



ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM
B.Voc Horticulture Syllabus (w.e.f:2020-21A.B)

B.Voc PROGRAM (4 years Honors)
2020-21 onwards (21 Jan 21)



B. Voc Horticulture

Members of BOS (Contact details)		



ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM
B.Voc Horticulture Syllabus(w.e.f:2020-21A.B)

Skill Enhancement Courses (SECs) for Semester -V,

From 2022-23(Syllabus-Curriculum)

Structure of SECs for Semester-V

(To choose One pair from the Four alternate pairs of SECs)

Semester No	Course No.	Course Name	Course type (T/L/P)	Hrs./ week (4+2)	Credits (4+1)	Max. Marks Cont/ Int/Mid Assessment	Max. Marks Sem-end Exam	Total
THIRD YEAR								
Semester V	1	Analytical Methods in Chemistry – 1 (Elective from common B. Sc syllabus) *	T	4	4	25	75	100
	2	Analytical Methods in Chemistry - 1(Elective from common B. Sc syllabus) *	P	2	1	-	50	50
	3	Analytical Methods in Chemistry – 2(Elective from common B. Sc syllabus) *	T	4	4	25	75	100
	4	Analytical Methods in Chemistry – 2 (Elective from common B. Sc syllabus) *	P	2	1	-	50	50
	5	Principles of Seed technology	T	4	4	25	75	100
	6	Principles of Seed technology	P	2	1	-	50	50
	7	Ornamental Horticulture & landscaping	T	4	4	25	75	100
	8	Ornamental Horticulture & landscaping	P	2	1	-	50	50
	9	Post Harvest Technology of Horticultural crops	T	4	4	25	75	100
	10	Post Harvest Technology of Horticultural crops	P	2	1	-	50	50
	11	Protected Cultivation	T	4	4	25	75	100
	12	On Job Training V	P	2	1	-	50	50
			Total		36	30		

* Common with B. Sc



SEMESTER V; 2022-2023

PAPER: ANALYTICAL METHODS IN CHEMISTRY - 1

(Skill Enhancement Course, 05 Credits)

Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Identify the importance of solvent extraction and ion exchange method.
2. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
3. Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
4. Understand the theories of different types of titrations.
5. Gain knowledge on different types of errors and their minimization methods.

II. Theory:

Unit-1: Quantitative analysis-1

1. A brief introduction to analytical methods in chemistry
2. Principles of volumetric analysis, concentration terms- Molarity, Molality, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.
3. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.

Unit-2: Quantitative analysis-2

1. Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration curves), redox, complex metric, iodometric and precipitation titrations-choice of indicators for the saturations.
2. Principles of gravimetric analysis: precipitation, coagulation, peptization, co precipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.

Unit-3: Treatment of analytical data

1. Types of errors- Relative and absolute, significant figures and its importance, accuracy - methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence interval.



Unit-4: Separation techniques

1. Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction.
2. Synergism. Application-Determination of Iron (III).
3. Ion Exchange method: Introduction, action of ion exchange resins, applications.

Unit-5: Analysis of water

1. Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method.

III. References

1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and KevinA.Schug,Seventh edition, Wiley.
3. Quantitative analysis by R.A.DayJr. And A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
5. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & CoLtd.



SEMESTER V; 2022-2023
PAPER: ANALYTICAL METHODS IN CHEMISTRY - 1

Credits :1

Teaching Hours:2

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Estimate Iron (II) using standard Potassium dichromate solution
2. Learn the procedure for the estimation of total hardness of water
3. Demonstrate the determination of chloride using Mohr's method
4. Acquire skills in the operation and calibration of pH meter
5. Perform the strong acid vs strong base titration using pH meter

Practicals:

1. Estimation of Iron (II) using standard Potassium dichromate solution (using DPA indicator)
2. Estimation of total hardness of water using EDTA
3. Determination of chloride ion by Mohr's method
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride/ammonium hydroxide.
6. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
7. Determination of dissociation constant of a weak acid.

Lab References:

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.



SEMESTER V; 2022-2023
PAPER: ANALYTICAL METHODS OF CHEMISTRY - 1
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

SECTION-A

ANSWER ANY FIVE QUESTIONS OF THE FOLLOWING (5X 5)=25M

1. Write a short note on standard solution ?
2. Define molarity and normality ?
3. Explain complexometric titrations with examples ?
4. Define coagulation and precipitation ?
5. Types of errors ?
6. What is significant figures and its importance?
7. Define turbidity and alkalinity ?
8. Principal of solvent extraction ?

