

PETIT SEMINAIRE HIGHER SECONDARY SCHOOL, PUDUCHERRY

16. PLANT & ANIMAL HORMONES

Xstd

SELF – EVALUATION

BIOLOGY

I. Choose the best answer :

01. Gibberellins cause **elongation of dwarf plants**.
 - a) shortening of genetically tall plants
 - b) elongation of dwarf plants
 - c) promotion of rooting
 - d) yellowing of young leaves
02. The hormone which has positive effect on apical dominance is : **Auxin**.
 - a) cytokinin
 - b) auxin
 - c) gibberellin
 - d) ethylene
03. Which one of the following hormones is naturally not found in plants : **2, 4-D**.
 - a) 2,4-D
 - b) GA3
 - c) Gibberellin
 - d) IAA
04. *Avena coleoptile* test was conducted by **F. W. Went**.
 - a) Darwin
 - b) N. Smit
 - c) Paal
 - d) F. W. Went
05. To increase the sugar production in sugarcanes they are sprayed with **Ethylene**.
 - a) Auxin
 - b) Cytokinin
 - c) Gibberellins
 - d) Ethylene
06. LH is secreted by **Anterior pituitary**.
 - a) Adrenal gland
 - b) Thyroid gland
 - c) Anterior pituitary
 - d) Hypothalamus
07. Identify the exocrine gland **Salivary gland**.
 - a) Pituitary gland
 - b) Adrenal gland
 - c) Salivary gland
 - d) Thyroid gland
08. Which organ acts as both exocrine gland as well as endocrine gland? **Pancreas**.
 - a) Pancreas
 - b) Kidney
 - c) Liver
 - d) Lungs
09. Which one is referred as “Master gland”? **Pituitary gland**.
 - a) Pineal gland
 - b) Pituitary gland
 - c) Thyroid gland
 - d) Adrenal gland

II. Fill in the blanks :

01. **Auxin** causes cell elongation, apical dominance and prevents abscission.
02. **Ethylene** is a gaseous hormone involved in abscission of organs and acceleration of fruit ripening.
03. **Abscissic acid** causes stomatal closure.
04. Gibberellins induce stem elongation in **Rosette** plants.
05. The hormone which has negative effect on apical dominance is **Cytokinin**.
06. Calcium metabolism of the body is controlled by **Parathormone**.
07. In the islets of langerhans, beta cells secrete **Insulin**.
08. The growth and functions of thyroid gland is controlled by **Thyroid Stimulating Hormone (TSH)**.
09. Decreased secretion of thyroid hormones in the children leads to **cretinism**.

III. a) Match column I with column II and III :

Column I	Column II	Column III
AUXIN	Coleoptile tip	Apical dominance
ETHYLENE	Fruits	Ripening
ABSCISIC ACID	Chloroplast	Abscission
CYTOKININ	Coconut milk	Cell division
GIBBERELLINS	<i>Gibberella fujikuroi</i>	Internodal elongation

III. b) Match the following hormones with their deficiency states :

<u>Hormones</u>		<u>Disorders</u>
a) Thyroxine	-----	Simple goitre
b) Insulin	-----	Diabetes mellitus
c) Parathormone	-----	Tetany
d) Growth hormone	-----	Acromegaly
e) ADH	-----	Diabetes insipidus

IV. State whether True or False. If False, write the Correct statement :

01. A plant hormone concerned with stimulation of cell division and promotion of nutrient mobilization is cytokinin. **TRUE**
02. Gibberellins cause parthenocarpy in tomato. **TRUE**
03. Ethylene retards senescence of leaves, flowers and fruits. **FALSE**
Correct Statement : Ethylene **hastens** senescence of leaves, flowers and fruits.
04. Exophthalmic goiter is due to the over secretion of thyroxine. **TRUE**
05. Pituitary gland is divided into four lobes. **FALSE**
Correct Statement : Pituitary gland is divided into **two** lobes.
06. Estrogen is secreted by corpus luteum. **FALSE**
Correct Statement : Estrogen is secreted by **graafian follicles of the ovaries.**

V. Assertion and Reasoning :

Direction : In each of the following questions, a statement of assertion (A) is given and a corresponding statement of reason (R) is given just below it. Mark the correct statement as:

- If both A and R are true and R is correct explanation of A
- If both A and R are true but R is not the correct explanation of A
- A is true but R is false
- Both A and R are false

01. **Assertion (A) :** Application of cytokinin to marketed vegetables can keep them fresh for several days.

