

DEPARTMENT OF HORTICULTURE
SYLLABUS FOR B.Sc HORTICULTURE

2023-24



PITHAPUR RAJAHS GOVERNMENT COLLEGE

Autonomous and Accredited with 'A' Grade by NAAC (3.17 CGPA)

KAKINADA – 533 001, E G Dist., ANDHRA PRADESH

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA, E.G.Dist.

Department of Food Science

P R GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA, E.G.DT.
Department of Horticulture

The Board of Studies meeting for Horticulture subject during the academic year 2023-24 is conducted at the Dept. of Horticulture on **31st Aug,2023** with Capt. Dr. M. Krishna Rao ,Lecturer –in-Charge in the chair along with the following members.

Name, Designation and Address

Signature

1. CHAIR PERSON:

CAPT.DR.M.KRISHNA RAO

Lecturer in-Charge
Dept. of Horticulture
PRGC(A), Kakinada

M. Krishna Rao
31/8/23

2. ADIKAVI NANNAYA UNIVERSITY NOMINEE:

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J. Suneetha
31/8/2023

3. MEMBERS NOMINATED BY EXECUTIVE COUNCIL OF THE COLLEGE:

a. SUBJECT EXPERT 1:

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M. Sulakshana
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c. SUBJECT EXPERT 3:

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31/12/2023.

Name, Designation and Address

Signature

d. INDUSTRIAL EXPERT:

SMT P.SWATHI

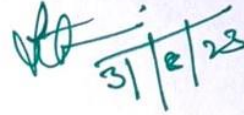
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31/12/23

e. ALUMNI MEMBER:

DR.D.R SALOMI SUNEETHA

Professor & Head

Plant Physiology,Biochemistry & Microbiology Dept

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4. MEMBERS FROM THE COLLEGE:

a. FACULTY MEMBER:

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P. Pendurthi Rajesh
21/8/23

MR.BANDE ASHOK RAMA RAJU

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B. Ashok Rama Raju
5/8/23

b. STUDENT MEMBERS:

Ramu Allu

Student Alumni Member
B.Voc Horticulture

A. Ramu

Surla Rajeswari

Student Member
III B.Voc Horticulture

S. Rajeswari

Ch.Bala Sai Chandra Prasad

Student Member
III B.Voc Horticulture

Ch. B. Ch. Sai Prasad

Madhu Babu

Student Member
II B.Voc Horticulture

T. R. Madhu babu

PEDAGOGY

Commissionerate of Collegiate Education, AP, Vijayawada

Development of Unit-wise Pedagogy for Conventional Subjects under CBCS

Broad Guidelines and Models

Pedagogy is a set of diverse teaching or instructional strategies and methods used by the teacher in an educational institution to facilitate effective learning by students. Diverse methods are used because learning is dependent on multiple ways but not on any one method such as lecturing. There is no single, universal approach that suits all situations

Pedagogy is the art and science of teaching. Different strategies used in different combinations with different groupings of students will ensure learning outcomes. Some strategies for teaching certain skills and fields of knowledge are more appropriate than the others. Some approaches are better suited to certain student backgrounds, learning styles and abilities. Effective pedagogical practice promotes the wellbeing of students, teachers and the community - it improves students' and teachers' confidence and contributes to their sense of purpose for being at college.

Although it is the privilege of the teacher to choose or design his/her own pedagogical methods it is also his/her responsibility to ensure proper learning by all students in the class. A few pedagogical methods designed and implemented in the last several decades remain time-tested and popular across the world. The effectiveness of ICT and other educational technologies as a support to pedagogy in the recent years was found to be immense.

The following are some of the pedagogical methods commonly practiced. They are given Pedagogical Strategy or method (PS) Numbers for common use in academic and teaching plans.

- I. **Common Strategies:** Common pedagogical strategies suggested to be used for preparing teaching plan (preferably in circles and matrices) for each unit of subject syllabus.

Table-1:

<i>Sno</i>	<i>PS</i>	<i>Pedagogic Strategy/Method</i>	<i>Practice</i>	<i>Advantages</i>
1	P1	Lecture	Continuous teaching by a teacher to a large number of students for about one hour	Useful in transmitting organized knowledge in a systematic way
2	P2	Demonstration	Showing a process with the help of real, dummy or simulated material	Applied for learning a practical aspect along with skills
3	P3	Question & Answer	Teacher asks questions before, during or after lecture or demo	Feedback on student level of understanding. Useful in assessing teacher's own progress.
4	P4	Discussion, Debate or Collaboration	Student activity after the lecture, video or other teacher activity. Small groups (Pair-learning: with two students) to large groups.	Spreads knowledge and ideas in students under group learning and consolidates basic learning. Communication skills are inculcated.

5	P ₅	Audio & Video	Play ready-made or teacher made audio/video on the topic	Brings in external expertise and better understanding through visuals or animations
6	P ₆	Virtual or Online learning	Students work with computer simulated models and processes. Stored or online. Learning directly through internet utilizing standard resources	Well crafted three dimensional models and processes give inside information and real time feelings. Access to vast and highly qualitative learning resources on the internet. A computer skill is inculcated.
7	P ₇	Assignment or Case Study	Easy, medium and critical assignments include compiling of information from standard books to preparing creative solutions and models to problems	Independent learning, critical thinking, judging and creativity are promoted. Writing skills are enhanced.
8	P ₈	Study (Research) Project	Students undertake a local problem and make research study on it towards its solution or betterment	Inculcates habit of learning by research. Trains in traits such as identifying problem, survey, collecting compiling and analyzing of information, drawing conclusions, report writing etc. Spoken and written communication skills are enhanced.
9	P ₉	Hands on Study	Students work in a field, industry, organization or under a professional for covering especially a practical part of syllabus	Provides on real time experience to students. Gives professional training. Trained in job/work skills.
10	P ₁₀	Class Seminar	Student teaches a part of the unit as a supplement to the lecturer	Student independent learning will be consolidated and inculcates such traits as comprehension, teaching skills, interaction , public speaking etc. . Communication skills are enhanced.

- II. **Test:** Teaching learning every Unit shall end with a test. This can be denoted as **Pr**. Test can be used not only as an assessment and measurement tool but also as an effective learning strategy. Questions shall be designed in such a way that the student needs to learn in several dimensions from test to test to answer the questions.

III. Additional Strategies: Fifteen more Additional Strategies are given in Table -2. These may be employed by the individual Lecturer based on the subject, unit, classroom situation etc. The teacher may mark **Px** for any of these additional strategies in the teaching plans, cycles and matrices.

Table-2:

<i>Sno</i>	<i>Pedagogic Strategy/Method</i>	<i>Practice</i>	<i>Advantages</i>
1	Quiz	Small student teams compete to answer random questions from the quiz master	Best used for extracting precise but dispersed information
2	Brainstorming	A small or large group of students gather their ideas on new concepts or aspects	Useful in preparing curious background for a new item of learning. . A soft skill is inculcated.
3	Role Play	Students take the role of actual persons in the field and enact the process	Creates a sense of understanding leading to responsible learning. . A soft skill is inculcated.
4	Modeling	Students prepare models of the existing and futuristic situations, real and imaginary. Includes problem solving, physical models, maps, figures and virtual models	Useful in developing skills integrated with knowledge in practical situations. One of the best ways of problem solving. Use of ICT will enhance the outcomes.
5	Peer review	A group of students reviewing the work of other students and also that of authors	Trains in developing insights for better understanding and judging
6	Games & Puzzles	Students solving subject related problems through available game models of designing their own models	Strengthens problem solving traits and invokes use of intelligence
7	Tutorial	Teacher interacting with small groups of students for reviewing the performance of both teacher and students	A good mechanism for obtaining feedback and midway corrections
8	News paper presentation	Teacher or a student presenting the day's matters related to the subject and on-going chapter resulting a discussion for a while	Relates theory to practice, especially the latest practice, a much needed regular intervention
9	Invited lecture	An expert or a faculty teaching a part of the unit in the classroom or at his/her place	Covers the in-house shortages and the students get the advantage of listening to an expert on that topic
10	Panel discussion	Discussing a topic by a panel of teachers, experts or students.	A variety of angles and solutions emerge for a single problem broadening of the

			minds of students. . A soft skill is inculcated.
11	Bulletin board	Students pin the papers they worked out on curricular topics for sharing with others	Motivates students to express themselves, promotes comprehension, writing abilities and freedom of expression.
12	Open text book study	Students study, discuss or answer a test (specially designed) by openly using a standard text book in a session	Motivates a relationship between students and standard books, a life long benefit. Helps in preparing assignments
13	Student magazine	A student magazine is periodically published with academic articles contributed by students	The art of scientifically expressing is encouraged which has both present and future value. It enhances understanding of a standard book or research paper. . A soft skill is inculcated.
14	Report/Review writing	Students write reports or reviews on case studies, projects, books or material	Promotes critical writing and reporting among students. A soft skill is inculcated.
15	Others		

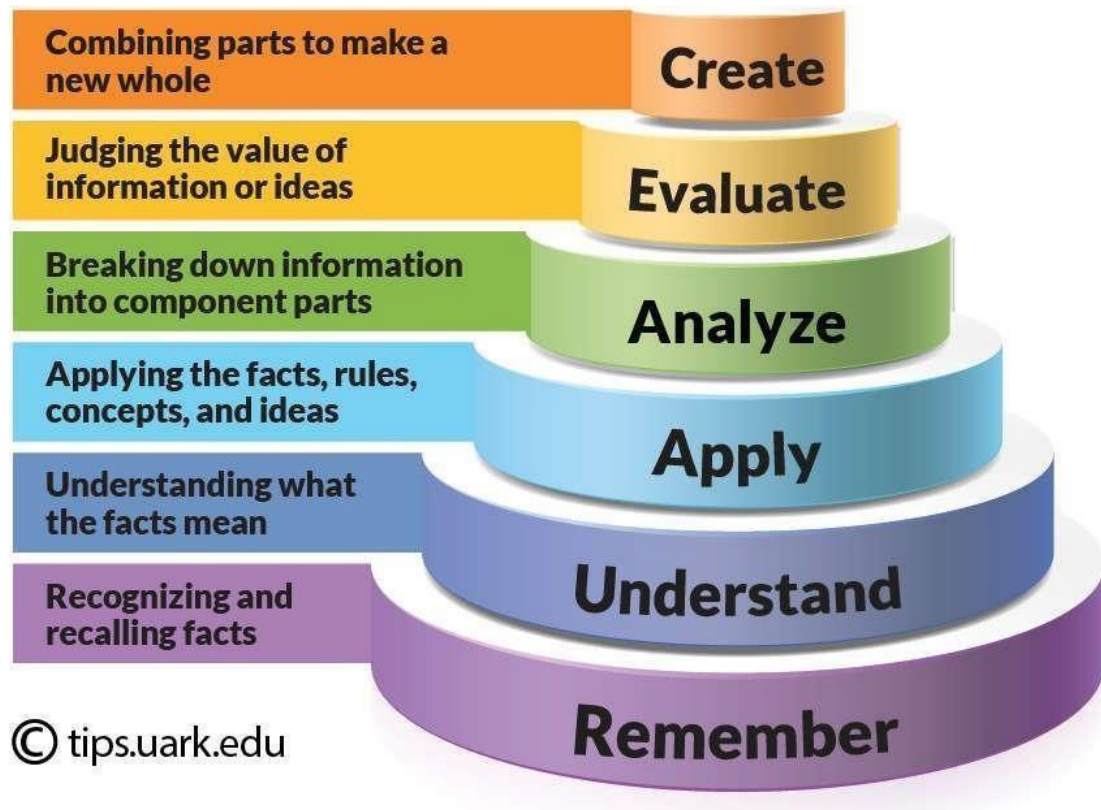
I. Outline Model Pedagogic Strategy Cycle:

There may be one or more Pedagogic cycles for a single unit depending on the number and nature of the topics in it.

