CHAPTER -7

CHEMICAL COORDINATION IN PLANTS

Multiple Choice Type

Question 1

The only phytohormone which is a gas at ordinary temperature:

1. Ethane
2. Ethyl alcohol
3. Ethylene
4. Ethyne

Answer

Ethylene

Reason — Ethylene is the only hormone which is gas at ordinary temperature.

Question 2

The hormone which promotes the ripening of fruits is:

1. Auxins
2. Gibberellins
3. Cytokinins
4. Ethylene

Answer

Ethylene

Reason — Ethylene helps in natural as well as artificial ripening of fruits.

Question 3

A growth inhibiting hormone in plants:

1. Gibberellins
2. Indole-3 acetic acid
3. Abscisic Acid
4. Cytokinins

Answer

Abscisic Acid

Reason — Abscisic Acid acts as growth inhibitor by slowing down plant metabolism.

Question 4

The hormone which stimulates cell division:

1. Auxins
2. Cytokinins
3. Gibberellins
4. Abscisic acid

Answer

Cytokinins

Reason — Cytokinins stimulate plant growth by promoting cell division. They are present in large amount in germinating seeds and developing fruits.

Question 5

Development of fruits without fertilization is called:

1. Parthenogenesis
2. Parthenon
3. Parthenocarpy
4. Dormancy

Answer

Parthenocarpy

Reason — Development of fruits without fertilization is called Parthenocarpy. It can be induced by auxins.

Question 6

The response by parts of the plant towards stimulus is called as:

1. Nastic movement
2. Tropism
3. Tactic movement
4. Senescence

Answer

Tropism

Reason — Growth movements occurring in response to unidirectional external stimuli in a plant part is called tropic movements.

Question 7

Apical dominance is influenced by :

1. Gibberellins
2. Ethylene
3. Cytokinins
4. Auxins

Answer

Auxins

Reason — The phenomenon of the suppression of growth of lateral buds by apical buds is called apical dominance and it is seen due to presence of auxin in apex region of plant.

Question 8

The growth movement of plant parts which occurs due to touch stimulus is called:

1. Heliotropism
2. Chemotropism
3. Hydrotropism
4. Thigmotropism

Answer

Thigmotropism

Reason — The growth movement of plant parts which occurs due to touch stimulus is called thigmotropism. For example, coiling of tendrils to their support.

Question 9

The instrument which can be used to demonstrate geotropism is:

1. Manometer
2. Thermostat
3. Clinostat
4. Barometer

Answer

Clinostat

Reason — Geotropism can be demonstrated in laboratory by using Clinostat. It has two set-ups with planted pots. One is static while the other rotates.

Question 10

The hormone which accelerates senescence (ageing) and abscission of leaves is :

1. IAA
2. GA_3
3. ABA
4. GA_1

Answer

ABA

Reason — Abscisic Acid (ABA) is the hormone which accelerates senescence (ageing) and abscission of leaves. It is a growth inhibitor.

Assertion Reason type

Question 11

Assertion. Both roots and shoots show positive phototropic movements.

Reason. Most parts of shoots are sensitive to light

1. Both A and R are True.
2. Both A and R are False.
3. A is True and R is False.
4. A is False and R is True.

Answer

A is False and R is True.

Explanation
Roots are negatively phototropic while shoots are sensitive to light so they are positively phototropic.

Question 12

Assertion. Plants do not have sense organs but they can still respond against different stimuli.

Reason. Plants have well-developed nervous and hormonal systems which enable them to respond against sunlight, gravity and water, etc.

1. Both A and R are True.

2. Both A and R are False.
3. A is True and R is False.
4. A is False and R is True.

Answer

A is True and R is False.

Explanation
Plants do not have well-developed nervous and hormonal systems which enable them to respond against sunlight, gravity and water, etc. but their remarkable ability to respond to stimuli through hormones and other mechanisms ensures their survival and adaptation to changing environments.

Question 13

Assertion. Parthenocarpic fruits contain a large number of smaller seeds.

Reason. The process of development of fruits without fertilization is termed as parthenocarpy.

1. Both A and R are True.
2. Both A and R are False.
3. A is True and R is False.
4. A is False and R is True.

Answer

A is False and R is True.

Explanation
Parthenocarpic fruits do not contain seeds as they are formed without fertilization.

Question 14

Assertion. Auxin is a growth-retarding plant hormone.

Reason. Auxins are mainly synthesized in shoot apical meristems and young leaves.

1. Both A and R are True.
2. Both A and R are False.
3. A is True and R is False.
4. A is False and R is True.

Answer

A is False and R is True.

Explanation
Auxin is a growth-promoting plant hormone. Auxins are mainly synthesized in shoot apical meristems, root apical meristem and young leaves.