Reason (R) : Cytokinins delay senescence of leaves and other organs by mobilization of nutrients.

Both A and R are true but R is not the correct explanation of A

02. **Assertion (A) :** Pituitary gland is referred as “Master gland”.

Reason (R) : It controls the functioning of other endocrine glands.

Both A and R are true and R is correct explanation of A

03. **Assertion (A) :** Diabetes mellitus increases the blood sugar levels.

Reason (R) : Insulin decreases the blood sugar levels.

Both A and R are true but R is not the correct explanation of A

VI. Answer in a word or sentence :

01. Which hormone promotes the production of male flowers in Cucurbits?

Gibberellin promotes the production of male flowers in Cucurbits.

02. Write the name of a synthetic auxin.

2, 4 D (2, 4 Dichlorophenoxy Acetic acid)

(or)

IBA (Indole 3 butyric Acid)

(or)

Indole 3 Propionic Acid

(or)

2, 4, 5-T (2,4,5 Trichlorophenoxy Acetic Acid)

(or)

NAA (α -Naphthalene Acetic Acid)

03. Which hormone induces parthenocarpy in tomatoes?

Gibberellin induces parthenocarpy in tomatoes.

04. What is the hormone responsible for the secretion of milk in female after child birth?

Prolactin (PRL) also called as **Lactogenic** hormone, initiates the secretion of milk in females after child birth.

05. Name the hormones which regulates water and mineral metabolism in man.

❖ **Vasopressin** or **ADH** regulates water metabolism in man.

❖ **Parathormone** and **aldosterone (mineralocorticoids)** regulate mineral metabolism in man.

06. Which hormone is secreted during emergency situation in man?

Epinephrine (Adrenaline) and **Nor-epinephrine (Nor-adrenaline)** are secreted in man during emergency situation such as stress and emotion .

07. Which gland secretes digestive enzymes and hormones?

Pancreas secretes digestive enzymes and hormones.

08. Name the endocrine glands associated with kidneys.

Neurohypophysis of **pituitary** gland and **Adrenal** glands are the 2 endocrine glands associated with kidneys.

VII. Short answer questions :

1. What are Synthetic auxins? Give examples.

Artificially Synthesized Auxins that have properties like Auxins are called as **SYNTHETIC AUXINS**.

Example: 2, 4 D (2, 4 **Dichlorophenoxy Acetic Acid**), NAA (α – **Naphthalene Acetic Acid**),
2, 4 ,5-T (2,4,5 **Trichlorophenoxy Acetic Acid**), etc.,

2. What are bolting? How can it be induced artificially?

Treatment of **Rosette** plants with **Gibberellin** induces **sudden shoot elongation** followed by **flowering**. This is called **BOLTING**. When applied on plants, it stimulates **extraordinary elongation of internodes**.

3. Bring out any two physiological activities of abscisic acid.

- ABA promotes the process of abscission (**separation** of LEAVES, FLOWERS and FRUITS from the branch).
- During **water stress** and **drought conditions** ABA causes **stomatal closure**.

4. What will you do to prevent leaf fall and fruit drop in plants? Support your answer with reason.

Application of **Auxin** on plants will prevent leaf fall and fruit drop; as Auxins **prevent** the formation of **abscission** layer.

5. What are chemical messengers?

The **hormones** produced by the **endocrine** glands are called chemical messengers. They **diffuse** into the **blood** stream and are carried to **distant parts** of the body and act on specific organs called **target organs**.

6. Write the differences between endocrine and exocrine gland.

Sl. No.	ENDOCRINE GLAND	EXOCRINE GLAND
01.	They are ductless glands.	They are glands with ducts (pathway).
02.	They secrete hormones .	They secrete enzymes .
03.	They directly mix with the blood .	The enzymes are carried by ducts .
04.	They control and coordinate other organs	They help in digestion and check the entry of germs
05.	Eg: PITUITARY gland; GONADS	Eg: SALIVARY glands; TEAR glands

7. What is the role of parathormone?

The parathormone regulates **calcium** and **phosphorus metabolism** in the body. They act on BONE, KIDNEY and INTESTINE to **maintain blood calcium** levels.