II. Other aspects:

1. The subject pedagogy development committee members shall examine each unit of each paper of their subject under CBCS and prepare pedagogic strategies for facilitating effective teaching and learning of the unit.
2. The pedagogic strategies can be adopted from the tables 1 & 2 above. If necessary, they may add more strategies suitable to their subject to table -2.
3. They shall prepare teaching plans for each unit and give explanation foot notes so that teachers across the state will understand the intentions of the committee members
4. A cycle of Pedagogic Strategies shall be given for each unit with relevant footnotes. A model cycle is given below.
5. A list of suggested suitable topics shall also be given for strategies like case study, assignments, models, project work, class seminar, videos and their open online sources (such as Swayam or NPTEL), websites for online learning etc.
6. It is intended to publish the subject-wise teaching plans and circulate them among colleges. Hence, the teaching plans with pedagogic strategies shall be prepared in the best possible way.

BLOOMS REVISED TAXONOMY



A group of cognitive psychologists, curriculum theorists and instructional researchers, and testing and assessment specialists published in 2001 a revision of Bloom's Taxonomy with the title *A Taxonomy for Teaching, Learning, and Assessment*. This title draws attention away from the somewhat static notion of "educational objectives" (in Bloom's original title) and points to a more dynamic conception of classification.

The authors of the revised taxonomy underscore this dynamism, using verbs and gerunds to label their categories and subcategories (rather than the nouns of the original taxonomy).

		Critical Thinking			Evaluation
					Appraise
					Synthesis
					Argue
					Arrange
					Assess
		Analysis			Choose
		Analyze			Categorize
		Application			Compare
		Appraise			Conclude
		Apply			Contrast
		Comprehension			Convince
		Calculate			Criticize
		Associate			Construct
		Change			Critique
Knowledge	Classify	Complete	Categorize	Create	
Arrange	Compute	Conduct	Combine	Design	Decide
Cite	Convert	Construct	Connect	Develop	Defend
Collect	Discuss	Demonstrate	Debate	Devise	Determine
Count	Distinguish	Discover	Detect	Explain	Evaluate
Define	Estimate	Dramatize	Determine	Formulate	Grade
Delineate	Explain	Employ	Diagram	Generate	Judge
Describe	Express	Illustrate	Differentiate	Group	Justify
Duplicate	Extend	Interpret	Discriminate	Integrate	Measure
Identify	Extrapolate	Interpolate	Distinguish	Invent	Rank
Label	Generalize	Manipulate	Examine	Manage	Rate
List	Give examples	Modify	Experiment	Modify	Recommend
Match	Indicate	Operate	Infer	Order	Revise
Name	Infer	Predict	Inspect	Organize	Score
Order	Locate	Prepare	Inventory	Plan	Select
Outlines	Paraphrase	Practice	Order	Prescribe	Support
Point	Predict	Produce	Outline	Propose	Value
Quote	Restate	Relate	Point out	Rearrange	
Read	Review	Show	Question	Reconstruct	
Recall	Rewrite	Sketch	Relate	Reorganize	
Recite	Summarize	Solve	Select	Setup	
Recognize	Tell	Translate	Separate	Specify	
Record	Translate	Use	Subdivide	Substitute	
Relate			Test	Tell	
Repeat			Utilize	Transform	
Report					
Reproduce					
Select					
Specify					
State					
Tell					

These “action words” describe the cognitive processes by which thinkers encounter and work with knowledge:

- Remember
 - Recognizing
 - Recalling
- Understand
 - Interpreting
 - Exemplifying
 - Classifying
 - Summarizing
 - Inferring
 - Comparing

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF HORTICULTURE

Student will know about selection of nursery, raising of nursery beds, structures for planting and its problems and management

PROGRAMME OUTCOMES FOR HORTICULTURE(PO)

B.Sc. Horticulture programmes aim towards:

- Imparting detailed knowledge of Horticulture and its allied branches
- Facilitating detailed study of allied branches required to raise the income of farmers
- Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises
- Knowledge dissemination regarding various technique of farming and farming system in India
- Detailed knowledge of cultivation practices, climate, Soil, fertilizers
- Study of market and marketing of horticulture produce.
- Specific knowledge of various branches specialized to their studies.
- Detailed knowledge on the subject to improve the farmer's condition by their contributions.

PROGRAMME SPECIFIC OUTCOMES (PSO):

- Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- To develop creative skills to solve problems and improve current systems.
- Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

SEMESTER-III: OLERICULTURE

UNIT -1: SOLANACEOUS VEGETABLES

Objectives

To study the cultivation details of Solanaceous vegetables

Learning outcome

Student will know about Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of tomato, bendhi, brinjal, chilli

Bulb Crops- Protected Cultivation Onion

UNIT – 2: LEAFY VEGETABLES

Objectives

To acquaint cultivation details of leafy vegetables

Learning outcome

Student will know about Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of amaranth, spinach, coriander, methi

UNIT – 3: ROOT AND TUBER CROPS

Objectives

To acquaint cultivation details of root and tuber crops

Learning outcome

Student will know about Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of Colocasia and Dioscorea, Sweet Potato and Tapioca, Carrot and Beet root

UNIT – 4: COLE CROPS

Objectives

To study the cultivation practices of cabbage and cauliflower

Learning outcome

Student will know about Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of cabbage and cauliflower

UNIT –5: LEGUMINOUS VEGETABLES

Objectives

To acquaint cultivation practices of leguminous vegetables

Learning outcome

Student will know about Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of cluster bean, double bean, cow pea and Dolichos

COURSE SPECIFIC OUTCOMES

Students will understand Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of solanaceous, leafy vegetables, cole crops and leguminous vegetables

SEMESTER-IV CONCEPTS OF POMOLOGY

UNIT -1: INTRODUCTION TO FRUIT CROPS

Objectives

To study the importance and nutritive value of fruit crops.

Learning outcome

Student will know about area and production of fruit crops in India and Andhra Pradesh.

UNIT-2: TROPICAL FRUITS

Objectives

To study the cultivation practices followed in Mango, guava, and papaya.

Learning outcome

Student will know about the soil, climate, varieties, land preparation, spacing, layout, planting, intercultural operations, fertilizer application, irrigation, pest and diseases , harvesting of Mango, Guava, and papaya.

UNIT-3: SUB TROPICAL AND TEMPERATE FRUITS

Objectives

To study the cultivation practices of Grapes, pomegranate and Apple.

Learning outcome

Student will know about the soil, climate, varieties, land preparation, spacing, layout, planting, intercultural operations, fertilizer application, irrigation, pest and diseases, harvesting of Grapes, Pomegranate, and apple.

UNIT-4: ARID AND MINOR FRUIT CROPS

Objectives

To study the cultivation practices of Amla, Ber, Bael and Wood apple.

Learning outcome

Student will know about the soil, climate, varieties, land preparation, spacing, layout, planting, intercultural operations, fertilizer application, irrigation, pest and diseases, harvesting of Amla, Ber, Bael and Wood apple.

UNIT-5: MANAGEMENT PRACTICES FOR FRUIT CROPS

Objectives

To study the integrated orchard management.

Learning outcome

Student will know about the production practices and storage and transport of local fruits.

SEMESTER -IV: DISEASES OF HORTICULTURE PLANTS AND THEIR MANAGEMENT

UNIT -1: DISEASES OF VEGETABLE CROPS

Objectives

To study the diseases in vegetable crops.

Learning outcome

Student will know about various diseases in vegetable crops like Brinjal, tomato and chilly

UNIT – 2: DISEASES OF ORNAMENTAL CROPS

Objectives

To study the diseases in Ornamental crops.

Learning outcome

Student will know about various diseases in ornamental crops like Rose, chrysanthemum, jasmine, marigold, tuberose and gladiolus.

UNIT-3: DISEASES OF FRUIT CROPS

Objectives

To study the diseases in fruit crops

Learning outcome

Student will know about various diseases in fruit crops like Mango, grape, papaya and citrus.

UNIT-4: INTEGRATED PEST AND DISEASE MANAGEMENT

Objectives

To study the integrated management of pest and diseases.

Learning outcome

Student will know about chemical nature, use, methods of application, toxicity, maximum residue level in pesticide and pesticide management.

UNIT-5: PESTICIDES

Objectives

To study the integrated pest and diseases management in fruits, vegetables, flower, medicinal and plantation crops.

Learning outcome

Student will know about insect pests and nematode pests in horticultural crops and their management.

**APSCHE/ REVISION OF C.B.C.S.
HORTICULTURE COURSES W.E.F.2023-24**

Semester	Course	Title of the Course	Hrs.	Credits	CCE	E.E.	Total
SECOND YEAR							
Sem.-III	3	Basics of Vegetable Science	4	3	50	50	100
		Practical - 3	2	2	-	50	50
Sem.-IV	4	Basics of Fruit Science	4	3	50	50	100
		Practical - 4	2	2	-	50	50
	5	Pests and diseases of horticulture plants and their management	4	3	50	50	100
		Practical - 5	2	2	-	50	50
THIRD YEAR							
Sem. -5	6	Domain related Skill Enhancement Courses (02). Three (3) pairs of courses (each pair has 2 related courses) will be offered, student has to choose a pair of courses.	3	3	50	50	100
			2	2	-	50	50
	7		3	3	50	50	100
			2	2	-	50	50

It is resolved to introduce the following new courses in the programmes **B.Sc Horticulture**, from the AY 2023-24

S.No	Course Code	Title of the new course	Programmes in which it is introduced
1	HORT6222A	Ornamental Horticulture	III HBC
2	HORT7222A	Commercial Floriculture	III HBC
3			
4			
5			

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF HORTICULTURE**

**Assessment methodology for Internships / On the Job Training /
Apprenticeship under the revised CBCS (2020 – 21 onwards)**

First internship (After 1st year examinations):Community Service Project

To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project.

