

# Horticulture (Code No. 816)

## JOB ROLE: FLORICULTURIST (PROTECTED/ENTREPRENEUR)

(QUALIFICATION PACK: Ref. Id.AGR/Q0702)

SESSION 2020-2021

CLASS XI

## 1. Introduction

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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 undertaken the various activities of flower cultivation involving preparatory cultivation, cultivation and post harvest management in green house. He also performs 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

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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 fertigation, green house operations, irrigation and fertigation, 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
<b>Total Marks</b>	<b>100 marks</b>

The unit-wise distribution of periods and marks for Class XI is as follows:

<b>CLASS XI (Session 2020-2021)</b>				
	<b>Units</b>	<b>No. of Periods for Theory and Practical</b>		<b>Max. Marks for Theory and Practical</b>
		<b>260</b>		<b>100</b>
<b>Part A</b>	<b>Employability Skills</b>			
	Unit 1: Communication Skills –III	10		
	Unit 2: Self-management Skills –III	10		10
	Unit 3: Information and Communication Technology Skills – III	10		
	Unit 4: Entrepreneurial Skills – III	15		
	Unit 5: Green Skills – III	05		
	<b>Total</b>	<b>50</b>		<b>10</b>
<b>Part B</b>	<b>Skills</b>	<b>Theory</b>	<b>Practical</b>	
	Unit 1: Introduction to Protected Cultivation	20	05	50
	Unit 2: Types of Protected Structure and its Components.	30	05	
	Unit 3: Preparation of Media and Container for Commercial Cultivation in Greenhouses	20	20	
	Unit 4: Irrigation and Fertigation System	25	15	
	Unit 5: Greenhouse Operations.	30	15	
	<b>Total</b>	<b>150</b>	<b>60</b>	<b>60</b>
<b>Part C</b>	<b>Practical Work</b>			
	Practical Examination			15
	Written Test			10
	Viva Voce			05
				<b>30</b>
<b>Part D</b>	<b>Project Work/Field Visit</b>			
	Practical File/ Student Portfolio			10
				<b>10</b>
	<b>Total</b>	<b>260</b>		<b>100</b>

## 4. CONTENTS

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### CLASS XI (Session 2020-2021)

#### Part A: Employability Skills

	Units
1.	Communication Skills –III
2.	Self-management Skills –III
3.	Information and Communication Technology Skills – III
4.	Entrepreneurial Skills – III
5.	Green Skills – III
	<b>Detailed curriculum of Employability Skills is available separately</b>

## 4. CONTENTS

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### CLASS XI (SESSION 2020-2021)

#### **PART A: EMPLOYABILITY SKILLS**

	Units
1.	Communication Skills -III
2.	Self-management Skills- III
3.	Information and Communication Technology Skills- III
4.	Entrepreneurial Skills -III
5.	Green Skills -III
	<b>Detailed curriculum of Employability Skills is available separately</b>

#### **PART B: 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.

<b>Unit 1: Introduction to Protected Cultivation</b>		
<b>Learning Outcome</b>	<b>Theory</b>	<b>Practical</b>
1. Describe protected cultivation and its importance	<ol style="list-style-type: none"> <li>1. Define protected cultivation</li> <li>2. Advantages of protected cultivation</li> <li>3. Define green house effect</li> </ol>	1. Enlist advantages of protected cultivation
2. Select the site for protected cultivation	<ol style="list-style-type: none"> <li>1. Criteria to be considered for site selection</li> </ol>	1. Enlist factors affecting protected cultivation
3. Horticulture crops suitable for protected cultivation	<ol style="list-style-type: none"> <li>1. Types of horticulture crops suitable for protected cultivation</li> <li>2. Varieties of Horticulture crops suitable for protected cultivation</li> </ol>	1. Enlist and identify different crops suitable for protected cultivation

<b>Unit 2: Types of Protected Structure and its Components</b>		
<b>Learning Outcome</b>	<b>Theory</b>	<b>Practical</b>
1. Types of protected structures	<ol style="list-style-type: none"> <li>1. Types of protected structures used in cultivation of crops</li> <li>2. Merits and demerits of different structures</li> <li>3. Greenhouse</li> <li>4. Shade house</li> <li>5. What are walk in and low tunnels</li> <li>6. What is mist house</li> </ol>	<ol style="list-style-type: none"> <li>1. Differentiate greenhouse shade house and low tunnels</li> <li>2. Demonstration of utility of mist house</li> </ol>
2. Identify greenhouses	<ol style="list-style-type: none"> <li>1. Classify greenhouses according to shape</li> <li>2. Define cladding material</li> <li>3. Classification according to cladding material</li> </ol>	1. Identify the cladding material used for greenhouse erection
3. Select of greenhouse design	<ol style="list-style-type: none"> <li>1. What are different factors to be considered for selection of location specific design</li> </ol>	1. Enlist factors affecting selection of greenhouse design

4. Identify components of greenhouse	<ol style="list-style-type: none"> <li>1. Different components of ideal greenhouse</li> <li>2. Cooling unit and give its importance</li> <li>3. Heating unit and where it is required</li> <li>4. Fertigation unit and its utility</li> <li>5. Tools and equipments used in greenhouse</li> <li>6. Measurement of greenhouse environment (light, temperature, RH, CO<sub>2</sub>)</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw a typical greenhouse and label the parts</li> <li>2. Collect figures of different components of greenhouse</li> </ol>
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### **Unit 3: Preparation of Media and Container for Commercial Cultivation in Greenhouse**

Learning Outcome	Theory	Practical
1. Identify media and its composition	<ol style="list-style-type: none"> <li>1. Define media</li> <li>2. Different types of media</li> <li>3. Ideal composition of media</li> <li>4. Soil-less cultivation</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of various types of media</li> <li>2. Differentiate soil and soil-less cultivation in green house</li> </ol>
2. Sterilize growing media	<ol style="list-style-type: none"> <li>1. Soil borne pathogens</li> <li>2. Soil sterilization</li> <li>3. Different methods of soil sterilization</li> </ol>	1. Differentiation of chemical and physical methods of soil sterilization
3. Prepare of beds	<ol style="list-style-type: none"> <li>1. Prepare raised and flat beds</li> <li>2. Advantages of raised beds</li> </ol>	1. Demonstration of raised beds preparation
4. Identify container and its filling	<ol style="list-style-type: none"> <li>1. What types of pots/containers used for growing crops in greenhouses</li> <li>2. Composition of various growing media for filling of containers</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstration of filling of pots/ containers</li> <li>2. Identification of containers</li> <li>3. Enlist different constituents of growing media</li> </ol>

## Unit 4: Irrigation and Fertigation Systems

Learning Outcome	Theory	Practical
1. Water quality and requirement	<ol style="list-style-type: none"> <li>1. Meaning of quality of water</li> <li>2. Water requirement for different crops</li> </ol>	1. Demonstration of measuring pH, TDS and EC in water for irrigation
2. Apply irrigation	<ol style="list-style-type: none"> <li>1. Define sprinkler irrigation</li> <li>2. Define drip irrigation</li> <li>3. Time and frequency of irrigation</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of components of drip irrigation</li> <li>2. Enlist merits and demerits of micro-irrigation</li> </ol>
3. Select fertilizers for protected cultivation	<ol style="list-style-type: none"> <li>1. Define fertilizers.</li> <li>2. Straight and complex water soluble fertilizers</li> <li>3. Types of fertilizers suitable for drip irrigation</li> </ol>	1. Identification of important water soluble fertilizers used in protected cultivation
4. Demonstrate the application and time of fertigation	<ol style="list-style-type: none"> <li>1. Define fertigation</li> <li>2. Methods of fertilizer application</li> <li>3. Equipment required for fertigation</li> <li>4. Foliar application of fertilizers</li> </ol>	<ol style="list-style-type: none"> <li>1. Enlist advantages of foliar application</li> <li>2. Demonstration of fertigation procedure</li> <li>3. Identification of equipment used in fertigation</li> </ol>

## Unit 5: Greenhouse Operations

Learning Outcome	Theory	Practical
1. Describe greenhouse operations	<ol style="list-style-type: none"> <li>1. Define greenhouse.</li> <li>2. Define naturally ventilated polyhouse</li> <li>3. Different operations in greenhouse</li> <li>4. Different equipments used in greenhouses</li> </ol>	<ol style="list-style-type: none"> <li>1. Enlist different greenhouse operations</li> <li>2. Enlist equipment used</li> </ol>
2. Manage the temperature	<ol style="list-style-type: none"> <li>1. Importance of temperature in plant growth</li> <li>2. Procedure of regulation of temperature</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstration of the regulation of temperature</li> <li>2. Enlist optimum temperature for important flower and vegetable crops</li> </ol>
3. Manage Light	<ol style="list-style-type: none"> <li>1. Importance of light in plant growth</li> <li>2. Procedure of measured and regulated light</li> </ol>	1. Demonstration of the regulation process of light

4. Manage Humidity	<ol style="list-style-type: none"> <li>1. Pole of RH in plant growth</li> <li>2. Measurement of humidity</li> <li>3. Procedure of regulation of humidity</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstration of how to regulate the humidity</li> <li>2. Enlist effect of high and low humidity</li> </ol>
5. CO <sub>2</sub> (carbon-dioxide) enrichment	<ol style="list-style-type: none"> <li>1. Importance of CO<sub>2</sub> to increase photosynthesis</li> <li>2. Process to increased the CO<sub>2</sub> in greenhouse</li> </ol>	1. Demonstration of the use of CO <sub>2</sub> enrichment Procedure
6. Ventilation of greenhouse	<ol style="list-style-type: none"> <li>1. Importance of ventilation in naturally ventilated polyhouse</li> <li>2. Regulate the ventilation</li> </ol>	1. Demonstration of the use of ventilation in green house

## 5. TEACHING ACTIVITIES

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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 two 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**

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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 polyhouse 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 micropropagation
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

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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.	Digitale electronic temperature indicator
23.	Pad		
24.	Ventilator	57.	Radiation measuring instrument
25.	Thermometer	58.	Sprayer
26.	Lux meter/Light meter	59.	Hygrometer
27.	Digital electronic temperature Indicator	<b>List of Chemicals</b>	
		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/green house 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 flowercrops.
  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, antirrhinum etc.
  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.
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