8. What are the hormones secreted by posterior lobe of the pituitary gland? Mention the tissues on which they exert their effect.

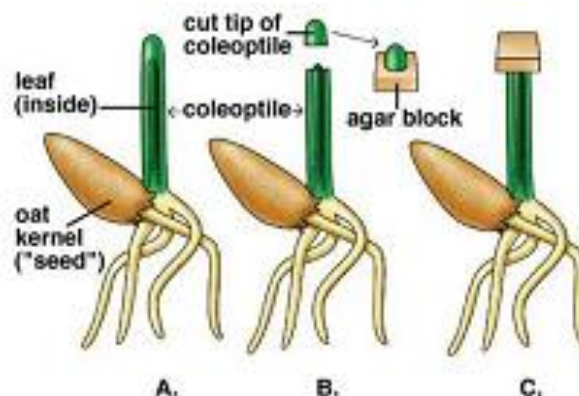
The hormones secreted by the posterior lobe of the pituitary gland are:

- VASOPRESSIN (or) ANTIDIURETIC HORMONE (ADH)**: In kidney tubules it increases **reabsorption of water** and reduces **loss of water** through urine. Hence the name antidiuretic hormone.
- OXYTOCIN**: It helps in the **contraction** of the **smooth muscles** of **uterus** at the time of child birth and **milk ejection** from the **mammary gland** after child birth.

9. Why are thyroid hormones referred as personality hormone?
Thyroid hormone maintains the **Basal Metabolic Rate (BMR)** of the body. It is **essential** for normal PHYSICAL, MENTAL and PERSONALITY DEVELOPMENT. Hence it is also known as PERSONALITY HORMONE.
10. Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low?
Iodine is involved in the formation of **thyroid hormones: T3 and T4**.
If the intake of iodine in our diet is low, the thyroid gland will not be able to secrete sufficient quantity of thyroxine which results in **Simple Goitre**.

VIII. Long answer questions :

- Q1. (a) Name the gaseous plant hormone. Describe its three different actions in plants.
Ethylene is the gaseous plant hormone. It's a **growth inhibitor** which is mainly concerned with **maturation** and **ripening** of fruits. Its physiological effects are:
- Ethylene **inhibits** the **elongation** of STEM and ROOT in DICOTS.
 - Ethylene **hastens** the senescence of LEAVES and FLOWERS.
 - Ethylene **breaks** the **dormancy** of BUDS, SEEDS and STORAGE ORGANS.
- (b) Which hormone is known as stress hormone in plants? Why?
Abscisic acid (ABA) is called as Stress hormone in plants because it **increases tolerance** of plants to various kinds of **stress**. It is found in the **chloroplast** of plants.
- Q2. Describe an experiment which demonstrates that growth stimulating hormone is produced at the tip of coleoptile.
- Frits Warmolt Went**, a Dutch biologist demonstrated the existence and effect of auxin in plants. He did a series of experiments in *Avena coleoptiles*.
 - In his first experiment, he **removed** the **tips** of *Avena* coleoptiles. The cut tips did not grow indicating that the tips produced something essential for growth.
 - In his second experiment, he placed the **agar blocks** on the **decapitated** coleoptiles tips. The coleoptiles tips did not show any response.
 - In his next experiment, he placed the **detached coleoptiles** tips on **agar** blocks. After an **hour**, he **discarded** the tips and placed this agar block on the **decapitated coleoptile**.
 - It grew **straight** up indicating that some chemical had diffused from the cut coleoptiles tips into the agar block which stimulated the growth.
 - From his experiments Went concluded that a chemical diffusing from the tip of coleoptiles was responsible for growth, and he named it as "Auxin" meaning 'to grow'.



A. Germination of an oat seed
B. Decapitate tip of coleoptile and place on agar block.
C. Agar block is placed on top of the decapitated tip of the seedling.