Learning outcomes:

- To facilitate an understanding of the issues that confronts the vulnerable /marginalized sections of the society.
- To initiate team processes with the student groups for societal change.
- To provide students an opportunity to familiarize themselves with urban / rural community they live in.
- To enable students to engage in the development of the community.
- To plan activities based on the focused groups.
- To know the ways of transforming the society through systematic programme implementation.

Assessment Model:

There will be only internal evaluation for this internship. Each faculty member is to be assigned with 10 to 15 students depending upon availability of the faculty members. The faculty member will act as a faculty-mentor for the group and is in-charge for the learning activities of the students and also for the comprehensive and continuous assessment of the students.

The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The project log is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration the individual student's involvement in the assigned work.

While grading the student's performance, using the student's project log, the following should be taken into account -

- a. The individual student's effort and commitment.
- b. The originality and quality of the work produced by the individual student.
- c. The student's integration and co-operation with the work assigned.
- d. The completeness of the logbook.

The assessment for the **Community Service Project implementation** shall include the following components and based on the entries of Project Log and Project Report:

- a. Orientation to the community development
- b. Conducting a baseline assessment of development needs
- c. Number and Quality of Awareness Programmes organised on beneficiary programmes and improvement in quality of life, environment and social consciousness, motivation and leadership, personality development, etc.
- d. Number Quality and Duration of Intervention/service Programmes (Prevention or promotion programs that aim to promote behavioural change in defined community contexts to address social problems) organised.
- e. Follow up Programmes suggested (Referral Services, Bringing Community Participation)
- f. Developing short and mid-term action plans in consultation with local leadership and local government officers.

The **Project Report** should contain

- a) Introduction, scope, objectives, and methodology
- b) Project specifications (area / background of the work assigned).
- c) Problems identified.
- d) Analyses of the problems
- e) Community awareness programmes conducted w.r.t the problems and their outcomes.
- f) Intervention/service programmes taken up
- g) Short-term and long term action plan for implementation
- h) Recommendations and conclusions.
- i) References

The **Project Presentation** is to be made by the student after he/she reports back to the College. The components for assessment are –

- a. assessing the involvement in the project
- b. presentation skills
- c. final outcome of the project as evinced by the student.

For Example: II MPC-EM

S.No.	Name of the Student	Class & Year of Study	Register Number	Project Log	Project Implementation	Project Report	Presentation	Total
				(20)	(30)	(25)	(25)	(100)

**Signature of
Project Mentor**

**Signature of
Nominated faculty**

**Signature of
HOD/ In-Charge**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Semester /Horticulture Core Course - 3
Basics of Vegetable Science (Olericulture)
(Total hours of teaching – 60 @ 04 Hrs./Week)

Learning Outcomes: On successful completion of this course, the students will be able to:

- Distinguish the growing of vegetables according to season and climate
 - Get detailed knowledge on cultivation aspects of different vegetables
 - Understand and explain the special intercultural operations done in vegetable crops
 - Study of morphology and taxonomy of different vegetable crops
 - Study of different varieties of vegetable crops
 - Identify the diseases and pests of vegetable crops and their management
-

Unit – 1 : Introduction to Vegetable crops **12 Hrs.**

1. Importance of vegetable cultivation in India and Andhra Pradesh.
2. Classification and Nutritive value of vegetables.
3. Area and production of vegetables in India and Andhra Pradesh.
1. port and import potential of vegetables in India. Constraints in vegetable production and remedies to overcome them.

Unit – 2 :Solanaceous and other vegetable crops **12 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Brinjal (b) Tomato (c) Sorel (d) Amaranth
(e) *Mentha* f) *Potato* g) *Okra*

Unit – 3 : Root and Tuber crops **16 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Carrot (b) Beet root and (c) *Colocasia* d) *Onion*

Unit – 4 : Cole crops and Cucurbitaceous vegetables **08 Hrs.**

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cabbage and (b) Cauliflower c) Cucumber d) Ridge Gourd
e) Ivy Gourd

Unit – 5 : Leguminous vegetables

12 Hrs.

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

Cultivation of (a) Cluster bean (b) Cow pea and (c) *Dolichos* d) *Garden Bean*

SEMESTER III PAPER-III OLERICULTURE

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - II			
Course Code HORT3222	OLERICULTURE				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of different tropical ,sub tropical and leafy vegetables	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions

PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings

PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers

PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.

PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.

PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).

PSO3: To develop creative skills to solve problems and improve current systems.

PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.

PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Solanaceous and other vegetable crops	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Introduction to vegetable crops	Analyzing
CO4	Gain knowledge on Root & Tuber crops	Knowledge & Application
CO5	Understand the internal structure and developmental stages in Leguminous vegetables	Understanding & Application

Knowledge	Skill	Employability	Entrepreneurship
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
 Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Practical syllabus of Horticulture Core Course – 3/Semester-III

Basics of Vegetable Science (Olericulture)

(Total hours of teaching – 30 @ 02 Hrs./Week)

1. Demonstration of seed germination test for a vegetable seed.
2. Demonstration of seed viability test.
3. Identification of vegetable seeds and vegetable crops at different growth stages
4. Preparing vegetable nursery beds
5. Raising vegetable seedlings in nursery bed and portraying
6. Identification of major diseases and insect pests of vegetables
7. Land preparation for sowing/ transplanting of vegetable crops
8. Sowing/ transplanting of vegetables in main field
9. Fertilizer application for vegetable growing
10. Visit to vegetable field to study methods of vegetable cultivation.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Model Question Paper for Practical Examination

III Semester /Horticulture Core Course - 3

Basics of Vegetable Science (Olericulture)

Max. Time: 3 Hrs.

Max. Marks: 50

- | | |
|---|---------------|
| 1. Demonstration of seed germination/ viability test (A). | 10 M |
| 2. Demonstration of preparing nursery bed/ cultivation practice for a vegetable crop (B). | 10 M |
| 3. Identification of material (C & D -Vegetable plants) and writing scientific name, family and uses. | 2 x 4 = 8M |
| 4. Identification of a disease on vegetable plant (E) | 4M |
| 5. Identification and comment on a cultivation practice (F) | 4 M |
| 6. Record + Viva Voice | 10 + 4 = 14 M |

Text books :

- **Bose T K et al. (2003)** Vegetable crops, Naya Udhyog Publishers, Kolkata.
- **Singh D K (2007)** Modern vegetable varieties and production, IBN Publisher Technologies, International Book Distributing Co, Lucknow.
- **Premnath, Sundari Velayudhan and D P Sing (1987)** Vegetables for the tropicalregion, ICAR, New Delhi

Suggested co-curricular activities for Horticulture Core Course -3 in Semester- III :

A. Measurable :

a. Student seminars :

1. Production Technology of Solanaceous crops
2. Production Technology of Leafy Vegetables
3. Production Technology of Root and Tuber crops
4. Production Technology of Cole crops
5. Production Technology of Leguminous crops
6. Special intercultural operations in vegetable crops
7. Major Pests and Diseases of vegetable crops and their management
8. Morphological characters of vegetable crops
9. Maturity and Harvesting indices of vegetable crops
10. Nutritional aspects of vegetable crops

b. Student Study Projects:

1. Identification and Herbarium preparation of different vegetable seeds
2. Identification and Herbarium preparation of disease symptoms of vegetable crops

3. Identification and Herbarium preparation of pest symptoms of vegetable crops

4. Raising of vegetables in Nursery and portrays

c. **Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

2. Visit to Horticulture University/ Research Station.
Visit to a vegetable nursery and vegetable crop field

IV Semester /Horticulture

Core Course – 4

Theory : **Basics of Fruit Science (Pomology)**
(Total hours of teaching – 60 @ 04 Hrs./Week)

Learning Outcomes: On successful completion of this course, the students will be able to:

- Realize the value of fruits in terms of human nutrition and economy of nation.
- Explain the potential fruit zones in various states of our country.
- Classify the fruiting plants based on temperature requirements.
- Acquire knowledge related to various cultivation practices for different fruit crops
- Demonstrate the special intercultural operations done in fruit crops
- Comprehend the knowledge on varieties of different fruit crops.
- Examine the pests and diseases of fruit crops and develop skills to manage the same,
- Explain about Integrated Orchard Management
- Develop knowledge on various entrepreneurial skills related to fruit science.

Unit – 1 : Introduction to Fruit crops **12 Hrs.**

1. Importance of fruit growing in India and Andhra Pradesh.
2. Nutritive value of fruits.
3. Area and production of India and Andhra Pradesh.
4. Export and import potential of fruits in India. Constraints in fruit production and remedies to overcome them.

Unit – 2 : Management practices for fruit crops **12 Hrs.**

1. Sustainable Production Practices for Local Fruit Production.
2. Integrated Orchard Management/Principles of IPM.
3. Harvesting and Labor Concerns
4. Grading, packing, storage and marketing of fruits.

Unit – 3 : Sub-tropical and temperate fruit crops **12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following sub-tropical and temperate fruit crops:

- (a) Grapes (b) Pomegranate (c) Citrus and (d) Apple

Unit – 4 : Arid and minor fruit crops **12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties,

soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, inter cropping, harvesting and yield, diseases and pests of the following arid fruit crops:

(a) Amla (b) Dates and (c) Ber

Unit – 5 : Tropical Fruit Crops

12 Hrs.

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following tropical fruit crops:

(a) Mango (b) Guava and (c) Papaya (d) Banana

SEMESTER IV PAPER-IV **Basics of Fruit Science**

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - II			
Course Code HORT4222	Basics of Fruit Science				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of different tropical ,sub tropical and Fruits	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their ownbusiness in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Introduction of Fruit Crops	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Tropical Fruit Crops Production Practices	Analyzing
CO4	Gain knowledge on Sub Tropical and Temperate Fruit Crops	Knowledge & Application
CO5	Understand the Management Practices for Fruit Crops	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	
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CO-PO– PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
 Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

**Practical syllabus of Horticulture Core Course – 4/ Semester IV
Basics of Fruit Science (Pomology)**

(Total hours of teaching – 30 @ 02 Hrs./Week)

1. Study of varieties of Mango, Papaya and Guava.
2. Study of varieties of Grape, Pomegranate, Citrus and Apple.
3. Study of varieties of Amla, Dates and Wood apple.
4. Manure and fertilizer application including biofertilizers in different fruit crops
5. Methods of application, calculation of the required quantity of manure and fertilizers based on the nutrient content.
6. Use of growth regulators in fruit crops.
7. Identification and collection of important pests in fruit crops.
8. Identification and collection of important diseases in fruit crops and Herbarium preparation.
9. Visit to a fruit market/ commercial orchids.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Model Question Paper for Practical Examination

IV Semester /Horticulture Core Course - 4

Basics of Fruit Science (Pomology)

Max. Time: 3 Hrs.