ANSWER ALL OF THE FOLLOWING (10 X 5)= 50M

1. a. Explain principals of volume analysis and give brief introduction to analytical methods ?
or
b. Description of common use of laboratory apparatus ?
2. a.Theories of acid base titration ? with examples ?
or
b.Write the following with examples
 - i. peptization
 - ii. digestion
 - iii. filtration
 - iv. co-precipitation and post-precipitation
3. a. Define accuracy methods to express accuracy and minimization of errors ?
or
b. Define precision methods and standard deviation and confidence interval ?
4. a. Ion exchange method principle and resins and write their applications ?
or
b.Explain factors efficiency of solvent extraction batch extraction ,counter current extraction ? with examples ?
5. a. Determination of chlorides by using mohr s method ?
or
b. Define total hardness of water COD and DO ?



SEMESTER V; 2022-2023
Semester – V/ Practical (Skill Enhancement Course)
ANALYTICAL METHODS OF CHEMISTRY - 1

Max. Time : 3 Hours

Max. Marks : 50

-
- | | |
|-----------------------|-------------|
| 1. Major question? | 20 M |
| 2. Minor question? | 15 M |
| 3. Record + Viva-voce | 10+5 = 15 M |



SEMESTER V; 2022-2023

PAPER: ANALYTICAL METHODS IN CHEMISTRY - 2

(Skill Enhancement Course, 05 Credits)

Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Identify the importance of chromatography in the separation and identification of compounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Demonstrate skills related to analysis of water using different techniques.
4. Understand the principles of spectro chemistry in the determination of metal ions
5. Comprehend the applications of atomic spectroscopy.

II. Theory:

Unit-1:

Chromatography-Introduction and classification

1. Principle, Classification of chromatographic methods, Nature of adsorbents, eluents, Rf values, factors affecting Rf values.

Unit-2:

TLC and paper chromatography

1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.
2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.

Unit-3:

Column chromatography

1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications.
2. HPLC: Basic principles, instrumentation –block diagram and applications.

Unit-4:

Spectrophotometry

1. Principle, Instrumentation: Single beam and double beam spectrometer, Beer Lambert's law- Derivation and deviations from Beer-Lambert's law, applications of Beer Lambert's law-Quantitative determination of Fe⁺², Mn⁺² and Pb⁺²

Unit-5:

Atomic spectroscopy

1. Types, atomizer, atomic absorption and emission and applications.

III. Reference

1. Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.
3. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition/ Pearson.



I. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Perform the separation of a given dye mixture using TLC
2. Learn the preparation of TLC plates
3. Demonstrate the separation of mixture of amino acids using paper chromatography
4. Acquire skills in using column chromatography for the separation of dye mixture

Practicals:

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
2. Separation of mixture of methyl orange and methylene blue by column chromatography.
3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
4. Separation of food dyes using Column Chromatography
5. Separation of triglycerides using TLC
6. Verification of Beer lambert's law. (Using potassium permanganate solution) using colorimeter /spectrophotometer.

Lab References:

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
2. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
3. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley- Eastern.
4. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
5. Mann F.Gand Saunders B.C, Practical Organic Chemistry, Pearson Education.



SEMESTER V; 2022-2023
PAPER: ANALYTICAL METHODS OF CHEMISTRY - 2
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

ANSWER ANY FIVE QUESTIONS OF THE FOLLOWING

(5X 5)= 25M

- 1.Factors effecting Rf values?
- 2.Principle of chromatography?
- 3.Principle of colunchropnotagraphy its application?
- 4.Explain stationary phase and mobile phase?
- 5.Single beam spectrometer?
- 6.Beer lamberits law?
- 7.Explain Atomizer?
- 8.Application of spectrophotometry?

ANSWER ALL OF THE FOLLOWING

(10 X 5)= 50M

1. a. Classification of chromatographic methods and its principle?
(Or)
b. Explain nature of adsorbents eluents and Rf values?
2. a. Thin layer chromatography principle and experiment procedure and write its application?
(Or)
b. Explain principle and experimental procedure of paper chromatography?
3. a. Explain the principle and instrumentation of Hphe with applications?
(Or)
b. Explain column chromatography with experimental procedure and its principle?
4. a. Explain principle and instrumentation of double beam spectrophotometer?
(Or)
b. Application of beers law of Quantitative determination of Fe^{+2} and Pb^{+2} ?
5. a. Explain principles atomic spectroscopy and types?
(OR)
b. Atomic absorption and emissions with oblications ?



