugs from seeds (*Trigonella*).

Unit - V **(12 Hours)**

A brief account on drugs acting on central nervous system (Analgesics, CNS stimulants, CNS depressants and Hallucinogenics). Drugs used in disorders of gastrointestinal tract (Carminatives, emetics, Bulk laxatives and Purgatives) and cardio vascular drugs (Cardiotonics, Cardiac depressants and Antihypertensives).

Text Books:

1. Arumugam, K. R. and Murugesh, N. 2003. Text Book of Pharmacognosy. Sathya Publishers, Madurai.
2. Gokhale, S. B., Kokate, C. K. and Purohit, A. P. 2010. Pharmacognosy, Nirali Prakashan, Pune.
3. Jain. 2001. Medicinal Plants. National Book Trust, New Delhi.
4. Purohit and Vyas. 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd Edition, Agrobios Publication, Jodhpur.
5. Ravindra Sharma. 2003. Medicinal Plants of India (An Encyclopedia), Daya Publishing House, New Delhi.
6. Trivedi, P. C. 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios Publication, Jodhpur.

Reference Books:

1. Bhattacharya, A. K. and Hansda, R. 2003. Hand book of Medicinal Plants. Pointer Publishers, Jaipur.
2. Handa, S. S. and Kapoor, V. K. 1998. Pharmacognosy. Vallabh Prakashan, New Delhi.
3. Wallis, T. E. 1997. Text book of Pharmacognosy. C.B.S. Publishers and Distributors, New Delhi.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester VI – Elective Course - II
Analytical Techniques in Plant Science
(Paper Code: 17U6BOE02B)

Crdits:03
Total Hrs:60

Aim:

- To learn various analytical techniques involved in plant science.

Objective:

- Acquiring knowledge on principle and applications of instruments used plant science analysis.

Unit –I **12 Hours**

Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.

Unit –II **12 Hours**

Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, $CsCl_2$ gradient, analytical centrifugation, ultracentrifugation, marker enzymes.

Unit –III **12 Hours**

Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography.

Unit– IV **12 Hours**

Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteinsand nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE.

Unit – V **12 Hours**

Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of

dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit.

Text Books:

1. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
2. Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
3. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
4. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester VI – Elective Course - III
Bioinformatics
(Paper Code: 17U6BOE03B)

Crdits:03
Total Hrs:60

Aim:

- To learn basics and applications of bioinformatics.

Objectives:

- Acquiring knowledge on biological sequence databases.

Unit–I **12 Hours**

An introduction Bioinformatics, Branches of Bioinformatics, Aim, Scope and Research area of Bioinformatics. Databases in Bioinformatics - Introduction, Biological Databases, and Classification format of Biological Databases, Biological Database Retrieval System.

Unit–II **12 Hours**

Biological Sequence Databases - National Center for Biotechnology Information (NCBI): Tools and Databases of NCBI, Database Retrieval Tool, Sequence Submission to NCBI, Basic local alignment search tool (BLAST), Nucleotide Database, Protein Database, Gene Expression Database.

Unit–III **12 Hours**

EMBL Nucleotide Sequence Database (EMBL-Bank): Introduction, Sequence Retrieval, Sequence Submission to EMBL, Sequence analysis tools. DNA Data Bank of Japan (DDBJ): Introduction, Resources at DDBJ, Data Submission at DDBJ. Protein Information Resource (PIR): About PIR, Resources of PIR, Databases of PIR, Data Retrieval in PIR. Swiss-Prot: Introduction and Salient Features.

Unit–IV **12 Hours**

Sequence alignments - Introduction, Concept of Alignment, Multiple Sequence Alignment (MSA), MSA by CLUSTALW, Scoring Matrices, Percent Accepted Mutation (PAM), Blocks of Amino AcidSubstitution Matrix (BLOSUM).

Unit–V **12 Hours**

Applications of Bioinformatics - Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement.

Text Books:

1. Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications.Oxford University Press.
2. Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester VI – Skill Based Elective Course - V
Biofertilizers
(Paper Code: 17U6BOS05A)

Crdits:03
Total Hrs:60

Aim:

To study the basic principles of biofertilizer and national economy.

Objectives:

- Understand the plant nutrient management and biofertilizer.
- Understand the organic plant production methods.
- Understand the organic plant protection methods.

UNIT - I **(8 Hours)**

Biofertilizers - Introduction, History, definition Importance of Biofertilizers- ecofarming. Chemical fertilizers – Introduction – Definition - hazardous effect – Components of soil- Mineral particles, Humus, soil atmosphere, soil water and biological system. Properties of soils – Physical properties, chemical properties - acid soils – saline and alkaline. Soil microorganisms - soil flora, soil fauna and role of soil organisms.

UNIT – II **(7 Hours)**

Cyanobacteria as Biofertilizer – Inoculum preparation – small scale and large scale production. Factors affecting cyanobacterial growth. *Azolla* as Biofertilizer and other uses, Morphology and life cycle of *Azolla* and *Anabaena – azollae,* Nitrogen fixation by *Azolla,* Growth rate and Nitrogen input Factors affecting the growth of *Azolla,* Decomposition of *Azolla* and mobilization of its nitrogen, Methods of *Azolla* utilization, Control of insects and diseases.

UNIT – III **(7 Hours)**

Rhizobium inoculants– Classification - Plant tests, Maintenance of culture, Cultivation and mass production, Quality control, Methods of inoculation. *Azospirillum* inoculants, Isolation of *Azospirillum* from rice root. Identification and classification, Maintenance and cultivation, Crop response.

UNIT - IV **(7 Hours)**

Isolation of Phosphate – Solubilizing Microorganisms –*Pseudomonas, Bacillus* - Quantitative measurement of phosphate solubilization in culture medium, Agronomic Aspects.

Mycorrhiza - Isolation and identification of Ectomycorrhizal fungi, Inoculation Technique for Ectomycorrhizal Fungi. Isolation of VAM fungal spores, Inoculum production of VAM Fungi, Field Response.

UNIT - V **(7 Hours)**

Soil Fertility-Vermi Compost, Green Manure, Source of Natural Nitrogen in Rice Soil, Legume Green Manure, Stem Nodulating Green Manure, Green Manuring in India – Limitations. Organic Matter Decomposition. Vermiculture – Introduction, production and significance of vermin compost.

Text Books:

1. Ananthakrishnan, T. N. (1992). Emerging Trends in Biological Control of Phytophagous, Insects. Oxford & IBH Publishing Co Ltd., New Delhi.
2. Lampkin, N. (1990). Organic Farming. Press Books, Ipswich, UK.
3. Palaniappan, S. P. and Anandurai, K. (1999). Organic Farming – Theory and Practice. Scientific Publishers, Jodhpur.
4. Rao, B.V.V. (1995). Small Farmer Focused Integrated Rural Development: Socio-economic Environment and Legal Perspective. Parisaraprajna Parishtana, Bangalore.
5. Reddy M.V. (1995). Soil Organisms and Litter Decomposition in the Tropics. Oxford & IBH Publishing Co Ltd., New Delhi.
6. Sharma, A. (2002). Hand Book of Organic Farming. Agrobios, Jodhpur.
7. Singh, S. P. (1994). Technology for Production of Natural Enemies. PDBC, Bangalore.
8. Subba Rao, N.S. (2002). Soil Microbiology. Oxford & IBH Publishing Co Ltd., New Delhi.
9. Woolmer PL & Swift MJ. 1994. The Biological Management of Tropical Soil Fertility. TSBF & Wiley.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester VI – Skill Based Elective Course - V
Organic Farming
(Paper Code: 17U6BOS05B)

Credits:2
Hours:36

Aim:

- Understand the principles of organic farming.

Objectives:

- Understand the plant nutrient management and biofertilizer.
- Understand the organic plant production methods.
- Understand the organic plant protection methods.
- Understand the organic farming and national economy.

UNIT I **(7 hrs)**

Organic farming - Principle, Scope, definition, concept and development. Relevance of Organic farming to India and global agriculture and future prospects. Organic forming land preparation and water management - land use, soil fertility, minimum tillage, shelter, zones, hedges, pasture management, agro-forestry. Water use efficiency.

UNIT II **(7 hrs)**

Organic plant nutrient management - nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and Biofertilizers.

UNIT III **(7 hrs)**

Organic plant production: Farming systems, crop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity. Organic plant protection: Cultural, Mechanical, botanical pesticides, control agents, weed management, use of biocontrol agents.

UNIT IV **(8 hrs)**

Organic crop protection methods: Rice, Cowpea, Cucurbits, Mango, Banana, Turmeric. Livestock management in organic farming.

UNIT V **(7 hrs)**

Socio-economic impacts, Basic concept of economics - Demand, supply, Economic viability of farm. Basic principles of production, reducing expenses, ways to increase rerutns, cost of production system, organic farming and national economy. Marketing, Import and export

potential: Socio-economic impacts inspection, certification, labeling and accreditation procedures.

Text Books:

1) Ananthakrishnan, T. N. (1992). Emerging Trends in Biological Control of Phytophagous, Insects. Oxford & IBH Publishing Co Ltd., New Delhi.
2) Lampkin, N. (1990). Organic Farming. Press Books, Ipswich, UK.
3) Palaniappan, S. P. and Anandurai, K. (1999). Organic Farming – Theory and Practice. Scientific Publishers, Jodhpur.
4) Rao, B.V.V. (1995). Small Farmer Focused Integrated Rural Development: Socio-economic Environment and Legal Perspective. Parisaraprajna Parishtana, Bangalore.
5) Reddy M.V. (1995). Soil Organisms and Litter Decomposition in the Tropics. Oxford & IBH Publishing Co Ltd., New Delhi.
6) Sharma, A. (2002). Hand Book of Organic Farming. Agrobios, Jodhpur.
7) Singh, S. P. (1994). Technology for Production of Natural Enemies. PDBC, Bangalore.
8) Subba Rao, N.S. (2002). Soil Microbiology. Oxford & IBH Publishing Co Ltd., New Delhi.
9) Woolmer PL & Swift MJ. 1994. The Biological Management of Tropical Soil Fertility. TSBF & Wiley.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester VI – Skill Based Elective Course - VI
Herbal Home Remedies
(Paper Code: 17U6BOS06A)

Credits:2
Hours:36

Aim:

- To study the importance of herbal home remedies.

Objectives:

- Understand the role of the herbs in day-to-day life.
- Understand the herbal remedies and herbal first aid.
- Understand the herbal preparations and remedies of selected medicinal plants.
- Understand the organic plant protection methods.
- Understand the herbal medicine and food preparation methods.

UNIT – I **(7 Hours)**

History and role of the herbs in day-to-day life. Beneficial aspects of herbal plants as food - common greens, vegetables, fruit, seeds and edible oils (general account only).

UNIT – II **(7 Hours)**

Herbal remedies - herbal first aid, home remedies-for common cold, fever, headaches, migraines, digestive and respiratory disorders, ear, eyes, mouth and throat infections, Skin care using herbal products.

UNIT – III **(7 Hours)**

Herbal medicine preparation**:** Decoction, infusion, syrup, tincture and poultice. Food: herbal salad, chutney, soup and tea.

UNIT-IV **(7 Hours)**

Herbal preparation and remedies of *Solanum trilobatum, Centella asiatica, Cissus quadrangularis, Piper betel, Ocimum sanctum, Azadirachta indica, Curcuma longa, Zingiber officinalis* and *Lawsonia inermis.*

UNIT – V **(8 Hours)**

Herbal preparation and remedies of *Murraya paniculata, Aerva lanata, Tribulus terresteris, Lippia nudiflora, Aloe vera, Moringa oleifera, Vitex negundo, Allium sativum, Cardiospermum halicacabum* and *Solanum nigrum.*

Text Books:

1. Bentley, R. and Trimen, H. (2000). Medicinal Plants Volume –I – III. Asiatic Publishing House, Delhi.
2. Deshpande, D.J. (2006). A Hand Book of Medicinal Herbs. Agrobios, Jodhpur.
3. Edwin Jerald, E. & Sheeja Edwin Jerald. (1998). Text Book of Pharmacognosy and Phytochemistry, CBS Publishers & Distributors, New Delhi.
4. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. (2010). Pharmacognosy, Nirali Prakashan, Pune.
5. Prajapathi, N. D. (2013). A Hand Book of Medicinal Plants. Agrobios, Jodhpur.
6. Sairam, T. V. (1999). Home Remedies Volume – I – V. Penguin Books India, Gurgaon.

B. Sc., Botany
For Students Admitted from the academic year 2017 – 2018
Semester V – Skill Based Elective Course - IV
Green House Technology
(Paper Code: 17U6BOS06B)

Credits:02
Total Hrs: 36

Objective:

- To understand the basic details about organization and functioning of greenhouses.

Learning Outcome:

- To familiarize with crop management in greenhouse condition.

Unit – I **(7 Hours)**

Introduction - scope – classification of greenhouses - construction of greenhouse - heating unit - cooling unit - environmental control (light and temperature).

Unit – II **(7 Hours)**

Root media for greenhouses - fertilizers – organic and inorganic – liquidfertilizers – application of fertilizers - nutrient deficiencies and toxicities.

Unit – III **(7 Hours)**

Irrigation system in green houses – drip irrigation – micro irrigation - waterquality and water sanitation.

Unit – IV **(7 Hours)**

Diseases of greenhouse plants (bacterial, fungal, nematodes and viral diseases) – management of pest and diseases – integrated pest management.

Unit – V **(7 Hours)**

Importance of greenhouse technology – net houses – poly houses – low cost greenhouses - micropropagation and greenhouse planting of tissue culture transplants – advantages and disadvantages of greenhouse technology.

Text Books:

1. Sheela VL. Horticulture. MJP Publishers, Chennai, 2011.
2. Prasad S, Kumar U. Green House Management for Horticultural Crops. Agrobios India, 2012.
3. Pant V, Nelson. Green House Operation and Management. Bali Publication, 1991.