CBSE | DEPARTMENT OF SKILL EDUCATION
CURRICULUM FOR SESSION 2023-2024

HORTICULTURE (SUB. CODE - 816)

JOB ROLE: FLORICULTURIST (PROTECTED/ENTREPRENEUR)

CLASS – XI

1. INTRODUCTION

Horticulture is associated with the cultivation of vegetables, fruits, flowers, crops, tuber crops and medicinal, aromatic and ornamental plants where one can attain knowledge about crop production, plant propagation, plant breeding, genetic engineering, preparation of soil and plant physiology and biochemistry and simultaneously can work in various fields including floral design, garden centers, teaching, fruit and vegetable production, arboriculture, landscape construction, etc.

A Floriculturist (Protected Cultivation) is a person who has under taken the various activities of flower cultivation involving preparatory cultivation, cultivation and post-harvest management in green house. He also perform maintenance and care of plant, design and maintenance of green house, preparing media and various other inputs essential for flower crop cultivation. The job is to be performed in efficient manner to allow the production of high quality of flowers, their harvesting and post-harvest management towards getting higher return.

2. COURSE OBJECTIVES

On completion of the course, students should be able to:

1. Apply effective oral and written communication skills to interact with people and customers;
2. Identify the principal components of a computer system;
3. Demonstrate the basic skills of using computer;
4. Demonstrate self-management skills;
5. Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills & abilities;
6. Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
7. Communicate effectively with the client, identify the principal components of a computer system, Identify different types of protected structure and Identify and categories crops for protected cultivation
8. Prepare media for protected cultivation
9. Demonstrate irrigation and fustigation, green house operations, irrigation and fustigation, care and maintenance of protected structure Demonstrate special horticultural practices in protected cultivation Identify and control of insect-pest and diseases demonstrate the harvest and post-harvest practices
10. Administer first aid to a casualty with small cuts, grazes, bruises, external bleeding, minor burns and scalds

3. CURRICULUM

This course is a planned sequence of instructions consisting of Units meant for developing employability and Skills competencies of students of Class XI opting for Skills subject along with general education subjects.

Theory	60 marks
Practical	40 marks
Total Marks	**100 marks**

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CLASS – XI (SESSION 2023-2024)

Total Marks: 100 (Theory-60 + Practical-40)

	UNITS	NO. OF HOURS for Theory and Practical 260		MAX. MARKS for Theory and Practical 100
Part A	**Employability Skills**			
	Unit 1 : Communication Skills-III	10		2
	Unit 2 : Self-Management Skills-III	10		2
	Unit 3 : ICT Skills - III	10		2
	Unit 4 : Entrepreneurial Skills-III	15		2
	Unit 5 : Green Skills-III	05		2
	Total	**50**		**10**
Part B	**Subject Specific Skills**	**Theory**	**Practical**	**Marks**
	Unit 1: Introduction to Protected Cultivation	25	05	25
	Unit 2: Types of Protected Structure and its components.	35	05	
	Unit 3: Preparation of Media and Container for Commercial Cultivation in Greenhouses	25	20	
	Unit 4: Irrigation and Fertigation System	30	15	25
	Unit 5: Greenhouse Operations.	35	15	
	Total	**150**	**60**	**50**
Part C	**Practical Work**			
	Practical Examination			15
	Written Test			10
	Viva Voce			05
	Total			**30**
Part D	**Project Work/Field Visit**			
	Practical File/ Student Portfolio			10
	Total			**10**
	GRAND TOTAL	**260**		**100**

4. CONTENTS

PART A: EMPLOYABILITY SKILLS

UNITS	NO. OF HOURS
Unit 1 : Communication Skills-III	10
Unit 2 : Self-Management Skills-III	10
Unit 3 : ICT Skills - III	10
Unit 4 : Entrepreneurial Skills-III	15
Unit 5 : Green Skills-III	05
TOTAL	**50**

NOTE: Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

PART B: SUBJECT SPECIFIC SKILLS

	Units
1.	Introduction to Protected Cultivation
2.	Types of Protected Structure and its Components.
3.	Preparation of Media and Container for Commercial Cultivation in Greenhouses
4.	Irrigation and Fertigation System
5.	Greenhouse Operations.

Unit 1: Introduction to Protected Cultivation

Learning Outcome	Theory	Practical
1. Describe protected cultivation and its importance	1. Define protected cultivation 2. Advantages of protected cultivation 3. Define greenhouse effect	1. Enlist advantages of protected cultivation
2. Select the site for protected cultivation	1. Criteria to be considered for site selection	1. Enlist factors affecting protected cultivation
3. Horticulture crops suitable for protected cultivation	1. Types of horticulture crops suitable for protected cultivation 2. Varieties of Horticulture crops suitable for protected cultivation	1. Enlist and identify different crops suitable for protected cultivation

Unit 2: Types of Protected Structure and its Components

Learning Outcome	Theory	Practical
1. Types of protected structures	1. Types of protected structures used in cultivation of crops 2. Merits and demerits of different structures 3. Greenhouse 4. Shade house 5. What are walk in and low tunnels 6. What is mist house	1. Differentiate greenhouse shade house and low tunnels 2. Demonstration of utility of mist house
2. Identify greenhouses	1. Classify greenhouses according to shape 2. Define cladding material 3. Classification according to cladding material	1. Identify the cladding material used for greenhouse erection
3. Select of greenhouse design	1. What are different factors to be considered for selection of location specific design	1. Enlist factors affecting selection of greenhouse design
4. Identify components of greenhouse	1. Different components of ideal greenhouse 2. Cooling unit and give its importance 3. Heating unit and where it is required 4. Fertigation unit and its utility 5. Tools and equipments used in greenhouse 6. Measurement of greenhouse environment (light, temperature, RH, CO2)	1. Draw a typical greenhouse and label the parts 2. Collect figures of different components of greenhouse

Unit 3: Preparation of Media and Container for Commercial Cultivation in Greenhouse

Learning Outcome	Theory	Practical
1. Identify media and its composition	1. Define media 2. Different types of media 3. Ideal composition of media 4. Soil-less cultivation	1. Identification of various types of media 2. Differentiate soil and soil-less cultivation in green house
2. Sterilize growing media	1. Soil borne pathogens 2. Soil sterilization 3. Different methods of soil sterilization	1. Differentiation of chemical and physical methods of soil sterilization
3. Prepare of beds	1. Prepare raised and flat beds 2. Advantages of raised beds	2. Demonstration of raised beds preparation
4. Identify container and its filling	1. What types of pots/ containers used for growing crops in greenhouses 2. Composition of various growing media for filling of containers	1. Demonstration of filling of pots/ containers 2. Identification of containers 3. Enlist different constituents of growing media

Unit 4: Irrigation and Fertigation Systems

Learning Outcome	Theory	Practical
1. Water quality and requirement	1. Meaning of quality of water 2. Water requirement for different crops	1. Demonstration of measuring pH, TDS and EC in water for irrigation
2. Apply irrigation	1. Define sprinkler irrigation 2. Define drip irrigation 3. Time and frequency of irrigation	1. Identification of components of drip irrigation 2. Enlist merits and demerits of micro-irrigation
3. Select fertilizers for protected cultivation	1. Define fertilizers. 2. Straight and complex water soluble fertilizers 3. Types of fertilizers suitable for drip irrigation	1. Identification of important water soluble fertilizers used in protected cultivation
4. Demonstrate the application and time of fertigation	1. Define fertigation 2. Methods of fertilizer application 3. Equipment required for fertigation 4. Foliar application of fertilizers	1. Enlist advantages of foliar application 2. Demonstration of fertigation procedure 3. Identification of equipment used in fertigation

Unit 5: Greenhouse Operations

Learning Outcome	Theory	Practical
1. Describe greenhouse operations	1. Define greenhouse. 2. Define naturally ventilated polyhouse 3. Different operations in greenhouse 4. Different equipments used in greenhouses	1. Enlist different greenhouse operations 2. Enlist equipment used
2. Manage the temperature	1. Importance of temperature in plant growth 2. Procedure of regulation of temperature	1. Demonstration of the regulation of temperature 2. Enlist optimum temperature for important flower and vegetable crops
3. Manage Light	1. Importance of light in plant growth 2. Procedure of measured and regulated light	1. Demonstration of the regulation process of light
4. Manage Humidity	1. Pole of RH in plant growth 2. Measurement of humidity 3. Procedure of regulation of humidity	1. Demonstration of how to regulate the humidity 2. Enlist effect of high and low humidity
5. CO2 (carbon-dioxide) enrichment	1. Importance of CO2 to increase photosynthesis 2. Process to increase the CO2 in greenhouse	1. Demonstration of the use of CO2 enrichment Procedure
6. Ventilation of greenhouse	1. Importance of ventilation in naturally ventilated polyhouse 2. Regulate the ventilation	1. Demonstration of the use of ventilation in green house

5. TEACHING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained teachers. Teachers should make effective use of a variety of instructional or teaching aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the teacher to the Head of the Institution

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of evaluators. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

6. ORGANISATION OF FIELD VISITS/ EDUCATIONAL TOURS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace.

Visit a Polyhouse/ Green house and observe the following: Location, Site, area, types of greenhouse, infrastructure, equipments used, Office building, Store, Pot yard, Packing Yard, Seed bed, Nursery bed, Water tank/ Tube well, Gate and fencing. During the visit, students should obtain the following information from the owner or the supervisor of the nursery:

1. Area under playhouse and its layout
2. Types of plants/flowers raised
3. Type of rootstock used
4. Methods of propagation adopted
5. Whether plants/flowers raised by micro propagation
6. Number of plants /flowers grow annually
7. Number of plants/flowers sold annually
8. Sale procedure
9. Manpower engaged
10. Total expenditure in construction of greenhouse/ nursery
11. Irrigation unit
12. Fustigation unit
13. Total annual income
14. Profit/Loss (Annual)
15. Any other information

7. LIST OF EQUIPMENT AND MATERIAL

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

1.	Tape	35.	Pruning knife
2.	Crow bar	36.	Super cut
3.	Rope	37.	Thinning scissor
4.	Khurpi	38.	Hand cultivator
5.	Wheel hoe	39.	Hand weedier
6.	Trenching hoe	40.	Weeding fork
7.	Transplanting travel	41.	Garden hoe
8.	Dibbler	42.	Shovel
9.	Planting board	43.	Digging fork
10.	Secateurs	44.	Garden rake
11.	Garden hatchet	45.	Spade
12.	Water can	46.	Small Trowel
13.	Sprinkler	47.	Rake
14.	Sprayer	48	Drip and sprinkler
15.	Duster	49.	Mobile benches
16.	Temperature & humidity control	50.	Fan

17.	System	51.	Pad
18.	Automatic shade system	52.	Ventilator
19.	Fogging and blackout	53.	Thermometer
20.	Irrigation system	54.	Lux meter/Light meter
21.	Mobile benches,	55.	Misting
22.	Fan	56.	Digital electronic temperature indicator
23.	Pad	57.	Radiation measuring instrument
24.	Ventilator	58.	Sprayer
25.	Thermometer	59.	Hygrometer
26.	Lux meter/Light meter	**List of Chemicals**	
27.	Digital electronic temperature Indicator	60.	Dry and liquid fertilizer
28	Radiation measuring instrument	61.	Peat
29.	Sprayer	62.	Formalin
30.	Hygrometer	63.	Bavestin
31.	Temperature & humidity control System	64.	Sulphur
		65.	Insecticide
32.	Automatic shade system	66.	Indofil-45
33.	Fogging and blackout	67.	Neem cake
34.	Irrigation system	68.	Plant Growth regulator/hormones

8. PRACTICAL GUIDELINES

As the practical is primarily an outdoor activity the schools can carry them out in the allocated 50 Periods.

(For a Group of 20-25 students)

Visit to a Garden / orchard farm/ greenhouse etc.

1. Identification of ornamental trees, shrubs, climbers and bulbous plants.
2. Preparation of herbarium of different ornamentals.
3. Laying out nursery for different seasonal flower crops.
4. Land preparation for flower crops directly raised through seeds.
5. Preparation of nursery beds and field preparation for planting flower seedlings.
6. Identification of propagules likes seeds, bulbs, tubers, rhizomes,etc.
7. Preparation of different type of cuttings for the propagation of carnation, chrysanthemum, bougainvillea etc.
8. Identification of manures and fertilizers and calculation of these as per recommended dose for the flower crops to be planted.
9. Identification of deficiency symptoms of nutrients in flower crops.
10. Identification of common tools and equipment used for cultivating flower crops.
11. Use of different irrigation methods in flower crops.
12. Controlling weeds in gardens through manual and chemical methods.
13. Identification and applying different kinds of mulches in the gardens.
14. Seed production of flower crops like marigold, pansy, petunia, antirrhinumetc.
15. Visit to local flower market.
16. Identification of important insect, mites', nematodes and other diseases (viral, bacterial and fungal).
17. Preparation of pesticide solution and their safe application.