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B.Voc Horticulture Syllabus (w.e.f:2020-21A.B)

SEMESTER V; 2022-2023

Semester – V/ Practical (Skill Enhancement Course)
ANALYTICAL METHODS OF CHEMISTRY - 2

Max. Time : 3 Hours

Max. Marks : 50

- | | |
|-----------------------|-------------|
| 1. Major question? | 20 M |
| 2. Minor question? | 15 M |
| 3. Record + Viva-voce | 10+5 = 15 M |



SEMESTER V; 2022-2023

PAPER: PRINCIPLES OF SEED TECHNOLOGY

(Skill Enhancement Course, 05 Credits)

Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

LEARNING OUTCOMES

General Objective: To impart knowledge to the students on the seed production and seed science and technology aspects in relation to Seed Act

Specific Objectives:

By the end of the course, the students will be able to

1. understand the concepts of quality seed production of different field and vegetable crops
2. study about different classes of seed and maintenance of genetic purity during seed production
3. Learn about seed certification procedure, seed drying, processing, cleaning, testing, packaging, storage, marketing etc.

Theory :

Unit 1

1. Introduction to seed technology – definitions – concept, role and goals of seed technology differences between scientifically produced seed and grain used as seed – Introduction to seed and seed quality Seed - definition - Seed structure - Seed development and maturation

Germination - phases of seed germination

Dormancy - types of seed dormancy - Seed senescence - causes of seed senescence Seed quality characteristics - significance

Classes of seed - Generation system of seed multiplication in seed supply chain .

2. Testing, release and notification of varieties – Central Variety Release Committee (CVRC) and State Variety Release Committee (SVRC)
3. Deterioration of crop varieties – factors responsible for loss of genetic purity – maintenance of genetic purity during seed production – safeguards for maintenance of genetic purity

Unit 2

1. Seed quality – characters of good quality seed – factors affecting seed quality – classes of seed – nucleus, breeder, foundation and certified seed – maintenance of breeder seed of established varieties – Hybrid seed production – history – importance – development of inbred lines, single crosses, double crosses, three way crosses etc. – evaluation of single cross and double cross hybrids
2. Genetic and agronomic principles of seed production
3. Seed replacement rate and varietal replacement - Seed Multiplication Ratio - Seed renewal period

Unit 3

1. Seed testing – objectives of seed testing – International Seed Testing Association (ISTA) and Association of Official Seed Certifying Agencies (AOSCA) – establishment of Seed Testing Laboratory (STL) – seed testing procedures for quality assessment
2. Post harvest seed handling Techniques - Threshing – methods
3. Drying - methods of seed drying - advantages and disadvantages Seed processing – definition – importance



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Unit 4

1. Seed cleaning and grading - upgrading - equipments - working principles
2. Seed treatment - importance - types - Seed invigouration techniques - seed hardening - seed fortification - seed priming - Seed enhancement techniques -seed coating - seed pelleting.

Unit 5

1. Seed Act and Seed Act enforcement – main features of the Seed Act 1966 – Central Seeds Committee – Central Seed Certification Board – State Seed Certification Agency – Central Seed Testing Laboratory – State Seed Testing Laboratory –
2. Enforcement of the Seed Act – sampling – duties and powers of seed inspectors – offenses of Seed Act and penalties
3. World Trade Organization (WTO) – objectives and functions – Intellectual Property Rights(IPR) – Protection of Plant Varieties and Farmers’ Rights (PPV and FR) Act – Plant Breeders’ Rights (PBR) – benefits of PBR – disadvantages of PBR

References

- Agarwal, P.K. 1994. *Principles of Seed Technology*. ICAR, New Delhi.
Agarwal, P.K. and Dadlani, M. 1986. *Techniques in Seed Science and Technology*. South Asian Publishers, New Delhi.
Agarwal, R.L. 1996. *Seed Technology*. Oxford and IBH Publication Co., New Delhi.



