Estd. 1962
"A++" Accredited by NAAC (2021)
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SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

SU/BOS/Science & Technology / 134 **Date: 15/02/2024**

To,

The Principal,
All affiliated colleges,
Shivaji University, Kolhapur.

Subject: Regarding minor changes in the syllabi of B.Sc.Part-I (Botany) as Per NEP-2020 under the Faculty of Science & Technology.

Sir/Madam,

With reference to the subject mentioned here above, I am directed to inform you that the university authorities have accepted and granted approval to the minor changes in the syllabi of B.Sc.Part-I Botany under the Faculty of Science & Technology.

This minor change in said Syllabus of will be implemented from the academic year 2024-25.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar
Dr. S.M.Kubal

Copy to :-

1	The Dean, Faculty of Science & Technology	8	Appointment Section
2	The Chairman, Respective, BOS	9	Centre for Distance Education
3	Exam Section	10	Computer Centre
4	Eligibility Section	11	Affiliation Section (U.G.)
5	O.E. I Section	12	Affiliation Section (P.G.)
6	O.E. II Section	13	P.G.Admission Section
7	O.E. III Section	14	P.G.Seminar Section

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दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

SU/BOS/Science/876 **Date: 26/12/2023**

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur

Subject: Regarding syllabi of B.Sc. Part-I (Sem. I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of B.Sc. Part-I (Sem. I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

B.Sc.-I (Sem. I & II) as per NEP-2020 (2.0)			
1.	Mathematics	7.	Electronics
2.	Statistics	8.	Chemistry
3.	Physics	9.	Sugar Technology (Entire)
4.	Botany	10.	Geography
5.	Microbiology	11.	Geology
6.	Industrial Microbiology	12.	Zoology

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website **www.unishivaji.ac.in**)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	8	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	9	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	10	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	11	Centre for Distance Education

SHIVAJI UNIVERSITY, KOLHAPUR.

A^{++}

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Revised Syllabus For

B. Sc. I Botany (MAJOR/MINOR)

(Faculty of Science & Technology)

Paper –I, II - (Semester- I)

and

Paper -III, IV - (Semester-II)

(NEP-2020) Syllabus to be implemented from July, 2024 onwards.

Level	Semester	1-Major		2-Major	3-OE	4-SEC	5-AEC, VEC, IKS			6-OJT, FP, CEP, CC, RP			Total Credits
		Major		Minor	IDC/MDC/ OE/GE	SEC	AEC (Language)	Value Education Courses (VEC)	IKS	CC	Summer Internship/Field Porject / OJT	Research project/ Dissertation	
		DSC	DSE	MIN	OE								
	I	DSC-I (2) DSC-II (2) DSC-Pract.-I (2)		Minor-I (2) Minor-II (2) Minor pract-II (2)	IDC/MDC/OE-I-(2) IDC/MDC/OE-II (2) (T/P)	SEC-I(2) SEC-Pract.-I(2)			IKS-I(2) Intro. To IKS			-	
	Credits	4+2=6		4+2=6	2+2=4	2+2=4			-			-	22
	II	DSC-III(2) DSC-IV(2) DSC-Pract.-II(2)		Minor-III(2) Minor-IV(2) Minor pract-II(2)	IDC/MDC/OE/III (2) IDC/MDC/OE-IV (T/P)(2)	SEC-II(2) SEC-Pract.-II(2)		VEC-I(2) Democracy				-	
	Credits	4+2=6		4+2=6	2+2=4	2+2=4		2					22
	1st year cum.credits	12		12	8	8		2	2				44

First Year Semester-I&II

Level	Sem	1-Major		2-Major	3-OE	4-SEC	5-AEC, VEC, IKS			6-OJT, FP, CEP, CC, RP			Total Credits
		Major		Minor	IDC/MDC / OE/GE	SEC	AEC (Language)	Value Education Courses (VEC)	IKS	CC	Summer Internship /Field Project/ OJT	Research project/ Dissertation	
		DSC	DSE	MIN	OE								
	I	DSC-I (2) Phycology and Microbiology DSC-II (2) Biomolecules and Cell Biology DSC-Pract.-I(2) Practical Course-I		Minor-I (2) Phycology and Microbiology Minor-II(2) Biomolecules and Cell Biology Minor pract-II (2) Practical Course-I	IDC/MDC /OE-I (2)(T/P) Biofertilizers and Manures IDC/MDC /OE-II (2) (T/P) ---	SEC-I(2) Herbal Drug Technology -I SEC-Pract.-I(2) Practical -I			IKS-I(2) Intro. to IKS			-	
	Credits	4+2=6		4+2=6	2+2=4	2+2=4			-			-	22
	II	DSC-III(2) Mycology and Phytopathology DSC-IV(2) Archegoniate DSC-Pract.-II(2) Practical Course-II		Minor-III (2) Mycology and Phytopathology Minor-IV (2) Archegoniate Minor pract-II (2) Practical Course-II	IDC/MDC /OE/III(2) Gardening Technique III IDC/MDC /OE-IV (T/P)(2) ---IV	SEC-II(2) Nursery Management SEC-Pract.-II(2) Practical-I		VEC-I(2) Democracy				-	

	Credits	4+2=6		4+2=6	2+2=4	2+2=4		2					22
	1st year cum. Credits	12		12	8	8		2	2				44

13. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

(Introduced from August 2022 onwards)

Old Syllabus (Semester pattern)			**Revised Syllabus (Semester pattern)**	
Paper No.	**Title of Old Paper**	**Semester No**	**Paper No.**	**Title of New Paper**
I	Microbes, Algae and Biofertilizers	**I**	**I**	Phycology and Microbiology
II	Cell biology and AnalyticalTechniques	**I**	**II**	Biomolecules and Cell Biology
III	Mycology, Phyto pathologyand Mushroom Cultivation	**II**	**III**	Mycology and Phytopathology
IV	Archegoniate (Bryophytes, Pteridophytes and Gymnosperms)	**II**	**IV**	Archegoniate