Max. Marks: 50

- | | |
|--|--------------|
| 1. Describing cultivation practice for a fruit crop. | 10 M |
| 2. Identification with remarks on Mango/ Guava/Papaya variety. | 5 M |
| 3. Identification with remarks Grape/Pomegranate/Citrus/Apple variety. | 5 M |
| 4. Identification with remarks Amla, Dates and Wood apple. | 5 M |
| 5. Identify the disease and pest symptoms and write its causal organism. | 2 x 5 = 10 M |
| 6. Record + Viva Voice | 10 + 5=15 M |

Text books :

- **Chattopadhyay, T.K.1997.** Text book on Pomology (Fundamentals of fruit growing), Kalyani Publishers, Hyderabad.
- **Chundawat, B.S. 1990.** Arid Fruit Culture, Oxford and IBH, New Delhi.
- **Gourley J H 2009.** Text book of Pomology, Read Books Publ.

Suggested co-curricular activities for Horticulture Core Course - 4 in Semester- IV :

A. Measurable :

a. Student seminars:

1. Nutritional value of fruits growing in India and Andhra Pradesh
2. Production Technology of major Tropical fruit crops
3. Production Technology of major Subtropical and Temperate fruit crops
4. Production Technology of major Arid and Minor fruit crops
5. Special intercultural operations in Fruit crops
6. Intercropping in fruit crops
7. Methods of Irrigation of fruit crops
8. Methods of fertilizer application of fruit crops
9. Major Pests and Diseases of Fruit crops and their management
10. Maturity and Harvesting indices of fruit crops
11. Principles of Integrated Orchard Management (IOM).

b. Student Study Projects:

1. Identification and Herbarium preparation of disease symptoms of fruit crops
2. Identification and Herbarium preparation of pest symptoms of fruit crops
3. Different methods of Irrigation of fruit crops

4. Different methods of fertilizer application of fruit crops

c. Assignments: Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to Horticulture University/ Research Station/Orchard.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

**IV Semester /Horticulture Core Course - 5
Pests and Diseases of Horticulture Plants and their Management**

Theory : (Total hours of teaching – 60 @ 04 Hrs./Week)

Learning Outcomes: On successful completion of this course, the students will be able to:

- Develop a critical understanding of insect pests and plant disease symptoms.
 - Examine and identify the pests and diseases of vegetable crops and their management
 - Examine and identify the pests and diseases of ornamental crops and their management
 - Examine and identify the pests and diseases of fruit crops and their management
 - Identify and classify various insect pests on horticulture plants.
 - Justify the significance of Integrated Plant Disease Management for horticultural crops.
 - Classify the pesticides based on use, chemical nature, formulation, toxicity and action.
-

Unit – 1 :Basics of Entomology and Plant Pathology

1. Classification of Insects upto orders and families of economic importance; Study of insect pests (Distribution, host range, biology, nature of damage and management) in horticultural crops.
2. Disease triangle and disease pyramid; Plant Pathology : Definition
3. A general account on symptoms of plant diseases caused by Viruses and Bacteria.
4. A general account on symptoms of plant diseases caused by Fungi.

Unit – 2 :Pests and diseases of Vegetables crops

1. Bhendi: Spotted boll worms, Red cotton bug, Yellow vein mosaic.
2. Cucurbits: Fruit flies, Pumpkin beetles; Downy and powdery mildews.
3. Potato: Potato tuber moth, Golden cyst nematode; Late blight.
4. Sweet Potato: Sweet potato weevil, Vine borer; Mottled necrosis.

Unit – 3 :Pests and diseases of Fruit & Plantation Crops

1. Coconut :.Rhinoceros beetle, Burrowing nematode; Ganoderma root rot, Grey blight
2. Banana :Banana weevil, banana aphids; Panama wilt. Bunchy top
3. Cashew : Tea mosquito bug. Cashew stem borer; Anthracnose, 2.Pink disease
4. Mango: Pests & Diseases.

Unit – 3 :Pests and diseases of Commercial Flower crops

1. Rose : Rose aphid, Dieback, and black spot, Powdery Mildew
2. Marigold : Aphids, leaf spot, and bud rot
3. Jasmine: Pests & Diseases

Unit – 4 :Management of Pests and Diseases

1. Principles and methods of plant disease management.

2. Integrated Pest Management & Integrated Disease Management
3. Fungicides classification based on chemical nature; commonly used insecticides, fungicides, bactericides and nematicides.
4. Preparation of fungicidal solutions, slurries, pastes and their application.

SEMESTER IV PAPER-V Pests and Diseases of Horticulture Crops and their Management

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - II			
Course Code HORT5222	Pests and Diseases of Horticulture Crops and their Management				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of different Pests and Diseases of Horticulture Crops and their Management	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions

PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings

PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers

PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.

PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.

PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).

PSO3: To develop creative skills to solve problems and improve current systems.

PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.

PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Basics of Entomology and Plant Pathology	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analyse the Pests and Diseases of Vegetable Crops	Analyzing
CO4	Gain knowledge on Pests and Diseases of Commercial Flower Crops	Knowledge & Application
CO5	Understand the Management Practices for Pests and Diseases	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	
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CO-PO– PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Practical syllabus of Horticulture Core Course – 5/ Semester-IV
Pests and Diseases of Horticulture Plants and their Management
(Total hours of teaching – 30 @ 02Hrs./Week)

1. Study of characteristics of insect pests, microbial pathogens, nematodes causing disease on different plants given in the theory syllabus.
2. Identification of disease symptoms on different plants given in the theory syllabus.
3. Observing and acquiring knowledge on pesticides, fungicides etc.,
4. Acquaintance with methods of application of common fungicides.
5. Field visit and acquaintance with disease of crops

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Model Question Paper for Practical Examination

IV Semester /Horticulture Core Course - 5

Pests and Diseases of Horticulture Plants and their Management

Max. Time: 3 Hrs.

Max. Marks: 50

1. Identify and comment on insect diseases A & B 2 x 5 = 10 M
2. Identify and comment on microbial diseases C & D 2 x 5 = 10 M
3. Identify and comment on nematodal diseases E & F 2 x 5 = 10 M
4. Identify and comment on Pesticide/ Fungicides G & H2 × 4 = 6 M
5. Record + Herbarium + Viva Voice 10 + 4= 14 M

Text books :

- **Verma L R and R C Sharma 1999.** Diseases of Horticultural Crops – Fruits, Indus Publishing, New Delhi.
- Diseases of Horticulture Crops and their management, TNAU Publ. Agrimoon.Com
- **Jagatap G P, D N Dhutraaj and UtpalDey. 2001.** Diseases of Horticultural crops and their management, Agrobios Publications

Suggested co-curricular activities for Semester- V :

A. Measurable :

a. Student seminars :

1. Disease symptoms and their management of vegetable crops
2. Disease symptoms and their management of ornamental crops
3. Disease symptoms and their management of fruit crops
4. Disease symptoms of nematode and their management in horticultural crops
5. Role of Integrated Pest Management (IPM) in horticultural crops
6. Role of Integrated Disease Management (IDM) in horticultural crops
7. Classification of insecticides
8. Classification of fungicides

b. Student Study Projects:

1. Identification and Herbarium preparation of disease symptoms of vegetable crops
2. Identification and Herbarium preparation of disease symptoms of ornamental crops.
3. Identification and Herbarium preparation of disease symptoms of fruit crops
4. Preparation of laminated photos of major diseases of horticultural crops
5. Preparation of laminated photos of major fungicides used in horticultural crops
6. Preparation of laminated photos of major insecticides used in horticultural crops

c. Assignments: Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to Horticulture University/ Research Station/Horticultural fields.
3. Visit to Pesticide industries/shops.

RECOMMENDED ASSESSMENT OF STUDENTS:

Recommended continuous assessment methods for all courses:

Some of the following suggested assessment methodologies could be adopted. Formal assessment for awarding marks for Internal Assessment in theory.

(a) Formal:

1. The oral and written examinations (Scheduled and surprise tests),
2. Simple, medium and Critical Assignments and Problem-solving exercises,
3. Practical assignments and laboratory reports,
4. Assessment of practical skills,
5. Individual and group project reports,
6. Seminar presentations,
7. Viva voce interviews.

(b) Informal:

1. Computerized adaptive testing, literature surveys and evaluations,
2. Peers and self-assessment, outputs from individual and collaborative work
3. Closed-book and open-book tests,

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

Common pattern for Question Paper for Theory Examination(s) at Semester end

Max. Time : 3 Hrs.

Max. Marks : 50 M

Section – A

Answer any three of the following questions. Draw a labeled diagram wherever necessary

2 x 5 = 10 M

- ✓ One question should be given from each Unit in the syllabus.

Section – C

Answer any FIVE of the following questions. Draw a labeled diagram wherever necessary

5 x 4 = 20 M

- ✓ Two questions (a & b) are to be given from each Unit in the syllabus (internal choice in each unit). Student has to answer 5 questions by choosing one from a set of questions given from a Unit.

Note : Questions should be framed in such a way to test the understanding, analytical and creative skills of the students. All the questions should be given within the frame work of the syllabus prescribed.

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF HORTICULTURE**

**Assessment methodology for Internships / On the Job Training /
Apprenticeship under the revised CBCS (2020 – 21 onwards)**

Second Internship (After 2nd year examinations): Apprenticeship / Internship / On the job training / In-house Project / Off-site Project

To make the students employable, an Apprenticeship / Internship / On the job training / In-house Project / Off-site Project shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years.

Learning outcomes

- Explore career alternatives prior to graduation.
- Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Learn to appreciate work and its function towards future .
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the future job.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job following graduation from college.
- Acquire additional skills required for world of work.

Assessment Model

There will be only internal evaluation for this internship. Each faculty member is to be assigned with 10 to 15 students depending upon availability of the faculty members. The faculty member will act as a faculty-mentor for the group and is in-charge for the learning activities of the students and also for the comprehensive and continuous assessment of the students.

The assessment is to be conducted for 100 marks and the credits assigned are 4. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightings shall be:

Project Log	20%
Project Implementation	30%
Project report	25%,
Presentation	25%

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The project log is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration the individual student's involvement in the assigned work.

While grading the student's performance, using the student's project log, the following should be taken into account -

- a. The individual student's effort and commitment.
- b. The originality and quality of the work produced by the individual student.
- c. The student's integration and co-operation with the work assigned.
- d. The completeness of the logbook.

The assessment for Project Implementation during **second internship / Project Work / On the Job Training / Apprenticeship** shall include the following components and based on the entries of Project Log and Project Report:

- a. Involvement in the work assigned
- b. Regularity in the work assigned
- c. New knowledge acquired
- d. New skill acquired

The Project Report should contain

- a. Introduction.
- b. Project specifications (area / background of the work assigned).
- c. Problems taken up.
- d. Analysis of the problem.
- e. Recommendations and conclusions.