SEMESTER V; 2022-2023

PRACTICAL: PRINCIPLES OF SEED TECHNOLOGY

Credits :1

Teaching Hours:2

Learning outcomes:

After completion of this practical course all the students should able to

- a. Learn the skills in selfing techniques, crossing techniques
- b. Learn the skills of rouging
- c. In hybrid seed production, the skills of growing parental lines, staggered sowings, flowering synchronizing the male and
- d. Skill in sampling and analytical procedures for purity testing and detection of spurious seed

Practicals :

- 1 Floral biology in self pollinated species and cross pollinated species.
- 2 Selfing techniques.
- 3 Crossing techniques.
- 4 Techniques of seed production in self and cross pollinated crops using A/B/R and twoline system.
- 5 Methods of seed dormancy breaking .
- 6 Tools and techniques for optimizing hybrid seed production.
- 7 Concept of rouging in seed production plot.
- 8 De-tasselling techniques in hybrid seed production in maize
- 9 Emasculation and dusting techniques in hybrid seed production.
- 10 Sampling and analytical procedures for purity testing and detection of spurious seed.
- 11 Visit to public and private seed production and processing plants.



SEMESTER V; 2022-2023
PAPER: PRINCIPLES OF SEED TECHNOLOGY
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

ANSWER ANY FIVE QUESTIONS OF THE FOLLOWING

(5X 5)= 25M

1. Define seed technology and write the differences between grain and the seed
2. Write briefly about development of seed industry in India
3. Explain about the different classes of seed and their standards
4. Write the procedure for maintenance of Nucleus seed and Breeder seed
5. What is male sterility ?and what are the different types of male sterility?
6. Explain about qualifications for a variety to be notified
7. Write about seed testing and its parameters
8. Explain about different types of seed testing

ANSWER ALL QUESTIONS:

(5X10) =50 M

1. (a) Explain the procedure of testing , releasing and notification of a variety
(OR)
(b) Write about our seed policy and seed demand forecasting
2. (a) Write about different parameters of seed quality and factors affecting the seed quality
(OR)
(b) Write about the hybrid seed production procedure
3. (a) Describe the procedure for seed certification.
(OR)
(b) Describe the procedure of seed testing
4. (a) Write about the enforcement of seed act and mention the duties of seed inspectors
(OR)
(b) Write briefly about W T O and P B R
5. (a) Write about seed cleaning and grading
(OR)
(b) What are the types of seed treatment and write their importance?



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SEMESTER V; 2022-2023

Semester – V/ Practical (Skill Enhancement Course)

PRINCIPLES OF SEED TECHNOLOGY

Max. Time : 3 Hours

Max. Marks : 50

- | | |
|---|------------|
| 1. Major question? | 12 M |
| 2. Minor question? | 8 M |
| 3. Identification, salient features and ecological importance of the following.
(Spotters /Specimens/ Charts/ Pictures etc choose if anyone from syllabus) | 4x5= 20 M |
| a. | |
| b. | |
| c. | |
| d. | |
| 4. Record + Viva-voce | 6+4 = 10 M |



SEMESTER V; 2022-2023

PAPER: ORNAMENTAL HORTICULTURE & LANDSCAPING

(Skill Enhancement Course, 05 Credits)

Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

Theory

Unit-1.

1. Definition of ornamental horticulture- Importance of Ornamental Horticulture.
2. Definition of Floriculture Scope and importance of floriculture industry in India
3. Definitions of Landscape and Landscaping.
4. Garden components (trees, shrubs, herbs, hedges, edges, climbers, topiaries) and principles.
5. Garden adornments- garden seats, ornamental tubs, urns, vases, bird baths, sundials
6. Floral clocks ornamental stones- fountains and statues

Unit-2.

1. Features of English - Italian- French and Japanese gardens-Water ponds- water falls-fountains bridges- water basins-fences and gates.
2. Famous gardens of India- Lal Bagh- Brindavan garden Botanical garden- Mughal garden-Chandigarh Rose garden.
3. Specialized gardens-Herb garden - Bog garden- sunken garden- kitchen garden-gardening inhanging baskets- window garden-importance of green house.
4. Rock garden- water garden and roof garden.

Unit-3.

1. Lawn-selection of grass-site selection- soil- preparation of soil- drainage-manuring andgrading maintenance of lawn mowing rolling irrigation
2. Weeding- diseases and other problems.
3. ornamental and shady trees
4. Shrubs
5. Herbaceous perennials
6. Climbers

Unit-4.

1. Palms
2. Ferns
3. Cacti
4. Succulents
5. Bio-aesthetic planning

Unit-5.