14. SPECIAL INSTRUCTIONS, IF ANY. --- Nil

Semester- I

Botany Paper I: DSC-13 A: Phycology and Microbiology

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1	**Phycology**		
	1. **Algae**	i) General characteristics ii) Diversity with respect to habit and habitats iii) Economic importance iv) Classification (as per G. M. Smith, 1955) up to classes v)Life cycle (excluding developmental stages of sex organs) of the following types a) Cyanophyceae: *Nostoc* b) Chlorophyceae: *Spirogyra*	14
2	**Microbiology**		
	2.1 Viruses	i) Discovery and General characteristics ii) General structure of viruses: Helical, Icosahedral and Complex iii) Types of viruses- DNA viruses (T- Phage), RNA viruses (TMV) iv) Economic importance	08
	2.2 Bacteria	i) Discovery and General characteristics ii) Cell structure iii) Forms of bacteria based on shapes iv) Reproduction – vegetative, asexual and recombination (conjugation) vi) Economic importance	08
Total Lectures			**30**

SEMESTER –I

Botany Paper II: DSC-14 A: Biomolecules and Cell Biology

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Biomolecules**		
	1.1 Carbohydrates	Introduction, Nomenclature, classification and definition of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides with one example	**04**
	1.2 Lipids	Introduction, Definition, Properties and Significance.	**03**
	1.3 Proteins	Introduction, Definition, Properties and Biological role of proteins.	**03**
	1.4 Nucleic acids	Introduction, Watson and Crick model of DNA, Types of RNA and Role of nucleic acids.	**05**
2.	**The cell**		
	2.1 Cell	Introduction, Structure of prokaryotic and eukaryotic cells.	**02**
	2.2 Cell wall and plasma membrane	Introduction, structure and function of Plant cell wall. Plasma membrane: fluid mosaic model.	**03**
	2.3 Cell division	Cell cycle, mitosis, meiosis and significance	**05**
	2.4. Cell Organelles	Structure and functions of Nucleus, Chloroplast, Mitochondria, Ribosomes, Peroxisomes, Glyoxisome	**05**
Total Lectures			**30**

SEMESTER –II

Botany Paper III: DSC-13B: Mycology and Phytopathology

CREDIT: 2. LECTURE PERIODS: 2.5 PER WEEK- LECTURE HOURS; 2 PER WEEK MARKS: 50

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Mycology**		
	1.1Fungi – A)	i) General characters of fungi ii) Classification of fungi up to class as per Ainsworth (1973). iii) Economic importance	**05**
	B)	Life cycle (excluding developmental stages of sex organs) of the following types- a) Zygomycotina: *Mucor* b) Ascomycotina: *Penicillium*	**10**
	1.2Lichens	i) Occurrence and General characters ii) Nature of association iii) Types of lichens (Crustose, Foliose and Fruticose) iv) Economic importance	**04**
2	**Phytopathology**		
	2.1 Concepts in Phytopathology	i) Introduction to phytopathology ii) Plant disease triangle components. iii) Koch's postulate iv) Terminology of plant Diseases - Localized, Systemic, Soil borne, Air borne, Seed borne, Endemic, Epidemic, Sporadic diseases. v) General symptoms of plant diseases- (Leaf spot, Blight, damping off, wilting, Dieback, Cankers, Chlorosis, Smut, Rust, Powdery mildew.	**06**
	2.2 Plant diseases	i) Study of following plant diseases with respect to symptoms and control measures- **a) Viral** – Yellow vein mosaic of Bhendi **b) Bacterial** – Citrus Canker **c) Fungal** – White rust of crucifers **d) Mycoplasma (MLO)-** Grassy shoot of sugarcane	**05**
		Total Lectures	**30**

SEMESTER –II

Botany Paper IV: DSC-14B: Archegoniate

CREDIT: 2. LECTURE PERIODS: 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Archegoniate**		
	1.1 Bryophytes	i) General characters and importance ii) Diversity with respect to habitats iii) Classification as per G.M. Smith (1955) up to classes iv) Important features and life history (excluding developmental stages) of ***Funaria***	**10**
	1.2 Pteridophytes	i) General characters and importance ii)Classification as per G.M. Smith (1955) up to classes Morphology, anatomy (leaf and stem) and life cycle (excluding developmental stages sex organs) of ***Pteris***	**10**
	1.3 Gymnosperms	i) General characters and importance ii) Classification as per Sporne (1965) up to classes Important features and life history (excluding developmental stages) of ***Cycas***	**10**
Total Lectures			**30**

Nature of theory question paper and scheme of marking: Total 40 Marks/ Per paper

Q. 1. Multiple choices questions (8-questions). 8 Marks

Q. 2. Attempt any two of the following (out of three). 16 Marks

Q. 3. Write short notes any four of the following (out of six). 16 Marks

Follow the rules of Shivaji University Kolhapur regarding NEP-2020 syllabus and examination.

Semester I

Practical based on paper I and II

Total Marks 50

1. Study of compound and dissecting microscope.
2. Study of T-Phage and TMV viruses with the help of Electron microphotographs/models
3. Study of Bacterial forms (Temporary / permanent slides/ photographs).
4. Study of vegetative and reproductive structures of *Nostoc* and Spirogyra
5. Study of Qualitative tests for carbohydrates, lipids and proteins (Any two test of each)
6. Study of plant cell structure with the help of epidermal peel
7. Study of mitosis
8. Study of meiosis
9. Study of cell organelles with the help of microphotograph/model
10. Study the effect of organic solvent on permeability of plasma membrane.
11. Study the effect of temperature on the activity of peroxisome.
12. Botanical excursion.

Semester II

Practical based on paper III and IV

Total Marks 50

1. Study of *Mucor*
2. Study of *Penicillium*
3. Study of types of Lichens
4. Study of any four general symptoms on plant diseases (As per theory)
5. Study of bacterial plant disease – Citrus canker
6. Study of Viral plant disease – Yellow vein mosaic of Bhendi
7. Study of Mycoplasmal plant disease – Grassy Shoot of Sugarcane
8. Study of fungal plant disease – White rust of Crucifers
9. Study of vegetative and reproductive structures of *Funaria*
10. Study of vegetative and reproductive structures of *Pteris*
11. Study of vegetative and reproductive structures of *Cycas*
12. Submission of plant diseases.

Course Outcomes

CO1. Students will able to recognize the structure , types and multiplication of viruses.

CO2. Students will able to understand the bacterial types, structure and mode reproduction

CO3. Students will able to identify the different types of algae and their importance in day today life.

CO4. Students will able develop the skills for the production of different type of Bio fertilizers ,

CO5. Students will able to distinguish the prokaryotic and eukaryotic organisms and acquire the knowledge of different plant cell organelles and its role in the plant body.

CO6. Students will able to understand the different types of cell division and it's phases.

CO7. Students will able to handle all types of microscope.

CO8. Students will able to develop a skill in the chromatography techniques.

CO9. Students will able to identify and classify the different fungi and also realize the economic importance of fungi.

CO10. Students will able to identify the lichens on the basis of morphology and to know the medicinal value of the lichens.

CO11. Students will be able to recognize the different plant diseases and their management.

CO12. Students will able to develops the soft skill technique in the Mushroom Cultivation and realize the commercial status of the mushrooms.

CO13. Students will able to identify the bryophytes their importance.

CO14. Students will able to recognize the characters and ecological importance of pteridophytes.

CO15. Students will be able to identify, classify the gymnosperms and understand the Economic importance of gymnosperms.

(iv) A brief note :- (On expected level of study from examination and assessment point of view):- -----

List of Books Recommended for B. Sc. I Botany

Algae –

1. Introductory Phycology. Kumar, H. D. 1988, Affiliated East-West Press Ltd., New York.
2. Algae - Kumar H. D. and H. N. Singh (1991)
3. Algae - Sharma O. P. (1986)
4. Algae - Pandey B. P. (1994)
5. A Text book of Algae - Chopra G. L. (1969)
6. A Text book of Algae - Kumar H. D., Singh H. N. (1977)
7. A Text book of Botany - V. Singh, P. C. Pandey, Jain D. K. (1999)
8. A Text book of Botany Vol. I – Pandey S. N., S. P. Misra, P. S. Trivedi (1.982)
9. A Treatise on Algae - K. N. Bhatia (1980)

Fungi –

1. A Hand book of Lichens - D. D. Awasthi (2000)
2. An Introduction to Fungi - Dube H. C. (1990)
3. Morphology of Plants and Fungi --Blod, H.C., Aloxopoulos, G. J. and Delevoryas, T. 1980. (4th Edition) Harper and Foul Co., New York.
4. An Introduction to Fungi.--Dube, H. C. 1990. Vikas Publishing House Pvt. Ltd.,Delhi.
5. Cryptogamic Botany Vol. I & II (2nd Edition), Gilbert, M. S. 1985. Tata McgrawHill Publishing Co., Ltd New Delhi.
6. Fungi- Vashishtha B. R. (1996)
7. Fungi- Pandey B. P. (1994)
8. Introduction to Fungi - Sundrarajan (2001)

9. Introductory Mycology - C. J. Alexopoulos, C. W. Mims, M. Blackwell
10. Cryptogamic Botany Vol. I - Algae and Fungi - G. M. Smith (1974)
11. Plant diseases –Singh R. S. (1963).
12. Manual of plant pathology –Padoley S. K. & Mistry P. B.
13. Hand book of field crop diseases- Ny. Vall (1979).
14. Experiments in Microbiology, Plant pathology and Tissue culture- Aneja K. R. (1993).
15. Plant pathology- R. S. Mehrotra, (1980) Dean, Faculty of science, Kurkshetra University, Kurukshetra.
16. Plant Diseases- F.T. Brooks, periodical Expert book Agency, D-42, VivekVihar, Delhi 1100032.
17. Plant diseases –RajaniShrma, Campus books international, 4831/24 Prahlad Street, An sari Road, Daryaganj, New Dehli-110002.
18. Diseases of crop plant in India –Dr. Rangaswami.
19. Plant diseases –R.S. Singh
20. Modern plant pathology – R. S. Bilgrami and H. C. Dube.

Bryophytes –

1. Bryophytes. Puri, P. 1985. Amarm& Sons, Delhi.
2. College Botany - S. Sundararajan (1999)
3. College Botany Vol. I - Gangulee H. C., Das K. S. and Datta C. T. (1991)
4. College Botany Vol. II - Gangulee H. C., Kar A. K. (1999)
5. College Botany Vol. III -- S. K. Mukharji (1990)
6. Cryptogamic Botany Vol. I- G. M. Smith (1955)
7. Cryptogamic Botany: Bryophytes and Pteridophytes - Smith G. C. (1955)

Pteridophytes—

1. An Introduction to Pteridophytes - Rashid A. (1978)
2. An Introduction to Pteridophyta (Diversity and Differentiation) -A. Rashid (1976)
3. A Text book of Pteridophyte – S. N. Pandey, P. S. Trivedi, S. P. Misra (1995)
4. An Introduction to Embryophyta - Parihar N. S. (1961)
5. Morphology and Evolution of Vascular Plants Gifford, E. M. and Foster, A. S. 1989. W.H. Freeman & Co., New York.
6. Morphology of vascular Plant (lower groups) -- A. J. Eames.
7. Illustrated Manual of Ferns of Assam -S. K. Borthakur, P. Deka, K. K. Nath (2000)
8. Pteridophyta – Vascular Cryptogams - P. C. Vashishta (1972)
9. Botany for Degree Students- Pteridophyta (Vascular Cryptogams) - P. C. Vashishta, A. K. Sinha, Anil Kumar – S Chad –Multicolour Illustrative Revised Edition- 2006.

Gymnosperms –

1. Botany for Degree Students- Gymnosperms (Vascular Cryptogams) - P. C. Vashishta, A. K. Sinha, Anil Kumar – S Chad –Multicolour Illustrative Revised Edition- 2006.
2. The Morophology of Gymmosperms. -- Sporne, K. R. 1991. B. I. PublicationsPvt., Bombay, Calcutta, Delhi.
3. Morphology of Gymnosperms -- J. M. Coulter and C. J. Chamberlain.
4. Gymnosperms – Structure & Evolution.--C. J. Chamberlain
5. Morphology of Gymnosperms.--K. R. Sporne.

6. Gymnosperms- Vashishta P. C. (1976)
7. Gymnosperms- C. J. Chamberlein (1966)
8. Indian Gymnosperms in Time and Space - Ramanujan C. G. K. (1979)
9. Origin and Evolution of Gymnosperms - Ed Charles B. Beck (2002)
10. Phylogeny and form in the plant Kingdom - H. C. Dittmer (1964)

Cytology, Microbiology and Analytical Techniques-

1. Plant Cell Biology –Structure and function-Gunning B.E.S and Steer M.W. (1996).
2. Plant Cell Biology-A practical approach.-Harris N. and Oparka K. J. (1994). (IRL-Press of oxford University UK.).
3. Cell Biology- De. Robert et.al. (1982), (Publ. Sundar and Company).
4. Cell Biology –C. B. Powar (1992), Himalaya Publ. House, Delhi.
5. Plant Biochemistry-Cell-Sumps P.K. and Connie's. (1981).
6. Molecular Cell Biology-Albert's B. Bray D. Lewis J. Faff M. Robert K. & Watson J.D. (1999). (Publ. Garlands publishing co-In, New York U.S.A.)
7. Text Book of cell and molecular biology –Gupta P.K. (1999), Rastogi publication, Meerat.
8. Molecular and Cellular Biology-Wolfe S.L. (1993), Wadsworth publishing Company, California, U.S.A.
9. Applied Microbiology- Vinita Kale and Kishore Bhusari (2007) Himalaya Publishing House, Mumbai.
10. Virology- Saravanan P. MJP, Publishers, Chennai. 600005.
11. Chromatographic Methods- Stock, R. and C. B. F. Rince (1978).
12. Biological Techniques- Srivastava, H. S. (1999).

SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A^{++}'Grade

Revised Syllabus For

B. Sc. Plant Protection (Minor)

(Faculty of Science & Technology)

Paper –I, II-(Semester-I)

and

Paper-III, IV-(Semester-II)

(NEP-2020) Syllabus to be implemented from June, 2024 onwards

SEMESTER I

PLANT PROTECTION PAPER – I (DSC IC 45): INTRODUCTION TO PLANT PROTECTION AND STUDY OF MAJOR CROPS

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS:3 PER WEEK, MARKS: 50

MODULE	SUB-MODULE	TOPIC	LECTURE PERIOD
1	**INTRODUCTION TO PLANT PROTECTION**		**15**
1	**1 . Introduction to plant protection and Major crops**	**1.1 Introduction and importance of plant protection.** **1.2 Introduction to agronomic crops: Study of following crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield, varieties** a. Cereal crop: Jowar b. Pulse crop: Chick pea c. Sugar crop: Sugarcane d. Oil crop: Groundnut e. Fruit crop: Mango f. Vegetable crop: Brinjal g. Spice crop: Chili h. Flower crop: Rose	15
2	**METHODS OF PLANT PROTECTION**		**15**
	2.1 Methods of plant protection	**General methods of plant protection:** **i) Cultural methods:** Tillage, Crop rotation, Trap crops, Fertilizer applications. **ii) Mechanical methods:** Field sanitation, Hand picking, Destruction of egg masses, Light traps, Sticky bags, Bagging for the insects. **iii) Physical methods:** Heat and Soil solarization	8
	2.2 Advances in agricultural practices	**i) Organic farming:** Principles and its scope **ii) Green manuring:** Introduction, Advantages and Types- a. Leguminous green manures: e.g., *Crotalaria juncea* b. Cover crops: e.g., *Brassica juncea*. **iii) Biofertilizers:** Introduction, Advantages and Types-	7

		a. Bacterial biofertilizers, e.g., *Rhizobium*, b. Fungal biofertilizers: e.g., VAM c. Algal biofertilizers: e.g., *Nostoc.* **iv) Organic fertilizers:** Vermicompost and Vermiwash (Introduction, Advantages.) **v) Biopesticides:** Introduction, Advantages and Types- a. Microbial pesticides b. Biochemical pesticides: Botanicals c. Plant incorporated protectants (PIPS) e.g., *cry* gene from *Bacillus thuringiensis*.	
		TOTAL LECTURES	**30**

SEMESTER I

PLANT PROTECTION PAPER – II (DSC IC 46): PLANT PATHOLOGY

CREDITS: 2, LECTURE PERIOD: 2 PER WEEK

LECTURE HOURS: 2 PER WEEK, MARKS: 50

Unit	Subunit	TOPIC	PERIODS LECTURES
1	**INTRODUCTION TO PLANT DISEASES**		**15**
	1.1 Concept of Plant Disease	**i) Definition and concept of plant disease, Terminologies in Plant Pathology:** Host, Pathogen, Pathogenicity, Pathogenesis, Symptoms, Infection, Incubation Period, Etiology, Susceptibility, Immunity, Hypersensitivity, Resistance. **ii) Classification of plant diseases –** Based on a. **Cause of the disease:** e.g., non-infectious disease and infectious disease b. **Causal organism:** e.g., Nematodal diseases, Viral diseases, Mycoplasmal diseases, Bacterial diseases, Fungal diseases, Algal diseases, Parasitic flowering plants. c. **Symptoms:** e.g., Rust, Smut, Canker, Mosaic, Anthracnose, Wilting, Die-back, Damping off, Blight and Mildew. d. **Mode of spread of pathogen:** e.g., Soil borne, Seed borne, Air borne and vector borne diseases. **iii) Mechanism of infection:** a) Penetration b) Host pathogen interaction c) Factors governing the process of infection.	07
	1.2 Study of Plant Diseases	**i) Study of following plant diseases with reference to symptoms, pathogen, disease cycle and their management.** **A. Infectious diseases** a) **Mycoplasmal disease:** Grassy shoot disease of sugarcane b) **Viral disease:** Little leaf of Brinjal c) **Bacterial disease:** Guava fruit canker	08

		d) **Fungal disease:** i. Rust of Soybean, ii. White rust of *Amaranthus*, iii. Grain smut of jowar, iv. Tikka disease of ground nut B. **Non infectious disease:** Introduction, Example (with respect to symptoms, causal abiotic factor, symptoms, remedy) e.g., Black heart of potato	
2	**PLANT DISEASE CONTROL**		**15**
	2. Principles of Plant Disease control	**i) Introduction** **ii) Disease control through Resistance-** a) Disease escape b) Disease endurance or tolerance c) Natural devices for resistance- **i) Protective:** Structural modifications, Production of toxic chemical substances, Stimulant deficiency, Absence of antigen. **ii) Defensive:** Histological modifications (Formation of cork layers, Abscission layers, Tyloses, Callus formation, Gum secretion).	8
	2Management of Plant Diseases	**i)Disease control through cultural practices:** e.g., Crop rotation, Intercropping, Drying, Ageing and cleaning of the seeds, Thermal treatment to seeds, Shallow planting. **ii) Biological control** **iii) Plant Quarantine Organization in India** **iv) Chemical control-** Fungicides: Study with reference to properties, mode of action and uses of -Bordeaux mixture and Carbendazim.	7
	TOTAL LECTURES		**30**

SEMESTER III

PLANT PROTECTION PAPER III (DSC ID 45): INTRODUCTION TO WEEDS AND WEED MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS:3 PER WEEK, MARKS: 50

UNIT	SUB UNIT	TOPIC	PERIOD LECTURE
1	**INTRODUCTION TO WEEDS**		**15**
	1.1 Introduction to Weeds	**i) Weeds – Definition and losses caused by weeds.** **ii) Classification of weeds based on** a) Ontogeny b) Ecology c) Crop association **iii) Reproduction and mode of dispersal of weeds.** **iv) Study of parasitic weeds-** **a) Root parasite:** Total root parasite (*Orobanche* sp.), Partial root parasite (*Striga* sp.) **b) Stem parasite:** Total stem parasite (*Cuscuta* sp.), Partial stem parasite (*Dendrophthoe* sp.)	**7**
	1.2 Study of Weeds	**i) Study of following weeds with reference to** **a) Gross morphology b) Reproduction c) Ecology d) Dispersal and e) Management** A. Dicot Weeds i. *Parthenium hysterophorus* ii. *Euphorbia hirta* iii. *Alternanthera sessilis* B. Monocot Weeds v. *Cyperus rotundus* vi. *Cynodon dactylon*	
2	**WEED MANAGEMENT**		**15**

	2. Methods of Weed Management	**i) Mechanical methods** - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching. **ii) Biological methods** - Bioherbicides and their application in agriculture. **iii) Chemical methods** -Study of weedicides with reference to properties, mode of action, formulation and uses of - i) 2, 4-D ii) Gramoxone (Paraquat)	08
	2.2 Weed Biology	i) Weed physiology after application of herbicides ii) Absorption and translocation of herbicides with reference to photosynthesis iii) Concept of herbicide resistance	07
	TOTAL LECTURES		**30**

SEMESTER III

PLANT PROTECTION PAPER – IV (DSC ID 46): INSECT PESTS, NON-INSECT PESTS AND THEIR MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS :3 PER WEEK, MARKS: 50

UNIT	SUBUNIT	TOPIC	LECTURE PERIOD
1	**INTRODUCTION TO INSECT PESTS AND NON- INSECT PESTS**		15
	1.1 Introduction to Insect Pests and Non-Insect Pests	**i) Definition and losses (Qualitative and Quantitative) caused by insect pests** **ii) General characters of insects.** **iii) Introduction to common insect pests** a. Aphids b. Caterpillars c. Grasshoppers d. Thrips e. Weevils **iv) Definition and losses (qualitative and quantitative) caused by non-insect pests** **v) Introduction to common non insect pests** a. Nematodes b. Snails and Slugs c. Rodents d. Birds	8
	1.2 Study of Insect Pests	**i) Study of following insect pests of different crops with reference to – Scientific name, Marks of identification, Life cycle, Nature of damage and Management** a. Sugarcane white grub b. Jowar stem borer c. Brinjal fruit borer **ii) Study of following stored grain pests of different crops with reference to:**	7

		Scientific name, Marks of identification, Life cycle, Nature of damage and Management a. Rice weevil b. Pulse beetle	
2	**MANAGEMENT OF INSECT PESTS AND NON- INSECT PESTS**		**15**
	2.1 Management of Insect pests and non-insect pests	**i) Integrated Pest Management (IPM):** Introduction, history, importance, concepts, principles and tools of IPM. **ii) Insecticides** a. Introduction b. Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable concentrates. c. Classification of insecticides based on i) Mode of entry – stomach, contact and systemic d. Insecticides - Common example with respect to introduction, chemical nature, properties, mode of entry, mode of action and uses of- Malathion, Carbaryl, Pyrethrin and Azadirachtin	**8**
	2.2 Recent trends in Pest Management	**i) Introduction, types and advantages of:** a. Attractants b. Repellants c. Antifeedants d. Pheromones e. Chemosterilants	**7**
	TOTAL LECTURES		**30**

Semester-I
Practical-I
(Based on paper I and II) ------Marks 50

1. Study of green manures e.g., *Crotalaria juncea* and *Brassica juncea*.

2. Study of biofertilizers: *Rhizobium, Nostoc* and biopesticide: *Azadirachta indica*.

3 to 6. Study of following agronomic crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield and varieties

a. Cereal crop: Jowar

b. Pulses crop: Chick pea

c. Oil crop: Groundnut

d. Fruit crop: Mango

e. Vegetable crop: Brinjal

f. Spice crop: Chili

g. Flower crop: Rose

7 to 12. Study of following plant diseases with reference to host, symptoms, pathogen, disease cycle and their management

a)Mycoplasmal disease: Grassy shoot disease of sugarcane

b)Viral disease: Yellow vein mosaic of Bhendi

c)Bacterial disease: Guava fruit canker

d)Fungal disease: i. Rust of Soybean ii. White rust of *Amaranthus*,
iii. Grain smut of jowar iv. Tikka disease of ground nut

13. Submission of crop diseases (any five).

Semester II
Practical-II
(Based on paper III and IV) ------- 50 Marks

1. Study of following weeds with reference to a) Gross morphology b) Reproduction c) Ecology, d) Dispersal and e) Management

   A. Dicot Weeds

      i. *Parthenium hysterophorus*

      ii. *Alternanthera sessilis*

   B. Monocot Weeds

      i. *Cyperus rotundus*

      ii. *Cynodon dactylon*

2. Study of following parasitic weeds with reference to a) Host b) Gross morphology c) Reproduction d) Management : i) *Orobanche,* ii) *Striga*, iii) *Cuscuta*.
3. Study of common insect pests and non-insect pests with reference to morphology and nature of damage: i) Aphids ii) Caterpillars iii) Snails.
4. Study of following insect pests of different crops with reference to –Scientific name, Marks of identification, Life cycle, Nature of damage and Management:

      i) Sugarcane white grub

      ii) Brinjal fruit borer

5. Study of following stored grain pests of different crops with reference to –Scientific name, Marks of identification, Life cycle, Nature of damage and Management:

      i) Rice weevil

      ii) Pulse beetle

6. Study of Attractants (Light trap, sticky trap) and Repellants (Naphthalene ball, *Vitex negundo*).
7. Examples on preparation of pesticides for application.
8. Determination of sucrose percentage in Sugarcane by hand refractometer (any two varieties).
9. Isolation of soil fungi from soil sample by using serial dilution method.
10. Separation of amino acids from healthy and diseased plants using paper chromatography technique.
11. -Study of weedicides with reference to properties, mode of action, formulation and uses

      i) 2, 4-D ii) Gramoxone (Paraquat)

12. Field visit/ excursion/visit to agricultural institute/ Agro industry/polyhouses.
13) Submission of any five common / stored grain insect pests.

Course Outcomes:

Paper I:

After successful completion of the course, the students will be able to

1. Know the scope and importance of the agronomy in the field of agriculture.
2. Identify different varieties of the crops and their significant role
3. Know the cultural practices of the different crops.
4. Develop the skill to prepare different types of manures and biofertilizers.

Paper II:

After successful completion of the course, the students will be able to

1. Know the scope and importance of the agronomy in the field of agriculture.
2. Know the mode of dispersion of pathogen.
3. Identify different plant diseases and their management.
4. Acquaint the broadcasting of plant diseases.

Paper III:

After successful completion of the course, the students will be able to

1. Know the scope and importance of the plant pathology in the field of agriculture.
2. Identify different weeds and know the management practices.
3. Prepare the formulations of different herbicides, fungicides and pesticides.
4. Manage the plant diseases from the field.

Paper IV:

After successful completion of the course, the students will be able to

1. Know the scope and importance of entomology in the field of agriculture.
2. Identify different insect pests and their management.
3. Identify different non insect pests and their management.
4. Prepare the formulations of different pesticides.

Nature of theory question paper and scheme of marking:	Total 40 Marks/ Per paper
Q. 1. Multiple choices questions (8-questions).	8 Marks
Q. 2. Attempt any two of the following (out of three).	16 Marks
Q. 3. Write short notes any four of the following (out of six).	16 Marks

Follow the rules of Shivaji University Kolhapur regarding NEP-2020 syllabus and examination.

SHIVAJI UNIVERSITY, KOLHAPUR.

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Revised Syllabus For

B. Sc. I Botany (Open Elective)

(Faculty of Science & Technology)

Paper –I, II - (Semester- I) and

Paper -III, IV - (Semester-II)

(NEP-2020) Syllabus to be implemented from July, 2024 onwards.

SEMESTER –I

OPEN ELECTIVE - I: BIOFERTILIZERS AND MANURES

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Biofertilizers**		
	1.1 Introduction	Definition, types and application of Bacterial, Fungal and Algal Biofertilizers	**03**
	1.2 *Rhizobium*	Characteristics, Symbiotic association with legume root nodules, isolation and mass multiplication.	**03**
	1.3 *Azotobacter*	Characteristics and its role as a biofertilizer. Isolation and mass multiplication	**03**
	1.4 Blue green Algae	Characteristics of *Nostoc* and its role as biofertilizer.	**03**
	1.5 *Trichoderma*	Characteristics and applications as a biofertilizer	**03**
2	**Manures**		
	2.1 Green manuring	Introduction and Agronomy of Sunnhemp (*Crotolaria juncea*) and Dhaincha (*Sesbania aculeate*).	**05**
	2.2 Biocompost	Introduction, types and biocomposting methods, Recycling of agricultural waste.	**05**
	2.3 Vermicompost and Vermiwash	Introduction, preparations, and applications.	**05**
Total Lectures			**30**

SEMESTER –I

OPEN ELECTIVE - II: GARDENING TECHNIQUE

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Basics in Gardening**		
	1.1	Definition, objectives and scope of gardening	**02**
	1.2	Types of gardening - landscape and home gardening	**03**
	1.3	Lawns: Types and preparations	**02**
	1.4	Types of creative gardening: Terrarium, Floating Garden, Bottle Garden, Hanging Garden, Vertical Garden, Broken pots.	**06**
	1.5	Potting mixture, Potting and repotting.	**02**
2	**Garden development**		
	2.1	Plant propagation methods - i) Layering –Air layering ii) Grafting –Whip grafting iii) Budding: Patch budding	**03**
	2.2	Applications of PGRs - Gibberellic acid, Auxin, Cytokinin.	**02**
	2.3	Management practices in garden (Fertilization, Irrigation and Weeding)	**02**
	2.4	Important garden plants: Trees (*Lagerstroemia*), climbers (*Bougainvillea*), foliage plants (*Diffenbachia*), Cacti and succulents (*Opuntia* and *Kalanchoe*), Palms (Fan palm), Hedge plants (*Clerodendron*), edge plants (*Duranta*)	**02**
	2.5	Bonsai technique	**02**
	2.6	Management of pests and diseases of Ornamental Plants.	**02**
	2.7	Important gardens in India: Lalbagh (Bangalore), Amrit Udyan (New Delhi) and Lead Botanical Garden (Shivaji University, Kolhapur)	**02**
Total Lectures			**30**

Course Outcomes:
After successful completion of the course, the students will be able to

1. Know the scope and importance of the gardening.
2. Understand skills of garden development.

Suggested Readings:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

SEMESTER –II

OPEN ELECTIVE - III: ETHNOBOTANY

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Ethnobotany and Methodology of Ethnobotanical studies**		
	1.1 Ethnobotany	Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) Intoxicants and beverages c) Resins and oils and miscellaneous uses.	**09**
	1.2 Methodology of Ethnobotanical studies	a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) Temples and sacred grooves in Sahyadri.	**06**
2	**Role of ethnobotany in modern Medicine and Legal aspects**		
	2.1 Role of ethnobotany in modern Medicine	Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) *a) Azadiractha indica b) Ocimum sanctum c) Vitex negundo. d) Gloriosa superba e) Tribulus terrestris f) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria.* Role of ethnobotany in modern medicine with special example *Rauvolfia sepentina, Artemisia, Withania.* Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management	**10**
	2.2 Ethnobotany and legal aspects	Ethnobotany as a tool to protect interests of ethnic groups. Sharing of wealth concept with few examples. Biopiracy, IPRs and Traditional Knowledge.	**05**
Total Lectures			**30**

SEMESTER –II

OPEN ELECTIVE - IV: MUSHROOM CULTIVATION

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Introduction and Spawn preparation**		
	1.1 Introduction	History of mushroom cultivation; Classification and distribution of mushroom; life cycle of mushroom. Identification of poisonous mushrooms.	**06**
	1.2 Spawn preparation	Isolation of pure culture; Nutrient media for pure culture; layout of spawn preparation room; raw material of spawn; sterilization; preparation of mother spawn and multiplication.	**09**
2	**Cultivation and Nutrient values**		
	2.1 Cultivation	Small scale and large-scale production unit. Types of raw material – preparation and sterilization; Mushroom bed preparation – maintenance of mushroom shed; harvesting method and preservation of mushrooms. Cultivation of following types of mushroom – milky mushroom; oyster mushroom, button mushroom and any one medically valuable mushroom.	**07**
	2.2 Nutrient values	Protein, carbohydrate, fat, fibre, vitamins and amino acids contents; short and long term storage of mushroom; preparation of various dishes from mushroom. Medicinal value of mushroom – cultivation, extraction, isolation and identification of active principle from mushroom. Pharmacological and economic values of mushroom.	**08**
Total Lectures			**30**

Suggested Readings

1) S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.

2) S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981

3) Lone et al,. Palaeoethnobotany

4) S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.

5) S.K. Jain, 1990. Contributions of Indian ethnobotny.Scientific publishers, Jodhpur.

6) Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester

7) Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India.Botanical Survey of India. Howrah.8) Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-19969) Faulks, P.J. 1958.An introduction to Ethnobotany, Moredale pub. Ltd.

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Revised Syllabus For

B. Sc. I Botany (Skill Enhancement Course)

(Faculty of Science & Technology)

Paper –I - (Semester- I) and

Paper -II (Semester-II)

(NEP-2020) Syllabus to be implemented from July, 2024 onwards.

SEMESTER –I, PAPER - I

SKILL ENHANCEMENT COURSE: HERBAL DRUG TECHNOLOGY

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Herbal medicines and Pharmacognosy**		
	1.1 Herbal medicines	History, role of medicinal plants in Ayurveda systems of medicine; marketing, utilization and scope of medicinal plants.	**07**
	1.2 Pharmacognosy	Systematic position, plant part used and medicinal uses of the following plants; Tulsi, Ginger, Chitrak and Amla	**08**
2	**Phytochemistry and Analytical pharmacognosy**		
	2.1 Phytochemistry	Active principles, identification and utilization of the medicinal herbs; *Catharanthus roseus* (Sadaphuli), *Withania somnifera* (Ashwagandha), *Curcuma longa* (Halad), *Justicia adhathoda* (Adulsa), *Tinospora cordifolia* (Gulvel) and *Cymbopogon citratus* (Gavati chaha).	**07**
	2.2 Analytical pharmacognosy	Techniques in Chromatography (Paper, TLC), Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests (Tannins, Alkaloids, Saponins, Steroids, Terpenoids, Flavonoids.)	**08**
Total Lectures			**30**

SEMESTER I

SKILL ENHANCEMENT COURSE

PAPER – I: HERBAL DRUG TECHNOLOGY

PRACTICALS **50 Marks**

1. Preparation of Churn (Triphala churna)
2. Preparation of Kadha / Decoction (Adulsa).
3. Preparation of herbal tea
4 & 5. Biochemical test for drug adulteration of i) Haladi (*Curcuma longa*) ii) Hing (*Ferula assafoetida*) iii) Camphor (*Cinnamomum camphora*) iv) Piper (*Piper nigrum*)
6. Macroscopic study and Organoleptic evaluation of i) Tulsi ii) Ginger iii) Chitrak v) Avala.
7 & 8. Study of medicinal plants with respect to morphology, part used, active principles and medicinal uses of *Catharanthus roseus* (Sadaphuli), *Withania somnifera* (Ashwagandha), *Curcuma longa (Halad), Justicia adhathoda* (Adulsa), *Tinospora cordifolia* (Gulvel) *and Cymbopogon citratus* (Gavati chaha).
9. Phytochemical analysis- Qualitative tests for Tannins, Alkaloids, Saponins, Steroids, Terpenoids, Flavonoids, Reducing sugars, Carbohydrates. (Any four)..
10. Visit to Herbal cosmetics production units/Pharma industry (Separate handwritten report to be submitted by student).

SEMESTER –II, PAPER - II

SKILL ENHANCEMENT COURSE: NURSERY MANAGEMENT

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Basics of Nursery**		
	1.1 Basics of Nursery	1.1 Definition and Types of nurseries. 1.2 Types of Pots and Containers for raising seedlings. 1.3 Types of growing media-Sand, compost, coir, peat and sawdust. 1.3 Potting mixture, Potting and repotting. 1.5 Types and preparation of nursery beds (Sunken, Flat and Raised). 1.6 Seed Dormancy: Causes and Methods breaking seed dormancy. 1.7. Methods of seed sowing in nursery (Dibbling and Broadcasting)	**15**
2	**Nursery practices and management**		
	2.1 Nursery practices and management	2.1 Plant propagation methods in Nursery-Asexual Propagation by using offsets, bulbs, crowns, stolons and runners. 2.2 Plant propagation methods in Nursery-Vegetative propagation by i) Layering –Air layering ii) Grafting –Whip grafting iii) Budding: Patch budding 2.3 Applications of PGRs - Gibberellic acid, Auxin, Cytokinin. 2.4Management practices in nursery (Fertilization, irrigation, Shading, Thinning, weeding) 2.5 Management of nursery plants: Hardening of seedlings, Staking, De-shooting, Disbudding, Pinching, Pruning.) 2.6 General practices in pest management in nursery. 2. 7 General practices in disease management in nursery.	**15**
		Total Lectures	**30**

SEMESTER II
SKILL ENHANCEMENT COURSE
PAPER – II-NURSERY MANAGEMENT
PRACTICALS **50 Marks**

1. Study of Nursery tools and implements
2. Preparation of various concentrations (ppm) of plant growth regulator.
3. Preparation potting mixture and demonstration of potting and repotting.

4 & 5. Demonstration of Whip grafting, patch budding and air layering technique in nursery plants.

6. Study of different types of growing media for nursery plants
7. Determine viability of seeds by Tetrazolium test.
8. Study of different methods for breaking seed dormancy.
9. Study of Wilt disease on nursery plants.
10. Collection and identification of insects on any four nursery plants.
11. Visit to commercial nursery.

Course Outcomes:

After successful completion of the course, the students will be able

To know the scope and importance of the nurseries.

To understand skills of nursery development.

To examine plant diseases and pests in nursery

Suggested Readings

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.

2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.

3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.

4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.

5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.

6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

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Revised Syllabus For

B. Sc. I Botany (IKS)

(Faculty of Science & Technology)

Paper –I (Semester- I)

(NEP-2020) Syllabus to be implemented from July, 2024 onwards.

SEMESTER –I

IKS - I: PLANTS IN TRADITIONAL MEDICINAL SYSTEM

CREDIT: 2. LECTURE HOURS; 2 PER WEEK **MARKS: 50**

MODULE	SUB-MODULE	TOPICS	LECTURE PERIOD
1.	**Ayurveda and other Systems of Medicines**		
	1.1 Ayurveda	Introduction, Origin, History, Basic Principles, Panchamahabhutas, Saptadhatu, Tridosha and Rasayana concepts, Plants used in Ayurveda Medicine (*Withania somnifera, Ocimum sanctum*), Conservation of endangered and endemic medicinal plants.	**07**
	1.2 Other Systems of Medicines	i) Siddha: Introduction, Origin and History, Basis of siddha Systems and Plants used in siddha Medicine (*Achyranthes aspera, Cissus quadrangularis*) ii) Unani: Introduction, Origin and History, Basis of Unani Systems, concept: Umoor-e- tabiya, Tumour treatments/ therapy, polyherbal formulations and Plants used in Unani Medicine (*Ricinus communis, Azadirachta indica)*	**08**
2	**Herbal Medicines**		
	2.1 Herbal Medicines	i) Herbal medicines: Introduction, Definition, History and Scope. ii) Herbal preparations: safety, modern herbal medicine. Benefits of herbal medicine. iii) Sources of herbal medicines: (*Tinospora cordifolia, Allium sativum*) Storage of medicinal plants for crude drugs. Ayurveda and the Indus Valley –Mesopotamian connection	**15**
Total Lectures			**30**