The Project Presentation is to be made by the student after he/she reports back to the College. The components for assessment are –

- a. assessing the involvement in the project
- b. presentation skills
- c. final outcome of the project as evinced by the student.

For Example:

II MPC-EM

S.No.	Name of the Student	Class & Year of Study	Register Number	Project Log	Project Implementation	Project Report	Presentation	Total
				(20)	(30)	(25)	(25)	(100)

**Signature of
Project Mentor**

**Signature of
Nominated faculty**

**Signature of
HOD/ In-Charge**

REVISED UG SYLLABUS UNDER CBCS
(Implemented from Academic Year 2023-24)

PROGRAMME: FOUR YEAR B.Sc. (Hons)

Domain Subject: **B. Sc - Horticulture**

Skill Enhancement Courses (SECs) for Semester V, from 2023-24 (Syllabus/Curriculum)

Pair Options of SECs for Semester-V

(To choose one pair from the five alternate pairs of SECs)

Univ. Code	Course NO. 6 & 7	Name of Course	Th. Hrs. / Week	IE Marks	EE Marks	Credits	Prac. Hrs./Week	Marks	Credits
	6A	Ornamental Horticulture	3	25	75	3	3	50	2
	7A	Commercial Floriculture	3	25	75	3	3	50	2

OR

	6B	Precision Farming and Protected Cultivation	3	25	75	3	3	50	2
	7B	Post-harvest Management of Horticultural Crops	3	25	75	3	3	50	2

OR

	6C	Water Management in Horticultural Crops	3	25	75	3	3	50	2
	7C	Soil Fertility and Nutrient Management	3	25	75	3	3	50	2

OR

	6D	Dryland Horticulture	3	25	75	3	3	50	2
	7D	Plantation Crops	3	25	75	3	3	50	2

Note: For Semester-V, for the domain subject History, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-6A: **Ornamental Horticulture**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Acquire a critical knowledge of ornamental gardening and its significance.
2. Identify and explain living and non-living components in an ornamental garden.
3. Acquire skills on propagation and planting of various ornamental plants.
4. Perform managerial skills related to ornamental gardening.
5. Demonstrate skills of designing and developing ornamental gardens in public places.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Ornamental Horticulture (10h)

1. History, Definition, scope of gardening, aesthetic values; types of gardens in India.
2. Landscaping, basic principles and basic components.
3. Principles of gardening, garden components and adornments.
4. Lawn types, establishment and maintenance; methods of designing rockery and water garden.

Unit -2: Types of Ornamental gardens (10h)

1. Special types of gardens, trees, their design, their walk-paths, bridges, constructed features.
2. Garden structures – greenhouse, glass house, net house.
3. Values in landscaping; propagation-planting of shrubs and herbaceous perennials.

Unit-3: Plants in Ornamental gardens (10h)

1. Importance, design values, propagation, planting of following annuals, biennials and perennials:
(a) Climbers (b) Creepers (c) Palms (d) Ferns (e) Grasses (f) Cacti (g) Succulents

Unit-4: Ornamental gardening – public utility (10h)

1. Cultural operations in ornamental gardens.
2. Bio-aesthetic planning, definition, need; round country planning; urban planning and planting - avenues, educational institutions, villages.
3. Beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, Planting material for play grounds.

Unit-5: Ornamental gardening in residences (10h)

1. Bottle garden, terrariums.
2. Vertical gardens, roof gardens.
3. Culture of bonsai, art of making bonsai.

References:

1. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication and Information division. ICAR, New Delhi.
 2. K.V.Peter. 2009. Ornamental plants. New India Publishing Agency, New Delhi.
 3. Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
- Bimaldas Chowdhury and Balai Lal Jana. 2014. Flowering Garden trees. Pointer publishers, Jaipur. India.

Co-Curricular Activities (student field training by teacher: 05 hours):**a) Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on garden operations, lawn making, art of bonsai, plant propagation methods; using CAD in landscaping.
2. **For Student:** Individual laboratory work and visit to parks in public and private places, studying the living and non-living elements of an ornamental garden – landscaping; culminating writing and submission of a hand-written Field Work Report (various plants, growth habit, propagation, design of garden) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying ornamental plants, types and styles of gardens, propagation of garden plants, landscaping)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on plant propagation, garden operations, ornamental gardening.
5. Collection of material/figures/photos related to gardening and landscaping in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to gardens and parks in public places and/or private firms; famous gardens in A.P. and India etc.
7. Invited lectures and presentations on related topics by field/industrial experts

SEMESTER V PAPER-6A Ornamental Horticulture

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - II			
Course Code HORT6222 A	Ornamental Horticulture				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Ornamental Horticulture	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Introduction to Ornamental Horticulture	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the types of Ornamental Gardens	Analyzing
CO4	Gain knowledge on Plants in Ornamental Gardens	Knowledge & Application
CO5	Understand the Ornamental Gardening – Public Utility	Understanding & Application

Knowledge	Skill	Employability	Entrepreneurship
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CO-PO– PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High], '-': No Correlation)
 Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Course 6A: Ornamental Horticulture – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various components required for ornamental garden development.
2. Perform various skills related to establishment and maintenance of an ornamental garden.
3. Demonstrate skills of making developing a lawn and bonsai.
4. Make landscape design using CAD.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of various plants grown in ornamental gardens.
2. Tools, implements and containers used in ornamental gardening.
3. Planning, designing and establishment of garden features viz. lawn, hedge and edge, rockery etc.,
4. Demonstration of types and styles of gardens using photos or videos.
5. Planning, designing and establishment of water garden, carpet bedding, shade garden, roof garden.
6. Preparation of land for lawn and planting.
7. Exposure to CAD (Computer Aided Designing)
8. Demonstration of bonsai making.
9. Study and creation of terrariums, vertical garden.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Ornamental Horticulture

Max. Time: 3 Hrs.

Max. Marks: 50

1. Demonstration of making a lawn /creating water garden ‘A’	8
2. Demonstration of making hedge and edge/ garden operations’ ‘B’	10
3. Demonstration of bonsai technique/ designing a landscape ‘C’	12
4. Scientific observation and data analysis	4 x 3 = 12
D. Climber/creeper/ palm	
E. Fern/Cactus/succulent	
F. Garden adornments	
G. Tool/implement/container	
5. Record + Viva-voce	5+3 = 8

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-7A: **Commercial Floriculture**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Understand the significance of flowers in human life.
2. Acquire skills related to production techniques in floriculture.
3. Explain the breeding techniques of some flowering plants.
4. Demonstrate skills of protected cultivation in floriculture.
5. Perform skills in relation to post-harvest operations in floriculture.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(*Syllabi of theory and practical together shall be completed in 80 hours*)

Unit-1: Basic concepts of floriculture (10h)

1. Aesthetic, cultural and industrial importance of flowers; domestic and export marketing of flowers.
2. Floriculture - Importance, area and production in Andhra Pradesh and India.
3. Scope and importance of commercial floriculture in A.P., and India.

Unit-2: Production technology-1 (10h)

1. Production techniques of following flowering plants for domestic and export market:
(a) Rose (b) *Chrysanthemum* (c) Marigold (d) Tuberose (e) *Crossandra* (f) Jasmine

Unit-3: Production technology-2 (10h)

1. Production techniques of following flowering plants for domestic and export market:
(a) *Anthurium* (b) *Gerbera* (c) *Gladiolus* (d) *Dahlia* (e) *Heliconia* (f) Orchid

Unit-4: Plant breeding of flowering ornamentals (10h)

1. Objectives and techniques in ornamental plant breeding.
2. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of following ornamental and flower crops.
a) Carnation (b) *Petunia* (c) *Geranium*

Unit-5: Post-harvest practices in floriculture (10h)

1. Growing of flowering plants under protected environments such as glass house, plastic house, net house, etc.
2. Importance of flower arrangement; Ikebana - techniques, types, suitable flowers and cut foliage.
3. Post-harvest technology of cut and loose flowers in respect of commercial flower crops.
4. Dehydration techniques for drying of flowers, scope importance and status.

References:

1. T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy.2003. Commercial flowers. Partha Sankar Basu, Nayaudyog,206, Bidhan Sarani, Kolkata
2. S.K. Bhattacharjee and L.C. De. 2003. Advanced Commercial Floriculture. Aavishkar Publishers, Distributors, Jaipur, India.
3. V.L. Sheela, 2008. Flower for trade. New India Publishing Agency, New Delhi
4. Dewasish Choudhary and Amal Mehta. 2010. Flower crops cultivation and management. Oxford Book Company, Jaipur, India.

Co-Curricular Activities (student field training by teacher: 05 hours):**a) Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on intercultural operations in floriculture, propagation techniques, breeding methods, post-harvest handling of flowers; floral designs and bouquet making.
2. **For Student:** Individual laboratory work and visit to floriculture fields/floriculture department in a Horticulture University/college - studying the cultivation practices from sowing/planting to harvesting of flowers, post-harvest techniques - written Field Work Report (various flowering plants, propagation, utilization/marketing) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying commercially important flowering plants, cultivation practices, propagation and breeding methods, post-harvest practices)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on intercultural operations, cultivation, shelf and vase-life, commercial products from flowers.
5. Collection of material/figures/photos related to commercial floriculture in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to Floriculture fields and Horticulture University/college.
7. Invited lectures and presentations on related topics by field/industrial experts.

SEMESTER V PAPER-7A Commercial Floriculture

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - III			
Course Code HORT7222 A	Commercial Floriculture				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of different tropical ,sub tropical and Flowers	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions

PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings

PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers

PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.

PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their ownbusiness in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.

PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).

PSO3: To develop creative skills to solve problems and improve current systems.

PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.

PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Basic Concepts of Floriculture	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Production Technology	Analyzing
CO4	Gain knowledge on Plant Breeding of Flowering Ornamentals	Knowledge & Application
CO5	Understand the Post Harvest Practices in Floriculture	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Course 7A: Commercial Floriculture – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify different flowering plants of commercial value.
2. Perform skills in propagation of flowering plants.
3. Demonstrate skills of post-harvest handling of flowers.
4. Perform skills of floral arrangements or making floral products.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification of commercially important floricultural crops.
2. Propagation technique in *Hibiscus*/Rose/*Chrysanthemum*/tuberose.
3. Propagation technique in *Gladiolus*/carnation/*Petunia*
4. Sowing of seeds and raising of seedlings of a flowering plant.
5. Training and pruning of rose/Jasminum.
6. Drying and preservation of flowers.
7. Use of chemicals and other compounds for prolonging the vase life of cut flowers.
8. Flower arrangement practices.
9. Preparation of bouquets, garland,veni and gajara.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Commercial Floriculture

Max. Time: 3 Hrs.

Max. Marks: 50

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- | | |
|--|------------|
| 1. Perform seed sowing and nursery raising /propagation of a flowering plant ‘A’ | 8 |
| 2. Perform a breeding technique of a flowering plant/making floral design ‘B’ | 10 |
| 3. Making of bouquet/ garland/veni/gajara ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Commercially important flowering plant | |
| E. Propagule for establishment | |
| F. Preservation method | |
| G. Product of floriculture | |
| 5. Record + Viva-voce | 5+3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-6B: **Precision Farming and Protected Cultivation**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Understand the importance of precision farming in present scenario.
2. Explain different types of green houses used for precision farming.
3. Acquire skills on construction of green houses.
4. Perform managerial skills related to precision farming under protected structures.
5. Demonstrate skills on cultivation high-value horticulture plants through precision farming.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Precision farming (10h)

1. Precision farming – Introduction and history, Importance and Scope.
2. Laser leveling, mechanized direct seed sowing seedling and sapling transplanting.
3. Mapping of soils and plant attributes.

Unit -2: Management in Precision farming (10h)

1. Site specific input application.
2. Weed management, Insect pests and disease management.
3. Yield mapping in horticultural crops.

Unit-3: Types of Green houses (10h)

1. Green house technology – Introduction viz. Importance, scope, advantages and disadvantages.
2. Types of Green Houses based on shape, utility, construction and cladding materials.
3. Plant response to Greenhouse environment.

Unit-4: Construction of Green house (10h)

1. Planning and design of greenhouses.
2. Design criteria of greenhouse for cooling and heating purposes.
3. Green house equipment; Materials of construction for traditional and low cost green houses.
4. Irrigation systems used in greenhouses.

Unit-5: Farming in Green house (10h)

1. Net house cultivation, Passive solar green house, Green house drying.
2. Choice of crops for cultivation under greenhouses: Capsicum, Cucumber, Broccoli, Cabbage, Spinach, Lettuce.
3. Cost estimation and economic analysis.

References:

1. Balraj Singh. 2006. Protected cultivation of vegetable crops. Kalyani Publishers, Ludhiana.
2. Brahma Singh, 2014. Advances in Protected Cultivation. New India Publishing Agency. New Delhi.
3. Jitendra Singh, 2015. Precision Farming in Horticulture. New India Publishing Agency. New Delhi.

Reddy, P. and Parvatha. 2011. Sustainable crop protection under Protected Cultivation. Springer Publications. USA.

SEMESTER V PAPER-6B Precision Farming and Protected Cultivation

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - III			
Course Code HORT6222 B	Precision Farming and Protected Cultivation				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Precision Farming and Protected Cultivation	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their ownbusiness in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Introduction to Precision Farming	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Management in Precision Farming	Analyzing
CO4	Gain knowledge on Types of Green Houses	Knowledge & Application
CO5	Understand the Construction of Green Houses	Understanding & Application

Knowledge	Skill	Employability	Entrepreneurship
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Co-Curricular Activities (student field training by teacher: 05 hours):

a) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on equipment and material in green house, preparation of soil and other media, irrigation systems and other practices in a green house.
2. **For Student:** Individual laboratory work and visit to green house in a Horticulture University/ college and/or private sector, studying the structure, material and equipment, growing media, farming practices, irrigation, INM and IPM; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like types and styles of green houses, material and equipment, advantages and disadvantages of protected cultivation, yield-cost benefit analysis)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on precision farming; protected cultivation of high value fruit and vegetable crops.
5. Collection of material/figures/photos related to protected cultivation of horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to protected cultivation facilities in a Horticulture University or college and/or private firms.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 6B: Precision Farming and Protected Cultivation – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various material and equipment required for green house construction.
2. Perform various skills related to preparation of soil and other media for cultivation under a protected structure.
3. Demonstrate operational skills related to equipment in a green house.
4. Make the calculation related to input-output economics.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of different types of greenhouses based on shape, utility.
2. Study of different types of greenhouses based on construction and cladding materials.
3. Testing of soil and water to study its suitability for growing crops in greenhouses.
4. Growing media, Soil culture- type of soil required.
5. Study of irrigation, drainage - flooding and leaching.
6. Soil pasteurization in peat moss and mixtures, Rock wool and other inert media.
7. Nutrient film technique (NFT), Hydroponics.
8. Study of cultivation of a crop in green house.
9. Economics of protected cultivation.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Precision Farming and Protected Cultivation

Max. Time: 3 Hrs.

Max. Marks: 50

1. Performing skill on type and style of a green house using a model 'A'	8
2. Making a growing medium used in protected cultivation 'B'	10
3. Performing NFT or Hydroponics 'C'	12
4. Scientific observation and data analysis	4 x 3 = 12
D. Material for green house	
E. Equipment in green house	
F. Style of green house	
G. Modern techniques in precision farming/high value crop	
5. Record + Viva-voce	5+3 = 8

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-7B: **Post-harvest Management of Horticultural Crops**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

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.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Post Harvest Technology (10h)

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

Unit -2: Maturity and harvesting indices (10h)

1. 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: Post harvest problems and treatments (10h)

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

Unit-4: Storage of Horticulture products (10h)

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

Unit-5: Post Harvest Operations (10h)

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

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. Ponteer 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 PAPER-7B Post-harvest Management of Horticultural Crops

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - III			
Course Code HORT7222 B	Post-harvest Management of Horticultural Crops				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Post-harvest Management of Horticultural Crops	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their ownbusiness in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Introduction to post harvest technology	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Maturity and Harvesting Indices	Analyzing
CO4	Gain knowledge on Post Harvest Problems & Treatments	Knowledge & Application
CO5	Understand the Storage of Horticulture Products	Understanding & Application



CO-PO– PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
 Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Co-Curricular Activities (student field training by teacher: 05 hours):

a) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on maturity indices of horticulture products, reaping and post-harvest handling, modern methods in storage.
2. **For Student:** Individual laboratory work and visit to Dept. of PHT in a Horticulture University/ college; store houses of horticulture products, studying post-harvest practices – grading, treatments, storage methods etc., culminating writing and submission of a hand-written Field Work Report (various horticulture crops, harvesting methods, storage practices, packaging and transport) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like harvesting practices, maturity indices, causes of spoilage, storage structures and practices, packaging, transport and marketing).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on PHT of different horticulture products; harvesting and grading, storage methods.
5. Collection of material/figures/photos related to PHT practices of horticulture products in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to protected cultivation facilities in a Horticulture University or college and/or storage units.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 7B: Post-harvest Management of Horticultural Crops – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

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.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of maturity indices of fruits, vegetables, flowers and plantation crops.
2. Determination of physiological loss in weight and quality
3. Grading of horticultural produce (manual and mechanical).
4. Post-harvest treatment of horticultural crops, physical and chemical methods.
5. Identification of pests and diseases of Horticulture products in storage.
6. Study of post-harvest disorders in horticultural produce.
7. Study of facilities of storage units and methods of storage.
8. Packaging in fruits, vegetables by using different packaging materials
9. Packaging in plantation crops and cut flowers by using different packaging materials.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Post-harvest Management of Horticultural Crops

Max. Time: 3 Hrs.

Max. Marks: 50

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- | | |
|--|------------|
| 1. Determination of maturity and harvesting indices of two horticulture products 'A' | 8 |
| 2. Grading practice of any two horticulture products 'B' | 10 |
| 3. Identifying a pest and a disease of horticulture product 'C' | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Maturity/harvest index of fruit/vegetable crop | |
| E. Maturity/harvest index of flower/plantation crop | |
| F. Post- harvest disorder/pest/disease of a horticulture crop | |
| G. Packaging material/ practice | |
| 5. Record + Viva-voce | 5+3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2023-24
Four Year B.Sc. (Hons) - Semester – V (from 2023-24)
Subject: **B. Sc - Horticulture**
Course-6C: **Water Management in Horticultural Crops**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Understand the importance of water for horticulture crops.
2. Explain different irrigation practices and factors influencing them.
3. Acquire skills on layout of sprinkler and drip irrigation.
4. Perform managerial skills related to water management in horticultural crop fields.
5. Demonstrate skills on efficient use of irrigation methods for different types of soils.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Importance of water for plants (10h)

1. Importance of water to plants, hydrological cycle; water resources in Andhra Pradesh and India.
2. Area of different crops under irrigation; function of water for plant growth.
3. Effect of moisture stress on crop growth; Available and unavailable soil moisture – distribution of soil moisture.

Unit -2: Water for horticultural crops (10h)

1. Water requirement of horticultural crops – net irrigation requirement, gross irrigation requirement.
2. Lysimeter studies, Plant water potential climatological approach – use of pan evaporimeter- Consumptive use of pan evaporimeter.
3. Definition of evaporation, transpiration, evapo-transpiration and potential evapo-transpiration.

Unit-3: Irrigation methods (10h)

1. Factor for crop growth stages – critical stages of crop growth for irrigation; irrigation scheduling – different approaches.
2. Soils quality of irrigation water, irrigation management practices for different soils and crops.
3. Methods of Irrigation- classification, border, check basin, Square and ring basin, furrow irrigation methods.

Unit-4: Modern methods of irrigation (10h)

1. Sub-surface pressurized methods; sprinkler- definition, adoptability, limitations.
2. Components and types of sprinkle irrigation system, layout, fertilizer applicator.
3. Drip irrigation system – definition, advantages, dis- advantages, components, fertilizer applicator, layout.

Unit-5: Water Management & Water Use Efficiency (10h)

1. Water management problem, merits and demerits; Water use efficiency (WUE), factors effecting WUE.
2. Methods to improve economic use of water for irrigation.
3. Water use for maximum profit of garden/orchard ecosystem; water management for problem soils.

References:

1. Y P Rao and S. R. Bhakar, 2008. Irrigation Technology Theory & Practices AgroTech Publishing Academy, Udaipur
 2. A.M. Michael, 2002. Irrigation Theory and Practice. Vikas Publishing House Pvt. Ltd. New Delhi.
 3. R.K. Shivanappan Drip Irrigation Keerthi Publishing House Pvt. Ltd., Coimbatore.
- A.M. Michael and T.P. Ojha, 1999. Principles of Agricultural Engineering Vol-II, Jain Brothers, New Delhi

SEMESTER V PAPER-6C Water Management in Horticultural Crops

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - III			
Course Code HORT6222C	Water Management in Horticultural Crops				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Water Management in Horticultural Crops	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions

PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings

PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers

PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.

PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.

PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).

PSO3: To develop creative skills to solve problems and improve current systems.

PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.

PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Importance of Water for Plants	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Water for Horticultural Crops	Analyzing
CO4	Gain knowledge on Irrigation methods	Knowledge & Application
CO5	Understand the Modern methods of Irrigation	Understanding & Application

Knowledge	Skill	Employability	Entrepreneurship
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Co-Curricular Activities (student field training by teacher: 05 hours):

c) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on determination of water potential and soil moisture, various irrigation practices, equipment for sprinkler and drip irrigation methods etc.
2. **For Student:** Individual laboratory work and visit to drip and sprinkler irrigation installation in a Horticulture University/ college and/or horticulture crop field, studying the layout and equipment, operation methods, irrigation schedule, fertigation, cleaning; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

d) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like determination of plant water requirements, transpiration in crops and use of anti-transpirants, traditional and modern methods of irrigation).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on irrigation methods and water management in horticulture crops.
5. Collection of material/figures/photos related to water management for horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or crop field.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 6C: Water Management in Horticultural Crops – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Determine water requirement of a crop plant.
2. Perform skills related to determination of soil moisture constants.
3. Operate equipment of sprinkler and drip irrigation.
4. Make layouts for different irrigation methods.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of water potential.
2. Estimation of soil moisture constants.
3. Determination of soil moisture by air oven method.
4. Estimation of irrigation efficiency of horticultural crops,
5. Estimation of water requirements of horticultural crops.
6. Collection of field data for designing micro-irrigation system for orchard and vegetable crops.
7. Study of different components of drip irrigation system.
8. Study of different components of sprinkler irrigation system.
9. Study of fertilizer application system.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Water Management in Horticultural Crops

Max. Time: 3 Hrs.

Max. Marks: 50

1. Determination of water potential/soil moisture 'A'	8
2. Estimation of irrigation efficiency of a horticulture crop 'B'	10
3. Making a layout for sprinkler/drip irrigation system 'C'	12
4. Scientific observation and data analysis	4 x 3 = 12
D. Component for sprinkler irrigation system.	
E. Component for drip irrigation system.	
F. Soil moisture constant	
G. Fertigation method in modern irrigation	
5. Record + Viva-voce	5+3 = 8

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-7C: **Soil Fertility and Nutrient Management**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Understand the role of macro and micro nutrients in plant nutrition.
2. Explain different types of manures, chemical and biofertilizers used for horticulture plants.
3. Acquire skills on nutrient deficiency symptoms and status of nutrients in plants.
4. Perform managerial skills related to integrated nutrient management in horticultural crop fields.
5. Demonstrate skills on efficient use of fertilizers for different types of horticulture crops.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Soil fertility and soil productivity (10h)

1. History of soil fertility, definition of soil fertility and productivity; essential nutrient elements and functions, deficiency symptoms.
2. Mechanism of Nutrient transport / uptake to plants and nutrient availability.
3. Problematic Soils, Acid, calcareous and salt affected soil characteristics and management

Unit -2: Soil organic matter (10h)

1. Role of micro-organisms in organic matter decomposition and humus formation.
2. Importance of C:N ratio and pH in plant nutrition soil buffering capacity.
3. Main objectives of INM, components of Integrated plant nutrient management (IPNM); soil fertility evaluation methods: chemical, biological and by visual symptoms, critical levels of different nutrients and hidden hunger in soil.
4. DRIS Approach, critical limit approach,

Unit-3: Manures and fertilizers (10h)

1. Manures and fertilizer classification and manufacturing process; properties and fate of major and micronutrient in soils.
2. NPK fertilizers: composition and application methodology, luxury consumption, nutrient reactions, deficiency symptom by visual diagnosis.
3. Secondary and Micronutrient fertilizers their types, composition, reaction in soil and effect on crop growth.
4. Time and methods of manures and fertilizers application; foliar application and its concept.

Unit-4: Modern methods of irrigation (10h)

1. Fertilizer control order; nutrient interactions, plant nutrient toxicity symptoms and remedial measures.
2. Effect of potential toxic elements in soil and plant.
3. Soil test crop response and targeted yield concept.
4. FCO

Unit-5: Nutrient management (10h)

1. Biofertilizers: importance, types and use in horticultural crop.
2. Nutrients use efficiency (NUE) and management.
3. Use of vermicompost and residue wastes in crops.

References:

1. Mengel , et al., 2001. Principles of Plant Nutrition (5th Edition), Springer.
2. Yawalkar K.S, Agarwal J. P. and Bokkde, 1992. Manures and Fertilizers. Agri. Horticultural Publishing House, Nagpur.
3. Tandan HLS, 1994. Fertilizers Guide. Fertilizers Development Consultation Organizations, New Delhi.

Seethramaan, S. Biswas, B.C. Maheshwari, S. and Yadav, D.S. 1986 Hand Book on Fertilizers Technology. The Fertilizers Association of India, New Delhi.

SEMESTER V PAPER-7C Soil Fertility and Nutrient Management

	P.R.Government College(Autonomous) Kakinada	Program & Semester HBC - III			
Course Code HORT7222C	Soil Fertility and Nutrient Management				
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Soil Fertility and Nutrient Management	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the Introduction to soil fertility and soil productivity	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Soil Organic Matter	Analyzing
CO4	Gain knowledge on Manures and fertilizers	Knowledge & Application
CO5	Understand the Modern methods of Irrigation	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	
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CO-PO– PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
 Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

IV. Co-Curricular Activities (student field training by teacher: 05 hours):

e) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on determination of macro and micro-nutrients in plants and soil, identification of nutrient deficiencies in plants, application of manures, chemical and biofertilizers and INM and IPNM etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, soil testing laboratory, and/or horticulture crop field, studying the plant-nutrient deficiencies, fertilizer application methods; equipment in a soil testing laboratory, their operation and methodology of nutrient estimation; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

f) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identification of plant nutrient deficiencies, estimating nutrients in soils, determination of plant nutrient requirements, natural and commercial manures, chemical and biofertilizers and their application, traditional and modern methods of fertilizer application).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for horticulture crops in INM and IPNM.
5. Collection of material/figures/photos related to plant nutrition management for horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or crop field; soil testing laboratory.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 6C: Soil Fertility and Nutrient Management – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Diagnose nutrient deficiencies in plants.
2. Estimate organic matter, major and minor nutrients in soil.
3. Determine the adulteration of fertilizers.
4. Perform skills related to INM and IPNM.
5. Perform skills related to application of soil amendments.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of organic matter (Organic carbon) in soil and interpretations.
2. Determination of available Nitrogen in soil and interpretations.
3. Determination of available P in soil and interpretations.
4. Determination of available K in soil and interpretations.
5. Determination of available S in soil and interpretations.
6. Determination of exchangeable Calcium and Magnesium by Versenate (EDTA) Method.
7. Determination of soil Micronutrients
8. Fertilizer Adulteration test / Identification of Adulteration in fertilizer / Detection of adulteration in fertilizers (Rapid test)
9. Determination of Gypsum requirement of saline and alkali soils.
10. Determination of Lime requirement of acid soils.
11. Use of soil testing kit and use of leaf colour chart for nutrient deficiency diagnosis.
12. Study of various biofertilizers.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Soil Fertility and Nutrient Management

Max. Time: 3 Hrs.

Max. Marks: 50

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- | | |
|---|------------|
| 1. Determination of organic matter, Nitrogen/Phosphorus/ Potassium/Sulphur in a soil sample 'A' | 8 |
| 2. Determination of exchangeable Ca-Mg/soil micronutrients 'B' | 10 |
| 3. Determination of Gypsum or lime requirement/ fertilizer adulterations 'C' | 12 |
| 4. Scientific observation and data analysis
D. Plant nutrient deficiency symptom
E. Manure/chemical fertilizer
F. Biofertilizer
G. Fertigation method in INM/IPNM | 4 x 3 = 12 |
| 5. Record + Viva-voce | 5 + 3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2023-24

Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-6D: **Dryland Horticulture**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

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

1. Understand the basic concepts of dryland horticulture and its prospects.
2. Acquire skills in relation to management of soil and water in dryland farming.
3. Demonstrate skills on various methods to check the water loss during farming.
4. Understand the cultivation practices of certain crops suitable for dryland farming.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Dryland horticulture (10h)

1. Definition, importance and limitation of dry land horticulture.
2. Present status and future scope. Constraints encounter in dry lands.
3. Agro-climatic features in rain shadow areas, scarce water resources, high temperature, soil erosion, run-off losses etc.

Unit -2: Soil and water management (10h)

1. Techniques and management of dry land horticulture: watershed development, soil and water conservation methods-terraces, contour bunds, etc.
2. Methods of control and impounding of run-off water-farm ponds, trenches, macro catch pits, etc.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-3: Methods for efficient water use (10h)

1. Methods of reducing evapotranspiration, use of shelter belts, mulches, anti transpirants, growth regulators, etc.
2. Water use efficiency-need based, economic and conjunctive use of water, Micro systems of irrigation etc. IFS concept and alternate land use systems.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-4: Modern methods of irrigation (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:
(a) Ber (b) Annona (c) Pomegranate (d) Tamarind

Unit-5: Water management (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:
(a) Fig (b) Wood apple (c) Marking nut (d) Carambola

References:

1. Chadha, K. L. (ICAR)2002, 2001. Hand book of Horticulture. ICAR, New Delhi
2. Chundawat, B.S. 1990. Arid Fruit Culture. Oxford and IBH, New Delhi.
3. P.L. Taroj, B.B. Vashishtha, D.G.Dhandar. 2004. Advances in Arid Horticulture. Internal Book Distributing Co., Lucknow.
4. T. Pradeep Kumar, B. Suma, Jyothi Bhaskarand K.N.Sathesan. 2008. Management of Horticultural Crops. New India Publishing Agency.

SEMESTER V PAPER-6D Dryland Horticulture

	P.R.Government College(Autonomous) Kakinada				
Course Code HORT6222 D	Dryland Horticulture	Program & Semester HBC - III			
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of Dryland Horticulture	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand Soil and Water Management	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Methods for efficient water use	Analyzing
CO4	Gain knowledge on Modern method of Irrigation	Knowledge & Application
CO5	Understand the Water Management	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Co-Curricular Activities (student field training by teacher: 05 hours):

a) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on watershed development, soil and water conservation methods, Micro systems of irrigation etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, sites of dryland farming, studying the water management, characteristics of plants grown in dryland areas, cultivation practices; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like water management practices in dryland areas, methods of controlling evapotranspiration, cultivation practices for plants grown in drylands etc.,).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for horticulture crops in INM and IPNM.
5. Collection of material/figures/photos related to dryland horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or dryland crop fields.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 6D: Dryland Horticulture– Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Study the rainfall pattern and water deficit conditions in an area.
2. Perform skills on harvesting and conservation of rain water.
3. Identify the adaptation of plants to dryland areas.
4. Perform skills related to irrigation methods suitable to dryland areas.
5. Perform skills on checking evapo-transpiration.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of rainfall patterns.
2. Practicing contour bunding and trenching.
3. Studying micro catchments.
4. Studying soil erosion and its control in a dryland area.
5. Study of evapotranspiration and methods to control.
6. Practicing mulching methods.
7. Irrigation systems - Surface, Sub-surface; micro irrigation methods.
8. Study of special techniques of planting and aftercare in dry lands.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in dry land plants.
11. Study of morphological and anatomical features of drought tolerant fruit crops.
12. Study of morphological and anatomical features of salinity tolerant fruit crops.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Dryland Horticulture

Max. Time: 3 Hrs.