Question 15

Assertion. Ethylene is the only hormone which is a gas at ordinary temperature.

Reason. It helps in the ripening of fruits and is produced in the roots.

1. Both A and R are True.
2. Both A and R are False.
3. A is True and R is False.
4. A is False and R is True.

Answer

A is True and R is False.

Explanation
Ethylene is produced in various tissues of plants, especially in fruits, leaves, and flowers, rather than specifically in the roots.

Short Answer Type

Question 1

Match the items in column A with those of column B.

Column A	Column B
(a) Auxin	(i) apical dominance
(b) Gibberellin	(ii) cell-division
(c) Cytokinin	(iii) fruit ripening
(d) Ethylene	(iv) internodal elongation

Answer

Column A	Column B
(a) Auxin	(i) apical dominance
(b) Gibberellin	(iv) internodal elongation
(c) Cytokinin	(ii) cell division
(d) Ethylene	(iii) fruit ripening

Question 2

Complete the following sentences:

(a) Growth of root towards water is ..... .

(b) ..... hormone inhibits apical dominance.

(c) ..... and ..... induce chemotropism of angiosperms and gymnosperms.

(d) ..... of sweet peas exhibit thigmotropism.

(e) ..... is also called as "stress hormone".

Answer

(a) Growth of root towards water is ***hydrotropism*** .

(b) ***Cytokinins*** hormone inhibits apical dominance.

(c) ***Sugars*** and ***peptones*** induce chemotropism of angiosperms and gymnosperms.

(d) ***Tendrils*** of sweet peas exhibit thigmotropism.

(e) ***Abscisic acid*** is also called as "stress hormone".

Question 3

How is movement in plants different from that in animals?

Answer

Differences between movement in plants and movement in animals are as follows —

Movement in plants	Movement in animals
Plant movements are often related to growth.	Animal movements are not related to growth.

Movement in plants	Movement in animals
Plant movements are confined to only some plant parts.	Animal movements involve movement of the entire body.
No muscles are involved in plant movements.	Muscles are involved in animal movements.
It involves bending, twisting and elongation of plant parts.	It involves displacement from one place to another.
Movement is said to be non-locomotory.	Movement is said to be locomotory.
Plants generally move to secure support, capture food or to find water or soil nutrients.	Animals generally move to find mates, for protection from environmental changes and to capture food.

Question 4

Name the stimulus which causes the following movements in plants: phototropism, thigmotropism, hydrotropism and geotropism.

Answer

- Phototropism → Light
- Thigmotropism → Touch
- Hydrotropism → Water
- Geotropism → Gravity

Question 5

Name the following.

(a) A hormone that stimulates growth by cell division.

(b) A growth-retarding hormone in plants.

(c) The main auxin found in most plants.

Answer

(a) Cytokinin

(b) Abscisic acid

(c) Indole 3-acetic acid (IAA)

Question 6

The box given below contains twelve words. Out of these, ten can be arranged in five suitable matching pairs. Make these five pairs in the form of table.

Auxins, Abscissic acid, Fruit ripening, Cytokinins, Closure of stomata, Parthenocarpy, Ethylene, Gibberellins, Tropism, Stem elongation, Cuscuta, Cell division.

Answer

Hormone	**Function**
Auxin	Tropism
Abscisic acid	Closure of stomata
Cytokinins	Cell division
Ethylene	Fruit ripening
Gibberellins	Stem elongation

Descriptive Type

Question 1

Define the following terms:

(a) Phytohormones

(b) Tropism

(c) Clinostat

(d) Apical dominance

(e) Parthenocarpy

(f) Abscission

(g) Heliotropism

Answer

(a) **Phytohormones** — Phytohormones or plant hormones are naturally occurring small organic molecules.

(b) **Tropism** — Response or orientation of a plant to certain stimulus that acts with greater intensity from one direction to another is called tropism.

(c) **Clinostat** — Clinostat is a mechanical device that rotates at a slow speed to demonstrate geotropism.

(d) **Apical dominance** — The phenomenon of the suppression of growth of lateral buds by apical buds is called apical dominance.

(e) **Parthenocarpy** — Development of fruits without fertilisation is called parthenocarpy.

(f) **Abscission** — Abscission is the shedding of various parts of a plant such as leaves, buds, flowers and fruits.

(g) **Heliotropism** — The phenomenon in which the young flower heads follow the sun across the sky as it moves from east to west direction is called heliotropism.

Question 2

List five plant growth hormones and mention one important role of each.

Answer

1. **Auxins** — Auxins promote the growth of stem, roots and fruits by cell elongation.
2. **Gibberellins** — Gibberellins promote the growth of internodes by cell elongation.
3. **Cytokinins** — Cytokinins stimulate cell division.
4. **Ethylene** — Ethylene helps in ripening of fruits.
5. **Abscisic acid** — Abscisic acid induces dormancy of buds and seeds.