Q3. Write the physiological effects of gibberellins.

Physiological effects of gibberellins:

- i) Application of gibberellins on plants stimulate extraordinary elongation of internodes.
E.g.: **Corn and Pea.**
- ii) Treatment of rosette plants with gibberellins induces sudden shoot elongation followed by flowering. This is called bolting.
- iii) Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
- iv) Gibberellins break dormancy of **Potato tubers.**
- v) Gibberellins are efficient than auxins in inducing the formation of seedless fruit – Parthenocarpic fruits (Development of fruits without fertilization) E.g.: **Tomato.**

Q4. Where are estrogens produced? What is the role of estrogens in the human body?

Estrogen is a female sex hormone that is produced by the Graafian follicles of the Ovary.

Role of Estrogen in human body:

- i) It brings about the changes that occur during puberty.
- ii) It initiates the process of oogenesis.
- iii) It stimulates the maturation of ovarian follicles in the ovary.
- iv) It promotes the development of secondary sexual characters (breast development, high pitched voice etc.).

Q5. What are the conditions which occur due to lack of ADH and insulin? How are the conditions different from one another?

(a) Deficiency of ADH caused *Diabetes insipidus*, whereas Deficiency of Insulin causes *Diabetes mellitus*.

(b) ADH (**Anti Diuretic Hormone**) is secreted by the posterior lobe (**Neurohypophysis**) of Pituitary gland. Deficiency of ADH reduces re-absorption of water in kidney and causes an increase in urine output (**Polyuria**).

Insulin is secreted by the beta cells of Pancreas. Deficiency of insulin causes excretion of excess glucose in the urine (**Glycosuria**); frequent urination (**Polyuria**); increased thirst (**Polydipsia**) and increase in appetite (**Polyphagia**).

IX. Higher Order Thinking Skills (HOTS):

Q1. What would be expected to happen if

- a. Gibberellin is applied to rice seedlings.
Gibberellin will cause internodal elongation in rice.
- b. A rotten fruit gets mixed with unripe fruits.
The rotten fruit will produce lot of Ethylene and the unripe fruits will begin to ripen quickly.
- c. When cytokinin is not added to culture medium.
Generally, Cytokinin induces cell division. If it is not added to culture medium, division of cells will not occur and the cultural tissue will not show growth.

- Q2. A plant hormone was first discovered in Japan when rice plants were suffering from Bakanae disease caused by *Gibberella fujikuroi*. Based on this information, answer the following questions:
- Identify the hormone involved in this process.
Gibberellin
 - Which property of this hormone causes the disease?
Application of gibberellin on plants stimulate extraordinary elongation of internode. This causes Bakanae disease.
 - Give two functions of this hormone.
 - Gibberellin breaks dormancy of Potato tubers.
 - They promote the production of male flowers in monoecious plants (*Cucurbits*).
- Q3. Senthil has high blood pressure, produced eyeball and an increased body temperature. Name the endocrine gland involved and hormone secretion responsible for this condition.
Endocrine gland : **Thyroid gland**
Hormone : excess secretion of **Thyroxine**
- Q4. Sanjay is sitting in the exam hall. Before the start of the exam, he sweats a lot, with increased rate of heart beat. Why does this condition occur?
Sanjay is tensed about the exam and is worried. In stressful situations, the hormone Adrenaline is produced by Adrenal gland. It helps the body to handle stressful situations as follows :
- It increases heart beat and blood pressure.
 - It increases sweating.
- Hence, Sanjay sweats a lot with increased rate of heart beat.
- Q5. Susan's father feels very tired and frequently urinates. After clinical diagnosis, he was advised to take an injection daily to maintain his blood glucose level. What would be the possible cause for this? Suggest preventive measures.
Susan's father must be suffering from *Diabetes mellitus*; which is caused due to deficiency of Insulin, produced by β -cells of Pancreas. Frequent urination with loss of excess glucose is a major symptom of this disorder. Hence, he would have been advised to take Insulin injection daily to maintain his blood glucose level.
- Preventive Measures include:
- Avoiding carbohydrate rich foods like cereals, fruits, etc.,
 - Intake of protein rich foods, and
 - Regular physical exercise.