MAHARASHTRA AGRICULTURAL UNIVERSITY EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Sc. (Agri.)

Semester	:-	VI (New)	**Academic year**	:-	2023-24
Course No.	:-	ELE-HORT-368	**Title**	:-	Hi-tech Horticulture
Credit	:-	3 (2+1)	**Total Mark**	:-	80
Day & Date	:-		**Time**	:-	

*Note : 1) Solve **ANY EIGHT** questions from **Section 'A'***
*2) All questions from **Section 'B'** are compulsory.*
3) All questions carry equal marks.
4) Draw neat diagrams wherever necessary.

Section –A

Q.1 Write precision farming techniques and its components. (8 M)

Precision farming techniques

Precision farming is a comprehensive information based farm management system to identify, analyse and manage variability within fields for optimum profitability, sustainability and protection of land resources. It basically means adding the right amount of treatment at the right time and the right location within a field. Precision farming calls for an efficient management of resources through location specific high tech interventions which includes fertigation, protected/ greenhouse cultivation, soil and leaf nutrient based fertilizer management, mulching for in-situ moisture conservation, micro-propagation, high density planting, drip irrigation etc. Precision farming integrates environmental health, economic profitability and social and economic equity by giving emphasis on crop management using technologies like GIS, GPS, remote sensing (RS) along with ground equipment like variable rate applicators (VRA), yield monitors and computers along with appropriate software.

Components of Precision farming

1. crop characteristics
2. soil type
3. micro climate data
4. Surface and subsurface drainage condition
5. Irrigation facilities
6. Farm machinery and equipment's

Q.2 Answer the ~~Solve~~ following questions. (8 M)

a. Describe advantages and constraints of protected cultivation.

Advantages

1. Throughout the year four to five crops can be grown in a green house.
2. The productivity of the crop is increased considerably.
3. Superior quality produce can be obtained.
4. Gadgets for efficient use of various inputs like water, fertilizers, seeds and plant protection chemicals can be well maintained in a green house.
5. Effective control of pests and diseases.

	6. Percentage of germination of seeds is high in greenhouses. 7. The acclimatization of plantlets of tissue culture technique can be carried out in a green house. 8. Horticultural crop production schedules can be planned to take advantage of the market needs. 9. Different types of growing medium can be effectively utilized in the greenhouse. 10. Export quality produce of international standards can be produced. 11. Greenhouses are suitable for automation of irrigation, application of other inputs and environmental controls by using computers and artificial intelligence techniques. 12. Self-employment for educated youth. **Constraints** 1. Lack of specific information on area and production. 2. Lack of information on novel/ ruling verities. 3. Lack of advanced production technology like planting geometry, seed rate, nutrition, irrigation, management, grading, PP measures etc. 4. Inadequate infrastructure facilities and very low volume Greenhouse, cold storage etc. 5. Lack of suitable market survey and related information 6. Lack of Co-ordination between Govt. floriculture industry and growers 7. Lack of transportation facilities. 8. Very high airfreight cost in India which makes production uncompetitive in International market. 9. Lack of research especially in development of new verities, PHT, production practices. 10. There is no one window policy for financing for eg. NHB as loan where as APEDA gives subsidy.
	b. Explain soil treatment methods in green house 1. Soil solarization 2. Soil pasteurization 3. Soil fumigation 4. Soil by fungicides or chemicals
Q.3	a. Describe drip and bubbler micro irrigation in protected structure. (4M) **Drip Irrigation** Drip or trickle irrigation is the newest of all commercial methods of water application. It is described as the frequent, slow application of water to soils through mechanical devices called emitters or applicators located at selected points along the delivery lines. The emitters dissipate the pressure from the distribution system by means of orifices, vortexes and tortuous or long flow paths, thus allowing a limited volume of water to discharge. Most emitters are placed on the ground, but they can also be buried. The emitted water moves within the soil system largely by unsaturated flow. The wetted soil area for widely spaced emitters will be normally elliptical in shape. Since the area wetted by each emitter is a function of the soil hydraulic properties, one or more emission points per plant may be necessary. **Bubbler System** - In this system the water is applied to the soil surface in a small stream or fountain. The discharge rate for point source bubbler emitters is greater than the drip or subsurface emitters but generally less than 225 l/h. Since the emitter discharge rate generally exceeds the infiltration rate of the soil, a small basin is usually required to contain or control the water. Bubbler systems do not require elaborate filtration systems. These are suitable in situations where large amount of water need to

	be applied in a short period of time and suitable for irrigating trees with wide root zones and high water requirements.
	b. Basic principles of canopy management (4M) 1. Maximum utilization of light. 2.Avoidance of built-up microclimate congenial for diseases and pest infestation. 3.Convenience in carrying out the cultural practices. 4. Maximizing productivity with quality fruit production. 5. Economy in obtaining the required canopy architecture
Q.4	Explain application Remote sensing in Horticulture. (8M) 1. **Crop insurance**: Insurance companies can use the red and infrared bands of satellite images in combination of NDVI (Normalized Difference Vegetation Index) and verify seeded crops to catch fraud. 2. **Crop stands**: Remote sensing is very useful to identify crop stands and thus totally the area under crop stand and its production. 3. Crop conditions: Remote sensing can be a helpful tool to identify the crop condition using NDVI. Near-infrared radiation is being used to detect healthy vegetation in horticulture. 4. **Crop area estimation**: Horticultural crops usually face big ups and down both in its production and consumption as a result, it has a very unstable market and price. That's why reliable statistics regarding area and production of horticulture products is essential for market planning and export of produces. Remote sensing here plays a very important role to assess the supply scenario. 5. **Crop canopy measurement**: Crop canopy of horticultural crops is very important as its volume determines the amount of fertilizer, pesticide and any other chemicals to be applied besides canopy volume also indicates crop health condition as well as about the expected yield .It is possible by remote sensing techniques. 6. **Yield estimation**: Remote sensing is a very useful tool to estimate the yield of different annual crops but again so far its use has been very limited for fruit trees and vegetables. 7. **Detecting pest and disease occurrence**: Pest and diseases are the two main causes of production and consequently economic losses in horticultural industry. It has been proved that remote sensing can be a useful tool for early detection of diseases and identifying, managing pests and nematodes by detecting changes in plant pigments, leaf skeletonising caused by pest damage and identifying plant susceptible areas.
Q.5	Write principles and factors affecting on high density planting. (8M) **Principle of HDP** 1. To make the best use of vertical and horizontal space per unit time and . 2. To harness maximum possible returns per unit of inputs and resources. **Factors affecting on HDP.** •Cultivar/Varieties •System of Planting •Planting material •Nutrition and moisture •Economics of production

Q.6	Explain the need of greenhouse cooling. Explain the methods of greenhouse cooling. (8M) Need of greenhouse cooling: A need of greenhouse cooling arises whenever the greenhouse temperature exceeds the upper limit of crop tolerance. Failure to bring down the temperature effectively may result in either partial or total crop failure within only a very short time. Methods of greenhouse cooing 1. Ventilation with roof and side ventilators : Top ventilators of 0.6 to 1.0 m depth, whereas, side curtain with the width of 1.5 to 3.0 m . The ventilation area should be at least 20 per cent of floor area for effective ventilation. 2. Roof shading a) Application of white wash : like distemper or lime over glazing material. b) Shading screen : Screens of material like PP, PE or polyester with different grades of shade like 20%, 25%, 30%, 50%, 75% and 90%. 3. Evaporative cooling a) Fan and pad system : Pad made of gravel, straw, wood fibre, khus, honey comb paper and charcoal. (Size 1 m height for every 20 m of pad to fan distance. Pad should provide at least 6-9 lit water/min. Low velocity and large volume fans draw air through pad mounted on the opposite side. b) High pressure misting : Water is sprayed into air above the plants at pressure 35-70 kg/m^2 from low capacity nozzles (1.9 to 2.8 lph) c) Low pressure misting : Water is sprayed into air above the plants at pressure less than 7 kg/m^2
Q.7	Write short note on following (8M) A. GIS and its components **Geographical Information System** - GIS is a technology that provides the meansto collect and use geographic data to assist in the development of Agriculture. A digital map is generally of much greater value than the same map printed on a paper as the digital version can be combined with other sources of data for analyzing information with a graphical presentation. The GIS software makes it possible to synthesize large amounts of different data, combining different layers of information to manage and retrieve the data in a more useful manner. GIS provides a powerful means for agricultural scientists to better service to the farmers and farming community in answering their query and helping in a better decision making to implement planning activities for the development of agriculture. B. Objectives of precision farming 1. To enhance productivity in agriculture 2. Prevents soil degradation in cultivable land. 3. Reduction of chemical use in crop production 4. Efficient use of water resources 5. Dissemination of modern farm practices to improve quality, quantity & reduced cost of production in agricultural crop
Q.8	Explain selection of site of hi-tech nursery and tools for hi –tech nursery management **Site is the basic requirement of a nursery** (8M) Nearness of road Near a habitat Suitable climate Neither shady nor exposed area Sufficient sunlight Good irrigation facilities Good soil condition