Question 3

Differentiate between:

(a) Thigmotropism and geotropism

(b) Positive and negative tropism

(c) Stimulus and response

(d) Phototropism and chemotropism

Answer

(a) Difference between thigmotropism and geotropism

Thigmotropism	**Geotropism**
Directional growth movement of a plant part in response to the touch of an object.	Directional growth movement of a plant part in response to gravity.

Thigmotropism	Geotropism
Example — Plants such as sweet peas, Cuscuta and vines have tendrils which coil around other plants in response to one sided contact or touch.	Example — Growth of roots of plants in downward direction.

(b) Difference between positive and negative tropism

Positive tropism	Negative tropism
Movement of plant part towards the direction of the stimulus is called positive tropism.	Movement of plant part against the direction of the stimulus is called negative tropism.
Example — Shoots show positive phototropism and grow in the direction of sunlight.	Example — Roots show negative phototropism and grow against the direction of sunlight.

(c) Difference between stimulus and response

Stimulus	Response
Change in the internal or external environment of an organism is called a stimulus.	Resulting action or movement caused by the stimulus is called a response.
Example — In phototropism, sunlight is the stimulus.	Example — In phototropism, the bending of the shoot is the response to the stimulus of sunlight.

(d) Difference between phototropism and chemotropism

Phototropism	Chemotropism
It means the movement in response to the stimulus of light.	It is the phenomenon of growth or movement of a plant part towards the source of nutrients or chemicals.
Example — Growth of shoots of plants in upward direction.	Example — Growth of pollen tube towards sugar and peptones of the female gametophyte.

<u>Structured / Application / Skill Type</u>

Question 1

Tea plants are never allowed to grow lengthwise. This is done by cutting their apical buds, a process known as pruning. In this way, tea plants get a dense growth and easy yield. Answer the following questions:

(a) Name the scientific phenomenon that is being overcome by pruning.

(b) What plant hormone is responsible for the scientific phenomenon mentioned in (a).

(c) Name one plant hormone which inhibits the said phenomenon.

Answer

(a) Apical dominance

(b) Auxins

(c) Cytokinins

Question 2

The figure given below shows the stages of ripening in a banana. Answer the questions that follow:

(a) Name the plant hormone responsible for the above changes.

(b) Mention two characteristic features of this hormone.

Answer

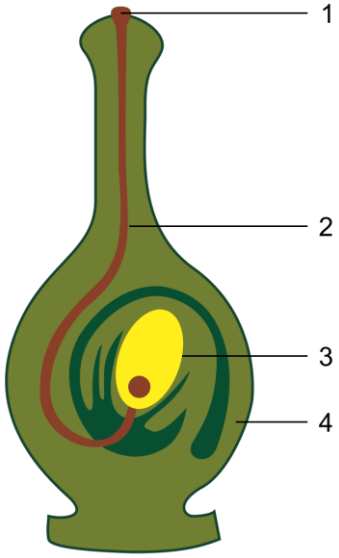
(a) The plant hormone responsible for the above changes is Ethylene. It is the only hormone which is a gas at ordinary temperature. It is produced in fruits and remain in the same fruit.

(b) Characteristic features of ethylene are:

1. It is synthesised in flowers, germinating seeds and ripening fruits.
2. It promotes root growth and root hair formation and also induces and promotes fruit ripening.

Question 3

The diagram given alongside shows a type of tropism. Study the same and answer the questions that follow:



(a) Name and define the type of tropism shown in the diagram.

(b) Label the guidelines (1) to (4).

(c) Name two effective stimulants that help in the growth of part (2).

(d) Name two groups of plants where part (2) grows towards gametophyte with the help of the stimulants mentioned in (c).

Answer

(a) The type of tropism shown in the diagram is Chemotropism. It is the phenomenon of growth of plant organs in response to chemicals.

(b) Guidelines (1) to (4) are labelled below:

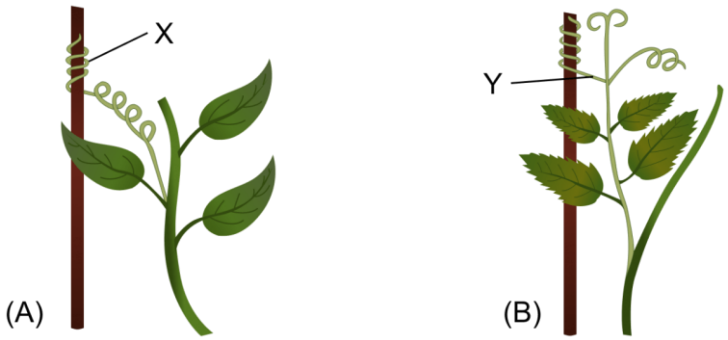
- 1 → Pollen grain
- 2 → Pollen tube
- 3 → Ovule
- 4 → Ovary

(c) Sugars and peptones.

