RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

(AUTONOMOUS)

AFFILIATED TO

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

B. Sc. GENERAL (SEMESTER PATTERN)

B. Sc. SECOND YEAR

BOTANY – CURRICULUM

(MCQ + THEORY PATTERN)

w. e. f. JUNE, 2014

ACKNOWLEDGEMENT

The Chairman , Board of Studies in Botany (UG) acknowledges the contributions of the members, Board of Studies in Botany, in structuring the under graduate Curricula. The abundant support and recommendations from the members for designing different courses have shaped this curriculum to this present nature.

Thanks to all the esteemed.

Chairman

Board of Studies in Botany

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INTRODUCTION

The Board of Studies in Botany (UG) recognizes that curriculum, course content and assessment of scholastic achievement play complementary roles in shaping education. The structured Curriculum for Undergraduate Programme of Botany envisages Undergraduate Education as a combination of general and specialized education, simultaneously introducing the concepts of breadth and depth in learning .It also stresses learning to learn rather than learning of specific lessons. The attempt is to prepare the students for life long learning by drawing attention to the vast world of knowledge of plants and introducing him to the methodology of systematic academic enquiry. With this in mind, we aim to provide a firm foundation in every aspect of Botany and to explain a broad spectrum of modern trends in Botany and to develop experimental, observational, computational skills also which lead him / her as an ambassador of sustainable development of our country.

OBJECTIVES

1. To know the importance and scope of the discipline.

2. To Inculcate interest in and love of nature with its myriad living forms.

3. To Impart knowledge of Science as the basic objective of Education.

4. To develop a scientific attitude to make students open minded, critical and curious.

5. To develop an ability to work on their own and to make them fit for the society.

6. To expose themselves to the diversity amongst life forms.

7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of biological materials and data.

8. To Make aware of natural resources and environment and the importance of conserving it.

9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient.

10. To Appreciate and apply ethical principles to biological science research and studies.

11. To enable the students to face NET, SET examinations.

12. To enable the students to face MPSC, UPSC and other competitive examinations successfully.

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B. Sc. GENERAL (SEMESTER PATTERN)

B. Sc. SECOND YEAR

BOTANY – CURRICULUM

(MCQ + THEORY PATTERN)

Semester	Paper No.	Paper Title	Lectures/ Practicals	Marks			Credits
				In Sem. Evaluation	End Sem. Evaluation	Total Marks	
III	V	Morphology and Taxonomy of Angiosperms	45	20	30	50	02
	VI	Economic Botany and Pharmacognosy	45	20	30	50	02
	Lab. Course III	Based on theory paper -V	12	--	--	25	01
	Lab. Course IV	Based on theory paper -VI	12	--	--	25	01
V	VII	Environmental Biology; Gardening and Land Scaping	45	20	30	50	02
	VIII	Plant Breeding and Biotechnology	45	20	30	50	02
	Lab. Course V	Based on theory paper -VII	12	--	--	25	01
	Lab. Course VI	Based on theory paper -VIII	12	--	--	25	01
					Total	**300**	**12**

Workload:
1. Theory: Three Lectures / Paper / Week.
2. Practical: One practical (Three Lectures) / Batch / Week

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
(MCQ + Theory Pattern)

BOTANY

Theory Paper-V: Morphology and Taxonomy of Angiosperms

Periods – 45 Maximum Marks – 50

Objectives:

The student will be able to:

1. Describe the function of classification.
2. Distinguish between taxonomy and systematics and be able to identify a classification as systematic or taxonomic.
3. Describe the reasons for preferring natural classifications over artificial classifications.
4. Describe the reason that classical taxonomy is an hierarchical scheme of classification.
5. Describe the role that key characteristics play in taxonomy.
6. Describe why consistency is both valuable for taxonomy and hard to achieve.
7. Relate the reason that botanical taxonomy uses "division", rather than "phylum" as the hierarchical level below that of kingdom and above that of class.
8. Define different taxonomic terms.

COURSE OUT COMES

1) Students are able to distinguish between taxonomy and systematic.
2) Able to correlate the reason that botanical Taxonomy study as hierarchical level.
3) Able to describe the reasons for performing natural classification over artificial classification.

Unit-I: Morphology of Angiosperms-I (10 L)**:**

1. Root: Definition, characters, types (taproot and adventitious) and functions.
2. Stem: Definition, characters, modifications (stem tendril, runner, and rhizome) and functions.
3. Leaf: Definition, structure of typical leaf (Hibiscus), Types of leaf apex and margin, Functions, Types, Phyllotaxy and Venation.

Unit-II Morphology of Angiosperms-II (10 L)**:**

1. Inflorescence: Definition, structure of typical inflorescence Types- Racemose and Cymose.
2. Flower: Definition, structure of typical flower (Hibiscus), symmetry and types (hypogynous, epigynous, perigynous).
3. Fruit: Definition and its Types.

Unit-III: Taxonomy of Angiosperms (12 L)**:**

1. Introduction,
2. Scope and objectives of angiosperm taxonomy.
3. Botanical Survey of India (BSI).
4. Binomial nomenclature,
5. Chemotaxonomy and Cytotaxonomy.
6. Taxonomic ranks.
7. Types of classification (artificial, natural and phylogenetic)
8. Bentham & Hooker's system of classification with merits and demerits.

Unit-IV: Study of families (13 L)**:**

Distribution, vegetative morphology (habitat, habit, root, stem, leaf), Reproductive morphology (inflorescence, flower, pollination, fruit) Floral Formula, Floral Diagram, Systematic position (as per Bentham & Hooker system) Distinguishing characters and Economic importance of plants (at least two) of the following families:

1. Brassicaceae.
2. Fabaceae.
3. Solanaceae.
4. Lamiaceae.
5. Euphorbiaceae.
6. Poaceae.

SUGGESTED READINGS :

1. A Text Book of Systematic Botany	Sutaria R N
2. Taxonoy of Angiosperms	Pandey S N and Mishra S D
3. Taxonomy of Angiosperms	Sambamurthy A V S
4. Taxonomy of Angiosperms	Vashishta P C
5. Modern Plant Taxonomy	Subramanyam N S
6. Principles of Angiosperms Taxonomy	Davis P. H. and Heywood V.H.
7. Angiosperms	Chopra G.L
8. Taxonomy of Angiosperms	Kumarsen Annie
9. Introductory Taxonomy of Angiosperms	S.Sundara Rajan
10. Flora of Osmanabad.	Naik, V.N. (1969)
11. Flora of Marathwada	Naik, V.N. (1998)

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
(MCQ + Theory Pattern)

BOTANY
Theory Paper-VI Economic Botany and Pharmacognosy

Periods – 45 Maximum Marks – 50

Objectives:

The student will be able to:

1. Acquire good knowledge about economic importance of cereals, pulses, oilseed crops.
2. acquire good knowledge about chemistry of active constituents of medicinal plants.
3. Know methods of isolation of active constituents of medicinal plants.
4. Identify and estimate of active constituents of medicinal plants.

COURSE OUT COMES

1) Students acquired good knowledge about economic importance of cereals, pulses crops.
2) Able to identify and estimate active constituents of medicinal plants.
3) They are able to analyze active constituents of Medicinal plants.

Unit-I: Economic Botany -I (10 L):

Introduction:

Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of the following-

1. Cereals (Wheat).
2. Pulses (Pigeon pea).
3. Fiber yielding plants (Cotton).

Unit-II: Economic Botany-II (10 L):

Botanical name, family, distinguishing characters (at least two), method of cultivation

and economic importance of the following-

1. Oil yielding plants (Soybean, Sunflower)
2. Timber yielding plants (Teak, Neem)
3. Medicinal plants (Aloe,Withania)

Unit-III: Introduction to Pharmacognosy (11L)

1. History, definition and scope of Pharmacognosy
2. Traditional and alternative systems of medicine
3. Classification of crude drugs.
4. Concept of active principle (Five examples)

Unit-IV: Ayurvedic Pharmacy (14L)

1. Introduction
2. Tridosha concept.
3. Indigenous systems of medicine (Ayurveda, Siddha, Unani).
4. Ayurvedic principles- Ras, Guna, Vipaka, Virya, Prabhava.
5. Ayurvedic formulations – Asava, Arishta, Kvatha, Churna, Ksharas, Leha, Vatika, Taila, Bhasma.
6. Drug adulteration.
7. Study of drugs w.r.t. occurrence, distribution , morphological characters, constituents and uses of *Adhatoda* (Leaf drug)

SUGGESTED READINGS :

1. Economic Botany	Pandey B. P (1987)
2. Text book of Economic Botany	Verma V. (1984)
3. Economic Botany,	Hill A.W (1981)
4. Economic Botany.	Albert, F.H. .
5. Economic Botany	Hill, A.F
6. Pharmacognosy	Trease and Evans
5. Pharmacognosy	Shah and Qadry
7. A Text Book of Pharmacognosy	Ghani A.
8. Text book of Pharmacognosy	M. Ali.
9. Practical Pharmacognosy	Kokate C.K.,
10. Pharmacognosy	Kokate C.K. Purohit A.P. and Gokhale S.B.
11. Pharmacognosy	Trease G.E. and Evans. W.C. · Tyler V.E Brady
12. Bhaishyajakalpana	Vaidya S.S. and Dole.V.A
13. Text book of pharmacognosy	Wallis,T.E.

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – IV
(MCQ + Theory Pattern)

BOTANY
Theory Paper-VII Environmental Biology ; Gardening and Land Scaping

Periods – 45 Maximum Marks – 50

Objectives:

The main objectives of this course are
1. to provide an understanding for the fate and impact of pollution on "organic" life.
2. to characterize the biological impacts of toxins and contaminants on "organic life".
3. to critically evaluate environmental topics in the media and the science behind these studies.
4. to learn an understanding of the methods of gardening.
5. to understand the technique potting.
6. to know aesthetic importance of garden.

COURSE OUT COMES

1) Able to understand methods of gardening.
2) Able to characterize the biological impacts of toxins and contaminants on organic life.
3) Provided with understanding for the fate and impact of pollution on organic life.

UNIT – I: ENVIRONMENTAL BIOLOGY-I (*12 L)*

1. Ecology – Definition and Scope
2. Structure of ecosystem (Abiotic and Biotic)
3. Types of ecosystem (Pond ecosystem and Forest ecosystem)
4. Ecological pyramids and energy flow
5. Food chain and Food web
6. Morphological and anatomical adaptations of plants to water stress conditions
i. Hydrophytes –Lotus leaf (petiole)
ii. Xerophytes – Nerium leaf

UNIT – II: ENVIRONMENTAL BIOLOGY-II *(10 L)*

1. Pollution: Causes, effects and control measures of:

i. Water pollution,
ii. Soil pollution
iii. Air pollution

2. Aforestation and deforestation

3. Chipko movement

UNIT – III: Gardening (13 L)

1. Scope and objectives of gardening
2. Style of gardens: Formal, Informal
3. Types of gardens: English, Mughal, Hindu-Buddhist and Japanese.
4. Components of garden
5. Pots and container
6. Essentials of pot culture
7. Potting compost
8. Potting

UNIT – IV LANDSCAPE DESIGNS *(10 L)*

1. Landscape Design: Definition, Landscape elements of construction

2. Computer application in landscape

3. Hedges for gardens & farms

4. Lawns & Grasses: Planting methods, maintenance, pest management

5. Development of flowerbeds and their designs

6. Preparation of Bonsai and Flower Arrangement

SUGGESTED READINGS :

1. A text book of Plant Ecology	Ambasht R.S.
2. Fundamentals of Ecology	Dash M.C.
3. Ecology.	Michael S.
4. Ecology and Environment	Sharma, P.D.
5. Modern Concepts of Ecology	Kumar H.D.
6.Fundamentals of Ecology	E.P. Odum
7.Environmental Chemistry	A.K. De
8.Environmetal Biology	Biswarup Muhkerjee
9.Modern Concepts of Ecology	H.D.Kumar
10.Environmental Science	Turk and Turk
11.Manual of Field Ecology	R. Mishra
12.Plant Ecology	Ambhast
13.Air Pollution Vol I	A.C. Stern
14.Environmental Impact Assessment	Larry Canter,
15.Environmental management	Biswarup Muhkerjee V.
16.Pollution Biology:	Hyne
17.Nursery and Landscaping	Veena Amarnath
18. Indoor Gardening	S.C.Day
19. Gardening	Parimal Mehra

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – IV
(MCQ + Theory Pattern)
BOTANY
Theory Paper-VIII Plant Breeding and Biotechnology

Periods – 45 Maximum Marks – 50

Objectives:

The main objectives of this course are

1. To understand different methods of plant breeding.
2. To acquire good knowledge about techniques in genetic engineering.
3. To acquire good knowledge about tissue culture in plants.
4. To understand methods of isolation of protoplasts and its fusion.
5. To understand the importance of GMO.

COURSE OUT COMES

1) Able to explain different methods of plant breeding..
2) Performs independently isolation of protoplasts and its fusion .
3) Developed skill in genetic engineering.

Unit-I: PLANT BREEDING-I (10L)

1. Definition, Aims and Objectives
2. Methods of Plant Breeding:
   i. Plant introduction and acclimatization
   ii. Mass Selection
   iii. Pure line selection.
   iv. Clonal selection.