	Good transport facility **Tools for high-tech nursery management** 1. Nursery calendars 2. Plant development registers 3. Nursery inventories 4. Records of nursery experiments
Q. 9	Write in brief scope and importance of Hi-tech Horticulture in India. (8 M) **Scope-** 1. Varied and dynamic agro climatic conditions. 2. Markets facilities 3. Planting material availability 4. Employment 5. Labour availability 6.Cost of inputs like water, fertilizer pesticides, electricity. 7. Govt of India has identified floriculture as Extreme focus thrust area for export. 8. Production and productivity **Importance-** 1. High production per unit area. 2. Economy of land and water 3. Best quality produce 4. Production of high value crops 5. Production in offseason
Q.10	Write the characteristics of media used for protected cultivation. Enlist different types of media used in greenhouse. (8 M) Characteristics of media : 1. The media should be sufficiently firm and dense to hold the plant in position. 2. Its' volume should remain constant when dry or wet. (Should not expand in wet condition or should not shrink when dry) 3. It must be retentive of moisture, so that frequent watering is avoided. 4. It must be free from weed seeds, nematodes, insects and various diseases. 5. It should have suitable pH require for crop growth. Types of media 1. Cocopeat 2. Sphagnum moss 3. Vermiculate 4. Perlite 5. Leaf mould 6. Shaded bark, saw dust and wood 7. Rock wool 8. Polysterine foam 9. Sand 10. Rise husk 11. Calcinade clay 12. Bagasse 13. Hydroponics

Section –B

Q.11		Define following terms (8M)
	1.	Coppicing - Coppicing is a method of cutting trees to ground level, leading to a strong vegetative response and the regeneration of new shoots from the base.
	2.	Sterilization - It is the process of destroying all forms of microbial life. Micro organism can be killed, inhibited for removal by exposing the material to lethal agents which may be physical, chemical, and biotic in nature.
	3.	Mechanized Harvesting- Mechanized harvesting is a process of harvesting crops using machines instead of manual labor.
	4.	Pulsing – It is short term preservative treatment with high concentration of sucrose and various other chemicals.
	5	Misting – it is the standard set of irrigation system in which application of water is done in the form of fine spray in order to create humidity in air.
	6	Post-harvest management - Post-harvest management is a system of handling, storing, and transporting agricultural commodities after harvest.
	7	Green house - Green house is frame or inflated structure covered with cladding material in which crops are grown under controlled condition.
	8.	Vermicomposting – it is process to converting biodegradable waste into organic manure with the help of earthworms.

Q.12		Fill in the blanks (8M)
	1	Seed treatment is done for control **seed born** disease.
	2	**CO_2** called green house gas.
	3	pH of soil can be raised by adding **Lime.**
	4	**O_2** gas of the atmosphere holds up UV rays.
	5	Urea is source of **Nitrogen.**
	6	Rootex contains **Auxin.**
	7	Most essential element for crop is **water.**
	8	Disease free plants in micro propagation can be obtained through **Meristem** culture.

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