(d) Gymnosperms and angiosperms.

Question 4

Study the diagrams given below and answer the following questions.



(a) Name the structures shown as X and Y in the figures (A) and (B), respectively.

(b) Write the functions performed by the structures X and Y.

(c) Name the phenomenon depicted and define it.

(d) How do the structures X and Y differ from each other?

(e) Give examples of the plants which show the said phenomenon.

Answer

(a) X → Stem tendrils, Y → Leaf tendrils.

(b) Stem tendrils (X) and leaf tendrils (Y) enable the plant to climb up a support.

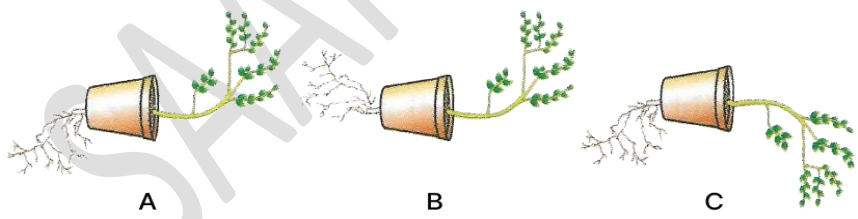
(c) Thigmotropism is the phenomenon depicted. It is the growth movement of plant parts in response to touch stimulus.

(d) Stem tendrils (X) arise from the stem while leaf tendrils (Y) arise from the leaf of the plant.

(e) Sweet Pea, Vines and Cuscuta.

Question 5

Given below are the figures showing some kinds of tropic movements in plants. Study the same and answer the following questions:



(a) Which one of these figures is correct? Give reason in support of your answer.

(b) Name the kind of movements shown by the root system and the shoot system. Define each.

(c) What are the two stimuli which affect root system and shoot system positively? Name them.

(d) Which of the following stimuli affect the growth of root strongly?

1. Gravity

2. Water

(e) Draw a neat and labelled diagram of the longitudinal section of a pistil showing chemotropism in an angiospermic plant.

Answer

(a) Figure A is correct as it shows roots growing towards gravity and shoot growing away from gravity.

(b) Root shows positive geotropism and shoot shows negative geotropism.

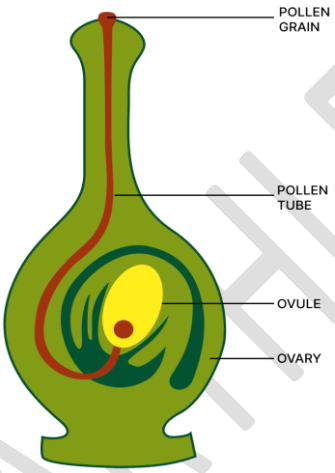
Positive geotropism is defined as movement of plant towards earth's gravity. For example, roots show positive geotropism.

Negative geotropism is defined as movement of plant away from gravity. For example, shoot shows negative geotropism.

(c) Root system — Gravity
Shoot system — Light

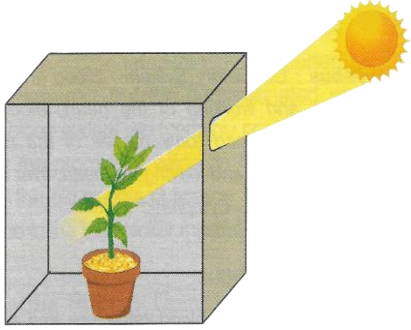
(d) Water
Reason — For roots, water is a more effective stimulus than gravity.

(e) Below diagram shows chemotropism in a pistil:



Question 6

The figure given below depicts a kind of tropic movement in plants. Study the same and answer the following questions.



(a) What kind of a movement is shown in figure. Define it.

(b) How does this movement differ from geotropism?

(c) Name the stimulus responsible for thigmotropism. Give one example of a plant showing thigmotropism.

(d) Name one stimulus which gives a positive response for the roots but negative response for the shoot.

(e) Draw a neat and labelled diagram of the part of plant showing leaf tendril. Name the plant.

Answer

(a) Phototropism.
It is defined as the movement in response to the stimulus of light.

(b) Stimulus for phototropism is light whereas for geotropism it is gravity.

(c) Touch is the stimulus for thigmotropism.
Example — The tendrils of sweet pea plant start coiling around the support in response to touch.

(d) Gravity

(e) **Sweet pea** plant shows thigmotropism. The labelled diagram showing leaf tendril is given below: