MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END EXAMINATION

B. Sc. (Hons) Horticulture

Semester	: II (New)	Academic year: 2017-18	
Course No.	: H/HORT 121	Title: Growth and Development of Horticultural Crops	
Credits	: 2 (1+1)		
Day & Date	:	Time:	Total marks: 40

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 Enlist the basic functions of auxins and describe any two in brief. (Enlist 2 marks, description 2 marks)

Ans. Basic functions of Auxins

1. Cell Elongation
2. Apical Dominance
3. Root Initiation
4. Prevention of Abscission
5. Parthenocarpy
6. Respiration
7. Callus Formation
8. Vascular Differentiation
9. Auxins and genes
10. Initiation of flowers
11. Weedicide or herbicide

Q. 2 Define photoperiodism and describe its classification.

Ans. Photoperiodism: The response of plant to the relative length of day and night within 24 hours. (1)

Classified in three categories (3)

i. **Short day plants:**

- In short day plants the dark period is critical and must be continuous.
- Interruption of the light period with red light does not have inhibitory effect on flowering in short day plants.
- Prolongation of the continuous dark period initiates early flowering in short day plants.

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ii. **Long day plants:**
- These plants require a longer day light period (usually 14-16 hours) in a 24 hour cycle for subsequent flowering.
- Some examples of these plants which are also called as short night plants are *Hyoscyamus niger (Henbane), Spinacea (spinach) Beta vulgaris (Sugar beet).*
- In long day plants the light period is critical
- A brief exposure in the dark period or the prolongation of the light period stimulates flowering in long day plants.

iii. **Day neutral plants:**
- These plants flower in all photoperiods ranging from 5 hours to 24 hours continuous exposure.
- Some of the examples of these plants are tomato, cotton, sunflower, cucumber and certain varieties of peas and tobacco.

Q. 3 Describe in brief the physiology of climacteric and non-climacteric fruits.

Ans. Ripening was associated with spectacular changes in respiratory rates, including a lowering of respiration in the mature fruits, followed by large increase in respiration during the time of ripening. (1)

Climacteric fruits- The period of occurrence of climacteric peak in fruits are called climacteric fruits. eg. mango, papaya, banana, pears etc.

Non-climacteric fruits – The rate of respiration remains steady during their ripening eg. Orange, lemon, citrus etc. Climacteric rise has been affected by low oxygen and increased concentration of carbon dioxide. Both these factors prevent climacteric rise and improves storage quality of fruits.

(3)

Q. 4 Enlist various theories of the mechanism of translocation of organic solutes and explain any one. (Enlist 1 mark explanation 3 marks)

Ans. i. **Munch's Mass Flow or Pressure Flow Hypothesis:**
- According to this theory translocation is a kind of blood circulation within the plant body and mesophylous cells of the leaves acting as a heart.
- The pumping force is provided by the osmotic concentrations of the solutes to be translocated in phloem which is supported by hydrostatic pressure developed due to entry of water from xylem.

ii. **Diffusion Hypothesis:**
- Diffusion is a simple process by which substances will move from its region of higher concentration to the region of lower concentration.
- But this theory is not accepted because; translocation of solute is a rapid whereas diffusion is very slow process.

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iii. **Photoplasmic Streaming Hypothesis:**

- This theory was proposed by de Vrlon in 1885.
- According to him moving protoplasm carries the solutes within the sieve elements and the protoplasmic fluid moves from cell to cell through large photoplasmic concentration across the sieve plates.

Q. 5 Define plant growth. Explain in brief its phases in horticultural crops.

Ans. Plant growth: Growth may be defined as permanent and irreversible increase in size of cell, organ or whole organism. (1)

Growth Phases (3)

i. **Lag phase:** Growth is slow at first
ii. **Log phase/Exponential phase:** Then gain speed
iii. **Stationary phase /Steady state:** Decrease and came to halt

Q. 6 Define pruning. Explain in short how tree physiology is affected by pruning.

Ans. Pruning: Pruning refers to judicious removal of any plant part to establish and to maintain a desired shape to improve fruitfulness and productivity

Tree physiology is affected by pruning

i. Growth response
ii. Foliage area, photosynthesis and respiration
iii. Hormonal pattern
iv. Fruit setting
v. Regularity of cropping
vi. Fruit quality

Q. 7 Write short notes (Any Two)

Ans. a) Leaf area index: Watson (1947) proposed the term leaf area index which is the ratio of the leaf area of a plant to the ground area (spacing) occupied by the plant.

$$\text{Leaf area index} = \frac{\text{Total leaf area of the plant}}{\text{Ground area occupied by the plant (spacing)}}$$

(2)

b) **Vernalization** : Methods of inducing early flowering in plants by pretreatment of the propagating material with very low temperature.

Practical utility of vernalization

i. Early bearing
ii. Crop can be grown in regions where they do not naturally reproduce
iii. Plant breeding (2)

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3. **Fruit ripening**: Fruit ripening constitutes a natural irreversible process of aging. the fruit reaches the end of its growth period, it may undergo some characteristic qualitative changes, which are collectively referred to as ripening.

Changes with ripening

i. Softening of the fruit flesh
ii. Hydrolytic conversions of storage materials in the fruit
iii. Changes in the pigments and flavors (2)

Q. 8 Define fruit drop? Discuss in brief types of fruit drop.

Ans. **Fruit drop**: Dropping of fruits at different stages of fruit development due to competition among the growing fruitlets, lack of pollination, fertilization un-favourable environmental conditions and hormonal imbalance is called as fruit drop. (1)

Different types of fruit drop

i. Post setting drop
ii. Summer drop
iii. Pre mature fruit drop
iv. Pre harvest drop (3)

Q. 9 Enlist various environmental factors affecting flowering and explain any one. (Enlist 2 marks, explanation 2 marks)

Ans. Various environmental factors affecting flowering are

i. Temperature
ii. Photoperiodic induction
iii. Light intensity
iv. Water availability

Q. 10 Enlist the role of gibberellins and explain any two. (Enlist 2 marks, explanation 2 marks)

Ans. i. Apical bud dormancy
ii. Role in sub apical meristem
iii. Cell elongation
iv. Fruit growth
v. Flowering
vi. Seed germination
vii. Mobilisation of foods in seed storage cells

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SECTION "B"

Q. 11 Fill in the blanks

1. **Maturity** refers to having completed natural growth and development.
2. **Training** means judicious removal of plant parts to give proper shape and strong framework of any plant.
3. The development of fruit without pollination and fertilization is called **parthenocarpy.**
4. Cytokinins widely occur in **root** part of higher plants. (4)

Q. 12 Define the following terms .

1. **Inhibitor:** A chemical substance capable of preventing growth process.
2. **Apical dominance:** it is the inhibitory effect of a terminal bud upon lateral bud development
3. **Leaf weight ratio:** It is the measure of leafiness of the plant on a weight basis.
4. **Growth regulator:** are the organic chemical compounds other than plant nutrients which regulate physiological process in an appreciable measure in plant when used in small concentrations. (4)

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Signature of the Course Instructor

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I have checked the question paper as per the given checklist and the question paper is found correct.

Signature of the Head of the Department

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