1. Land scaping
2. Floral ornaments- garlands-bouquets floral arrangements
3. Study of principles of landscape design and elements of landscape design



SEMESTER V; 2022-2023

PRACTICAL: ORNAMENTAL HORTICULTURE & LANDSCAPING

Credits :1

Teaching Hours:2

Practicals:

1. Examining the soil suitability for land scaping
2. Lay out of the field for land scaping
3. Designing land scapes on new garden
4. Parameters for a beautiful land scapes
5. Examining the different parameters like soil type, Ph, EC, soil fertility for planting ornamental plants
6. Selection of ornamental plants seasonal, annuals, bi annuals and perennials
7. Selection of plants based on climate and weather conditions
8. Planning of rock gardens,
9. Preparation of floral clock
10. Fertilizer application to gardens
11. Weeding ornamental Gardens
12. Irrigation to gardens ;

References:

1. A K Tiwari and R Kumar, 2007. **Fundamentals of Ornamental Horticulture and Landscape Gardening** . Oxford and IBH Publication Co., New Delhi.
2. K V Peter, 2009. **Ornamental Plants**. New Delhi Publishing Agency, Pitampura ,New Delhi



SEMESTER V; 2022-2023
PAPER: ORNAMENTAL HORTICULTURE & LANDSCAPING
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

I. ANSWER ANY FIVE QUESTIONS OF THE FOLLOWING (5X 5) =25M

1. Define Ornamental horticulture and explain its importance .
- 2 .Define Floriculture and explain Scope and importance of floriculture industry in India
- 3 .Write the Salient features of English - Italian- French and Japanese gardens
- 4 .Bring about some idea about Water ponds- waterfalls- fountains bridges- waterbasins- fences and gates.
- 5 .What is the importance of Ornamental and shady trees in the garden?
6. What are the important features of a lawn and how do you select site for Lawn
- 7 .What is the criteria of planting Palms, Ferns, and Cacti in the ornamental gardens
8. What is Bio-aesthetic planning and what is its importance

II. ANSWER ALL THE QUESTIONS WHICH CARRY EQUAL MARKS (10 X 5)=50M

1. a) Explain about the land scaping and its scope in beautification of gardens
OR
b) Discuss about the Garden adornments aspecially Floral clocks fountains and statues
2. a) Explain the salient features of any two of the following gardens
i) Lal Bagh ii) Brindavan garden iii) Mughal garden

iv) Botanical garden v) Chandigarh Rose garden.
OR
b) Bring out some idea about specialized gardens
3. a) What are the main features of lawn? Explain about the selection of site and soil, selection of grass etc.,
OR
b) How do you maintain the lawn against weeds, pests and diseases?
4. a) What are the different models of land scaping ?what are the aspects to be considered in Land scaping?
OR
b) Explain about Floral oranaments- garlands-bouquets floral arrangements
5. a)What are the elements of landscape design?
OR
b)Explain briefly the importance of principles of gardening



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B.Voc Horticulture Syllabus (w.e.f.2020-21A.B)

SEMESTER V; 2022-2023
Semester – V/ Practical (Skill Enhancement Course)
ORNAMENTAL HORTICULTURE & LANDSCAPING

Max. Time : 3 Hours

Max. Marks : 50

-
- | | |
|---|------------|
| 1. Major question? | 12 M |
| 2. Minor question? | 8 M |
| 3. Identification, salient features and ecological importance of the following.
(Spotters /Specimens/ Charts/ Pictures etc choose if anyone from syllabus) | 4x5= 20 M |
| a. | |
| b. | |
| c. | |
| d. | |
| 4. Record + Viva-voce | 6+4 = 10 M |



SEMESTER V; 2022-2023

POST HARVEST TECHNOLOGY OF HORTICULTURAL CROPS

(Skill Enhancement Course, 05 Credits)

Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

I. Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the basic concepts in post-harvest handling of horticulture produce.
2. Explain maturity and harvesting indices of horticulture products.
3. Acquire skills on identifying factors for post-harvest losses in horticulture.
4. Perform managerial skills related to storage of horticulture products.
5. Demonstrate skills on packaging and forwarding horticulture products to market.

II. Theory:

Unit -1:

1. Introduction to Post Harvest Technology.
2. Importance of Postharvest Technology in horticultural crops; Pre-harvest factors affecting quality.
3. Maturity, types of maturity and factors affecting maturity of horticultural crops.
4. Maturity indices, harvesting, handling, grading of fruits- Mango, Banana, Papaya, Citrus and Guava.

Unit -2:

1. Maturity and harvesting indices
2. Maturity indices, harvesting, handling, grading of:
 - a) Vegetables- Tomato, Cabbage, Onion
 - b) Cut flowers - Rose, Chrysanthemum, Tuberose
 - c) Plantation crops - Coconut, Cashew nut, Coffee

Unit-3:

1. Post harvest problems and treatments
2. Factors responsible for deterioration of fruits, vegetables, cut flowers.
3. Physiological and bio-chemical changes during ripening; Hastening and delaying ripening process.
4. Postharvest treatments of horticultural crops -VHT, HWT, irradiation, fungicidal and chemical.

Unit-4:

1. Storage of Horticulture products
2. Quality parameters and specification in fruits, vegetables and cut flowers.
3. Structure of fruits, vegetables and cut flowers related to physiological changes after harvest.
4. Methods of storage for local market and export.
5. Pre-harvest treatment and pre-cooling, pre-storage treatments.

Unit-5:

1. Farming in Green house
2. Different systems of storage.
3. Packaging methods and types of packages, recent advances in packaging-vacuum packaging, poly shrink packaging, grape guard.
4. Types of containers and cushioning materials, packing treatments and cold storage; Modes of transport.



III. References:

1. Jacob John, P. 2008. A Handbook on Post Harvest management of Fruits and vegetables. Daya Publishing House, Delhi
2. Battacharjee, S. K. and De, L. C. 2005. Post Harvest Technology of Flowers and Ornamentals Plants. Pooner Publisher, Jaipur, India.
3. Neetu Sharma and Mashkoo Alam, M. 1998. Post Harvest Diseases of Horticultural Perishables. International Book Distributing Co., Lucknow.
4. Saraswathy, S. et. al. 2008. Post harvest Management of Horticultural Crops. Agribios (India).
5. Wiils, McGlasson and Graham, J. 2007. Post Harvest- An Introduction to the Physiology and Handling of Fruits, Vegetables and ornamentals. Cab International



SEMESTER V; 2022-2023

PRACTICAL: POST HARVEST TECHNOLOGY OF HORTICULTURAL CROPS

Credits :1

Teaching Hours:2

Practicals:

1. Identify the maturity and harvesting indices of horticulture products.
2. Perform various skills related to manual and mechanical grading of horticulture products.
3. Identify causes for losses of horticulture products in store houses.
4. Demonstrate skills on packaging and transport of horticulture products.
5. Study of maturity indices of fruits, vegetables, flowers and plantation crops.
6. Determination of physiological loss in weight and quality
7. Grading of horticultural produce (manual and mechanical).
8. Post-harvest treatment of horticultural crops, physical and chemical methods.
9. Packaging in plantation crops and cut flowers by using different packaging materials.
10. Packaging in fruits, vegetables by using different packaging materials
11. Study of facilities of storage units and methods of storage.
12. Study of post-harvest disorders in horticultural produce.
13. Identification of pests and diseases of Horticulture products in storage.



III YEAR; SEMESTER V; 2022-2023
PAPER: POST HARVEST TECHNOLOGY OF HORTICULTURAL CROPS
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

I. Answer any five of the following questions

- 1) Explain physiological and bio-chemical changes during ripening?
- 2) Explain the process of I radiation?
- 3) Explain about maturity indices in tomato?
- 4) Explain factors responsible for deterioration of fruits?
- 5) Explain about grading process in fruits (Guava)
- 6) Explain the factors effecting in delaying ripening of fruits?
- 7) Explain about pre-cooling and pre-storage treatments?
- 8) Explain about packing materials for horticulture products?

II. Answer all the following questions

- 1) a. Explain about quality parameters of fruits and vegetables?
Or
b. Methods of storage material for local end market export?
- 2) a. Explain the scope and importance of post harvest technology in India
Or
b. Explain different systems of storage
- 3) a. Explain maturity indices in cabbage and onion?
Or
b. Explain about the post harvest treatments in horticulture crops.
- 4) a. Explain about maturity and types of maturity of horticultural crops.
Or
b. Explain about different types of containers and questioning materials of horticultural crops.
- 5) a. Explain about recent advances in packaging – vacuum packaging.
Or
b. Explain different modes of transport facilities of horticultural products.



ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM
B.Voc Horticulture Syllabus(w.e.f:2020-21A.B)

SEMESTER V; 2022-2023

Semester – V/ Practical (Skill Enhancement Course)
POST HARVEST TECHNOLOGY OF HORTICULTURAL CROPS

Max. Time : 3 Hours

Max. Marks : 50

- | | |
|---|------------|
| 1. Major question? | 12 M |
| 2. Minor question? | 8 M |
| 3. Identification, salient features and ecological importance of the following.
(Spotters /Specimens/ Charts/ Pictures etc choose if anyone from syllabus) | 4x5= 20 M |
| a. | |
| b. | |
| c. | |
| d. | |
| 4. Record + Viva-voce | 6+4 = 10 M |



SEMESTER V; 2022-2023
PROTECTED CULTIVATION
(Skill Enhancement Course, 05 Credits)
Max Marks: Theory: 100 + Practical: 50

Credits: 4

Teaching Hours: 4

Learning outcomes:

After completion of the course the students should be able to understand that

1. This course is highly important course to increase farmers' income and can be a good entrepreneurship.
2. The high value horticultural crops can be grown out of the season, out of the environment and on a commercial scale and farmers can get good profits
3. Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers.
4. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lily, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.
5. Off-season production of flowers and vegetables is more profitable. And knowing the Insect pest and disease management

Lecture outlines

Theory

Unit 1

1. Protected cultivation- Importance and scope - Status of protected cultivation in India
2. Glass house, polyhouse, rain shelters, poly tunnels, hotbeds and cold frames, shade nets. Greenhouses – Definition- History - Green house effect – Advantages of green houses. Types of green houses – Types of green houses based on shape, utility, construction and cladding material.
3. Greenhouse design – Locating a green house, green house orientation – Layout of green house – Material requirement – Erection.
4. Cladding material involved in greenhouse/ poly house – Glass, flexible plastic films, polyethylene, Ethylene Vinyl acetate, poly vinyl fluoride, poly vinyl chloride, acrylic, tefzel T2 film, reinforced plastic, rigid plastic sheet, Saran plastic mesh.
5. Environment control - Light - Supplemental lighting – Incandescent lamp, fluorescent lamp, high intensity discharge lamps - Temperature control - Heat distribution.

Unit 2

1. Environment control - Ventilation and cooling in a green house – Naturally ventilated, Fan and Pad cooling, forced air cooling etc. – Relative humidity, carbon dioxide level.
2. Soil preparation and management – Soil sterilization methods – Soil and soilless media (cocopeat, vermicompost, perlite, vermiculite, charcoal, pumice, rockwool etc.,) - Substrate management.
3. Types of benches and containers – No bench, raised benches, ground benches – Arrangement of benches – Longitudinal, cross-benches, peninsula arrangement, movable benches, pyramid benches – Containers – Types of containers.
4. Irrigation management - Water application methods – Hand watering and automatic watering systems- Tube watering, capillary mat, overhead sprinklers, perimeter watering, drip system, misting – Fertigation – Dry and liquid fertilizers
5. Methods of application of liquid fertilizers (constant feed and intermittent feed)– Carbon dioxide fertilization.



Unit 3

1. Automation – Parameters to be controlled – Types of green house control – Step control, integrated control, feedback, proportional, integral, derivative, feed forward, energy balance, sensors (Temperature, Light, CO₂, Humidity, Irrigation etc.).
2. Propagation and production of quality planting material of horticultural crops – Greenhouse cultivation of important horticultural crops – Rose – Introduction – varieties suitable for green house cultivation – Climatic requirements - Planting – Spacing, planting density.
3. Fertilizer requirement – Fertigation – Training and pruning – Use of growth regulators – Physiological disorders - Harvesting – Grading & packing – Yield. Carnation - Introduction – Varieties suitable for green house cultivation – Climatic requirements – Planting – Spacing, planting density - Fertilizer requirement – fertigation – Training, pruning – Special intercultural operations (Netting, Pinching) – Use of growth regulators - Harvesting – Grading & packing – yield.
4. Chrysanthemum - Introduction – Varieties suitable for green house cultivation – Climatic requirements – Planting – Spacing, planting density. Chrysanthemum - Special intercultural operations pinching,
5. Orchids - Varieties for green houses production – Climatic and substrate requirement – Propagation – Planting – Fertilizer requirement- Use of growth regulators – Physiological disorders – Harvesting – Grading and packing – Yield.