Max. Marks: 50

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- | | |
|---|------------|
| 1. Demonstration of skills on studying rain fall/ contour bunding or trenching ‘A’ | 8 |
| 2. Demonstration of methods of controlling evapotranspiration/ layout of micro-irrigation systems ‘B’ | 10 |
| 3. Anatomical features of a drought or salinity tolerant plant ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Water harvesting method | |
| E. Soil erosion/control method | |
| F. Irrigation practice in dryland area. | |
| G. Morphological features of a plant adapted to dryland farming | |
| 5. Record + Viva-voce | 5 + 3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2023-24
Four Year B.Sc. (Hons) - Semester – V (from 2023-24)

Subject: **B. Sc - Horticulture**

Course-7D: **Plantation crops**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50 Course Code:

Learning Outcomes:

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

1. Understand the characteristics of plantation crops.
2. Realize the contribution of plantation crops in national economy.
3. Explain the soil and climatic requirements of some important plantation crops in India.
4. Demonstrate managerial skills on farming, reaping the products and post-harvest practices in relation to plantation crops.
5. Identify the physiological disorders, pests and diseases of plantation crops.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Plantation crops (10h)

6. Plantation crops: Definition, history and development, scope and importance; Differences between plantation and fruit crops
7. Area and production, export and import potential, role in national and state economy.
8. Important research stations on plantation and beverage crops and their role.

Unit -2: Oil yielding crops (10h)

1. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coconut (b) Oil palm

Unit-3: Masticatory crops (10h)

2. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Areca nut (b) Betel vine

Unit-4: Beverage crops (10h)

1. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coffee (b) Cacao

Unit-5: Nut and Industrial crops (10h)

3. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Cashew nut (b) Rubber

References:

1. Chadha, K.L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi
2. Kumar, N.J.B. M. Md. Abdul Khaddar, RangaSwamy, P. and Irrulappan, I. 1997. Introduction to spices, Plantation crops and Aromatic plants. Oxford & IBH, New Delhi.
3. Meena, S.R. 2020. Production technology for fruit and plantation crops. TNAU, Coimbatore, WWW.agrigyan.in

SEMESTER V PAPER-7D Plantation crops

	P.R.Government College(Autonomous) Kakinada				
Course Code HORT7222 D	Plantation crops	Program & Semester HBC - III			
Teaching	Hours Allocated:60 (Theory)	L	T	P	C
Pre-requisites:	Knowledge of different tropical ,sub tropical and Plantation crops	4	0	2	4

L-Lecture; T- Tutorial; P- Practical, C- Credits

PROGRAMME OUTCOMES

- PO I: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking actions, checking out the degree to which these assumptions are accurate and valid and looking at our ideas and decisions
- PO 2: Students can easily speak, read, write, listen clearly and elicit views to others mediate disagreements and help to reach conclusions in group settings
- PO 3: Students can easily understand the Facilitating detailed study of allied branches required to raise the income of farmers
- PO 4: The HBC programme creates an understanding about Providing detailed knowledge of horticulture in India and Indian farmers income generating enterprises.
- PO 5: After completing B.Sc, HBC programme students can get lot of employment opportunities in various fields such as agriculture, horticulture either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Horticulture etc., Students can also pursue higher studies in Botany, Horticulture or Chemistry and they may focus on scientific research also. Acquire the knowledge of practical ability in handling the apparatus and process of methodology

PROGRAMME SPECIFIC OUTCOMES

- PSO1: Considers the acquisition, integration, and application of plant-science knowledge expected for horticulturists. This knowledge is often taught in formal classes and through books.
- PSO2: The capacity to integrate knowledge across a range of disciplines (e.g., business, soils, pathology), and have the ability to actually perform physical tasks that require practice and training (e.g., grafting).
- PSO3: To develop creative skills to solve problems and improve current systems.
- PSO4: Sets an expectation that graduates will be able to communicate about more than just the science behind horticulture, but also about the social, spiritual, and cultural importance of plants.
- PSO 5: Finally, horticulture graduates ought to have developed leadership skills, learned how to work in teams, and exhibit a high level of professionalism and personal responsibility.

Course Outcomes

On completion of the course, the students will be able to-		Cognitive Domain
CO1	understand Introduction to plantation crops	Remembering /Understanding
CO2	Applicative learning may be enhanced due to their broad sectors applications in various fields.	Application
CO3	Analysing the Oil yielding crops	Analyzing
CO4	Gain knowledge on Masticatory Crops	Knowledge & Application
CO5	Understand the Beverage crops	Understanding & Application

Knowledge	Skill	Employability	Entrepreneurship
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CO-PO- PSO Mapping:

- (1:Slight[Low];2:Moderate [Medium];3:Substantial[High],'-': No Correlation)
Low=10-25% Moderate=25-60% High=60-100%

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2	1	2	2	2	2
CO2	3	2	2	2	2	2	1	1	1	1
CO3	1	2	2	2	3	3	2	2	3	1
CO4	1	2	3	2	2	3	1	2	2	2
CO5	1	2	3	2	3	3	1	2	3	3

Co-Curricular Activities (student field training by teacher: 05 hours):

c) **Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on identification of varieties, propagation methods, physiological disorders, pests and diseases of plantation crops etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, fields of plantation crops, studying the cultivation practices; post-harvest methods, study of economics etc., culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

d) **Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like traditional and modern methods of cultivation, water management, weed management, disease management etc., for important plantation crops in India).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for plantation crops in INM and IPNM.
5. Collection of material/figures/photos related to plantation crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or plantation crop fields.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 7D: Plantation Crops– Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify the plantation crops and their varieties.
2. Make layout of orchards of plantation crops.
3. Perform skills on propagation techniques of plantation crops.
4. Identify the physiological disorders of plantation crops.
5. Identify the pests and diseases of plantation crops.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of plantation crops and their varieties.
2. Designing and making layout of orchards.
3. Propagation methods and nursery techniques of plantation crops.
4. Studying physiological disorders of plantation crops.
5. Studying pests of plantation crops.
6. Study of diseases of plantation crops
7. Preparation of plant bio regulators and their uses.
8. Tapping and processing of latex in rubber.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in Plantation crops.
11. Study of morphological and anatomical features of plantation crops.
12. Study of morphological and anatomical features of plantation crops.

Model Question Paper Pattern for Practical Examination
Semester – V/ Horticulture Skill Enhancement Course
Plantation Crops

Max. Time: 3 Hrs.

Max. Marks: 50

-
- | | |
|--|------------|
| 1. Making a layout of an orchard for a plantation crop 'A' | 8 |
| 2. Demonstration of a propagation technic of a given plantation crop 'B' | 10 |
| 3. Identification of Pests/diseases of a plantation crop 'C' | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Identification of variety of a plantation crop | |
| E. Propagation technic | |
| F. Physiological disorder/pest/disease | |
| G. Morphological/anatomical features of a plantation crop | |
| 5. Record + Viva-voce | 5 + 3 = 8 |

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF HORTICULTURE
Assessment methodology for Internships / On the Job Training /
Apprenticeship under the revised CBCS (2020 – 21 onwards)

Third internship/Apprenticeship (5th/6th Semester period):

During the entire 5th /6th Semester, the student shall undergo Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work.

Learning outcomes

- Explore career alternatives prior to graduation.
- Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Learn to appreciate work and its function towards future .
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the future job.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job following graduation from college.
- Acquire additional skills required for world of work.

**Assessment model for the semester long apprenticeship / on the job training /
internships during the V/VI Semester:**

The assessment for the V / VI Semester long apprenticeship is for 200 marks and credits assigned are 12.

A monthly report is to be submitted to the teacher guide online within 15 days after the completion of the every month upto four months. The last two months of internship period shall be used for preparation of final project report simultaneously undergoing on the job training / internship / apprenticeship.

The assessment for this internship / on the job training will be both internal and external assessment. The internal assessment will be for 25% of marks which will be continuous and the assessment by the industry / enterprise / organization where the student does his/her internship will be indicated in grades. This assessment is to be conducted by a responsible person (General Manager / HR Manager / Head of the Division) in consultation with the supervisor under whom the internship was done.

The components of internal assessment during *this third internship / Project Work / On the Job Training / Apprenticeship* shall include the following components and based on the entries of Project Log and Project Report:

- a. Involvement in the work assigned
- b. Regularity in the work assigned
- c. New knowledge acquired
- d. New skill acquired

The Project Report should contain

- a. Introduction.
- b. Project specifications (area / background of the work assigned).
- c. Problems taken up.
- d. Analysis of the problem.
- e. Recommendations and conclusions.

The Project Presentation is to be made by the student after he/she reports back to the College.

The components for assessment are –

- a. assessing the involvement in the project
- b. presentation skills
- c. final outcome of the project as evinced by the student.

There shall be a final evaluation committee comprising of Principal, Teacher Guide, Internal Expert and External Expert nominated by the affiliating University. The final evaluation committee shall consider the following for evaluation –

- A. Monthly Reports submitted by the student
- B. Final Project Report
- C. Grading given by the Company / Business unit / Enterprise where the student has undergone the training. The grades shall be converted into marks on the scale followed by the University.

To evaluate and award marks, the Committee conducts viva voce examination at the college.

Example:

Name of the Student:	
Class & Year of Study	
Registered Number	
Internal Assessment Component	Max. Marks
1. Project Log	10
2. Project Implementation	20
3. Project Report	10
4. Presentation	10
TOTAL	50
External Assessment Component	Max. Marks
Performance Assessment by the Evaluation Committee, converting the grades awarded by the industry, enterprise, etc.	100
External Viva Voce	50
GRAND TOTAL	200

The BOS Committee Members in the BOS Meeting has resolved the following members to act as the examiners for both paper setting and paper evaluation

S. No	Name of the examiner	Location of Examiner	Mobile number
1	Dr. A. Srinivas Rao	Govt Arts College, Rajahmundry	9985076306
2	K.V.V.G.K Vara Prasad	Government Degree College, Tuni	9908876727
3	Dr. M. Sulakshana	A S D Womens Degree College, Kakinada	7997633870
4	Mrs. Akula Venkata Lakshmi	VSM Degree College of Arts Science & Commerce Ramachandrapuram	9391293659