Unit-II: PLANT BREEDING-II. (10L)

1. Hybridization
2. Heterosis and hybrid vigour
3. Mutation breeding
4. Polyploidy
5. Breeding in cotton

UNIT-III: BIOTECHNOLOGY – I (13)

1. Genetic Engineering: .
   i. Definition, scope and importance

ii. Tools: a) Restriction Endonucleases
b) Vectors: plasmids, cosmids.
iii. Technique of r-DNA
iv. Genomic and c-DNA libraries

2. Agrobacterium mediated gene transfer: (Biology of *Agrobacterium*, Ti - plasmid, and *Agrobacterium* mediated transfer technique),

4. Transgenic plants.

UNIT –IV: BIOTECHNOLOGY – II (12)

1. Tissue culture:
- **i.** Introduction,
- **ii.** Concept of Totipotency of cell,
- **iii.** Basic aspects of tissue culture laboratory,
- **iv.** Technique of tissue culture
- **v.** Callus culture, differentiation and morphogenesis.

2. Applications of Tissue culture:
- **i.** Micropropagation,
- **ii.** Production of secondary metabolites,
- **iii.** Somatic hybridization,
- **iv.** Anther culture and production of haploids.

SUGGESTED READINGS :

1. Plant Breeding: Principles and Methods. 7th edition	Singh, B.D. (2005)
2. Principles of plant breeding.	Allard, R.W. (1960).
3. Plant Breeding: Theory and Practice 2nd edition.	Chopra, V.L. (2000). New Delhi.
4. Plant Breeding: Mendalian to Molecular Approaches.	Jain, H. K. and Kharwal, M.C. (2003)
5. Advances in Plant Breeding. Vol 1 and 2,	Mandal, A.K., Ganguli, P.K., Banerjee,
6. Principles and Practices of Plant Breeding	Sharma, J. R
7. Plant Breeding	H.K. Chowdhari
8.Biotechnology An Expanding Horizons	B.D.Singh
9. Biotechnology	Verma S.K.

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
BOTANY
Lab. Course-III
(Based on theory paper – V)

Practicals: 12 Marks: 25

Practical 1: Study of Root and its modifications.

Practical 2: Study of Stem and its modifications.

Practical 3-4: Study of Leaf.

Practical 5: Study of Inflorescence.

Practical 6-7: Study of flower.

Practical 8-13: Description, identification and classification of the plants with floral formulae and floral diagrams of their families (mentioned in theory syllabus).

Practical 14-15: Botanical excursions (one long excursion =3practicals).

N.B : Any ten Practicals

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
BOTANY
Lab. Course-IV
(Based on theory paper - VI)

Practicals: 12 Marks: 25

Practical 1: Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of Wheat and pigeon pea.

Practical 2: Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of Soybean and Sunflower.

Practical 3: Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of Cotton.

Practical 4: Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of Neem and Teak.

Practical 5: Botanical name, family, distinguishing characters (at least two), method of cultivation and economic importance of *Aloe* and Withania.

Practical 6-: Histochemical tests of food storing tissue in pigeon pea, Wheat, lignin and cellulose.

Practical 07: Extraction of pectic substance.

Practical 08: Extraction of Tannin.

Practical 09-11: Preparation of ayurvedic formulations (as per syllabus) .

Practical 12: Botanical excursion.

N.B : Any Ten practicals

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
BOTANY
Lab. Course-V
(Based on theory paper -VII)

Practicals: 12 Marks: 30

Practical 1: Study of morphological and anatomical adaptations in hydrophytes – *Lotus petiole*

Practical 2: Study of morphological and anatomical adaptations in xerophytes – *Nerium.*

Practical 3: Determination of water holding capacity of different soils.

Practical 4: Estimation of salinity of different water samples.

Practical 5-6: Study of vegetation by quadrate method.

Practical 7: Determination of pH of different soils by pH paper/ pH meter.

Practical 8: Garden tools and implements.

Practical 9: Different types of pots.

Practical 10: Procedure of potting.

Practical 11: Preparation of Bonsai.

Practical 12-13: Visits to Gardens, Nurseries, Agriculture Colleges/Universities, Exhibitions, Polyhouses, Flower shows etc.

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N.B :Any Ten practicals

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Second Year
Semester – III
BOTANY
Lab. Course-VI
(Based on theory papers - VII)

Practicals: 12 Marks: 25

Practical 1-3: Colchicine treatment to induce tetraploidy in onion root cells.

Practical 4-5: Demonstration of techniques of hybridization (emasculation, pollination, tagging and bagging)

Practical 6-7: Effect of physical or chemical mutagens on crop plants (photographs) of M_1 and M_2 population.

Practical 8-9: Preparation and sterilization of the MS medium, slant preparation and inoculation.

Practical 10-11: Demonstration of techniques in callus culture and somatic hybridization

Practical 12-13: Visit to Plant breeding station, tissue culture laboratory/ Biotechnology institute is compulsory.

N.B : Any Ten practicals