Unit 4

1. Anthurium - Varieties suitable for green house cultivation – Climatic requirements – Growing media) – Use of growth regulators
2. Lilium - Varieties suitable for green house cultivation – Climatic requirements – Growing media - Planting – Spacing, planting density - Fertilizer requirement – Special intercultural operations (Defoliation, de-suckering) –
3. Tomato - Varieties suitable for green house cultivation – Climatic requirements – Soil preparation - Planting – Spacing, planting density – Training and pruning Bell pepper - Varieties suitable for green house cultivation – Climatic requirements – Soil preparation - Planting – Spacing, planting density – Training and pruning – Fertilizer requirement – Intercultural operations – Harvesting – Yield.
4. Cucumber - Varieties suitable for green house cultivation – Climatic requirements – Soil preparation - Planting – Spacing, planting density – Training and pruning - Fertilizer requirement – Intercultural operations – Harvesting – Yield.

Unit 5:

1. Strawberry - Varieties suitable for green house cultivation – Climatic requirements, planting density – Training and pruning - Fertilizer requirement – Intercultural operations – Harvesting – Yield.
2. Cultivation of economically important medicinal – Stevia, Ginseng and aromatic plants.
3. Off-season production of flowers and vegetables – Flower forcing – Techniques – Vegetable forcing – Techniques.
4. Insects of greenhouse crops – Springtails, beetles, sawflies, aphids, thrips, red and their management – Integrated Pest management in Green house.
5. Disease management in green houses – Bacterial blight, bacterial canker, bacterial leaf spots- Viral diseases - Tomato spotted wilt virus – Fungal Diseases - Downy Mildew, Powdery mildew, Sclerotinia rot, Damping off – Nematodes and their management.



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References

1. Vilas M. Salone and Ajay K. Sharma.2012. *Greenhouse Technology and Applications*.Agrotech Publishers. New Delhi.
2. S. Prasad and U. Kumar. 2012. *Greenhouse Management of Horticultural Crops*. Second edition, Agro bios. New Delhi
3. Joe.J.Hanan. 1998. *Green houses: Advanced Technology for Protected Horticulture*,CRC Press, LLC. Florida.
4. K.Radha Manohar and C. Igathinathane, 2013. *Greenhouse Technology and Management* BS Publications.
5. Paul V. Nelson. 1991. *Green House Operation and Management*. Ball publishing USA.



SEMESTER V; 2022-2023
PAPER: PROTECTED CULTIVATION
MODEL PAPER

Time: 3 Hours

Maximum: 75 Marks

I. ANSWER ANY FIVE QUESTIONS

25M

- 1: What is protected cultivation ? Explain its importance, scope and prospects in India
- 2: Mention the different structures proposed for protected cultivation?
- 3 Write about irrigation methods in poly houses?
- 4: Write about training & pruning and also about netting and pinching operation in poly houses?
- 5: Write down the production technology of chrysanthemum in poly houses?
- 6: Write down the production technology of orchids in poly houses?
- 7: Write down the production technology of Anthuriums in poly houses?
- 8 Write down the production technology of cucumbers s in poly houses?

II ANSWER ALL QUESTIONS each question carries 10 M (5x10=50)

50M

- 1) a. Write about different types of structures in Polyhouses
(OR)
b. How environmental controls can be installed in poly houses.
- 2) a. Write about the benches and other structures for cultivation in poly houses
(OR)
b. What are the different methods of fertilizer application in poly houses
- 3) Write about the production technology of following crops in green houses.
 - i. Rose
 - ii. Carnation
- 4) Write about the production technology of following crops in green houses.
 - i. Vegetables
 - ii. Fruits
- 5) a. Write about Pest management in poly houses
(OR)
b. Write about Disease management in poly houses



SEMESTER V; 2022-2023
OJT (ON JOB TRAINING)

Credits: 1

Teaching Hours: 2

Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Prepare the project proposal and project appraisal
2. Assess the cost benefit analysis of the project.
3. Execute the questionnaires for market surveys and socio-economics of farmers.
4. Analyze the socio-economic conditions of farmers and the role of cooperative societies.
5. Know the International trade of horticulture products and contribution of farmers to Indian economy.

CONTENT	EVALUATION	MARKS
FIELD TRIPS	3X5	15
PROJECT /INDUSTRIAL OR INSTITUTE TRAINING REPORT & SEMINAR	15+5	20
FIELD COMPONENTS	10X1	10
VIVA VOCE	-	05
TOTAL		50