Chemical Coordination and Integration Class 11 Biology: Complete Notes, Summary, MCQs & Exam Guide

Meta Description:
Comprehensive notes on Chemical Coordination and Integration Class 11 Biology including summary, MCQs, keywords, questions, and exam tips.

Introduction of the Chapter

Chemical Coordination and Integration is an important chapter of Class 11 Biology that explains how the human body maintains balance and harmony through chemical messengers called hormones. While the nervous system provides rapid control, the endocrine system ensures long-lasting regulation of growth, metabolism, reproduction, and homeostasis.

This chapter focuses on endocrine glands, hormones, their functions, and disorders caused by hormonal imbalance. Understanding Chemical Coordination and Integration helps students learn how body functions are regulated and coordinated to maintain internal stability.

Short Notes (Quick Revision Points)

- Coordination in the body occurs through the **nervous system** and **endocrine system**.
- The endocrine system releases **hormones** directly into the bloodstream.
- Hormones act on specific **target organs** having receptors.
- Endocrine glands are **ductless glands**.
- Major glands include pituitary, thyroid, parathyroid, adrenal, pancreas, pineal, and gonads.
- The **pituitary gland** is called the master gland.
- Hormonal imbalance can cause disorders like diabetes, goitre, dwarfism, and gigantism.
- Hormones regulate metabolism, growth, reproduction, and water balance.

Detailed Summary (Chemical Coordination and Integration)

Chemical Coordination and Integration explains how the endocrine system controls body activities using hormones. Unlike nerve impulses, hormones travel through blood and act slowly but produce long-lasting effects.

Endocrine System and Hormones

The endocrine system consists of ductless glands that secrete hormones into the bloodstream. Hormones are chemical messengers that regulate physiological processes by acting on target tissues with specific receptors.

Characteristics of Hormones

- Secreted in small quantities

- Transported by blood
- Act on specific target organs
- Slow but prolonged action
- Maintain homeostasis

Major Endocrine Glands

Hypothalamus

The hypothalamus links the nervous and endocrine systems. It produces releasing and inhibiting hormones that control the pituitary gland.

Pituitary Gland (Master Gland)

Located below the hypothalamus, it regulates other endocrine glands.

Hormones of anterior pituitary:

- Growth Hormone (GH) – body growth
- TSH – stimulates thyroid
- ACTH – stimulates adrenal cortex
- FSH & LH – reproductive functions
- Prolactin – milk production

Posterior pituitary hormones:

- ADH – water balance
- Oxytocin – uterine contraction & milk ejection

Pineal Gland

Secretes melatonin, which regulates sleep-wake cycles (biological clock).

Thyroid Gland

Located in the neck, it secretes thyroxine (T4) and triiodothyronine (T3), regulating metabolism and growth. Iodine is essential for its function.

Disorders:

- Goitre – iodine deficiency
- Hypothyroidism – cretinism (children), myxedema (adults)
- Hyperthyroidism – Graves disease

Parathyroid Glands

Secrete parathyroid hormone (PTH), regulating calcium and phosphate balance.

Thymus Gland

Produces thymosin, important for immune system development.

Adrenal Glands

Located above kidneys.

Adrenal cortex hormones:

- Mineralocorticoids – salt balance
- Glucocorticoids – metabolism & stress response
- Sex corticoids

Adrenal medulla hormones:

- Adrenaline & noradrenaline (fight or flight response)

Pancreas (Islets of Langerhans)

Acts as both endocrine and exocrine gland.

- Insulin – lowers blood sugar
- Glucagon – raises blood sugar

Disorder: Diabetes mellitus (insulin deficiency)

Gonads

Testes: Testosterone – male characteristics & sperm formation
Ovaries: Estrogen & progesterone – female reproductive functions

Mechanism of Hormone Action

Hormones act by binding to receptors on target cells. They may:

- Activate genes and protein synthesis
- Change membrane permeability
- Regulate enzyme activity

Feedback Mechanism

Hormone secretion is controlled by feedback mechanisms.

Negative feedback: Maintains hormone balance (e.g., thyroid regulation).
Positive feedback: Rare; enhances hormone secretion (e.g., oxytocin during childbirth).

Flowchart / Mind Map (Text-Based)

Chemical Coordination and Integration
→ Endocrine System
→ Hormones
→ Major Glands
→ Hypothalamus
→ Pituitary (Master gland)

→ Thyroid & Parathyroid
→ Adrenal glands
→ Pancreas
→ Pineal gland
→ Gonads
→ Hormone Functions
→ Feedback Mechanism
→ Hormonal Disorders

Important Keywords with Meanings

- **Hormone** – Chemical messenger regulating body functions
- **Endocrine gland** – Ductless gland releasing hormones into blood
- **Target organ** – Organ affected by a hormone
- **Homeostasis** – Maintenance of internal balance
- **Thyroxine** – Hormone regulating metabolism
- **Insulin** – Hormone controlling blood glucose level
- **Adrenaline** – Emergency hormone for stress response
- **Melatonin** – Sleep cycle hormone
- **Feedback mechanism** – Regulation of hormone secretion
- **Goitre** – Enlargement of thyroid gland

Important Questions & Answers

Very Short Answer Questions

1. **What is a hormone?**
   Hormones are chemical messengers secreted by endocrine glands into blood to regulate body functions.
2. **Why is the pituitary called the master gland?**
   Because it controls other endocrine glands.
3. **Name the hormone controlling blood sugar.**
   Insulin.
4. **What is goitre?**
   Enlargement of thyroid gland due to iodine deficiency.
5. **Function of ADH?**
   Maintains water balance.
6. **Which gland regulates sleep?**
   Pineal gland.
7. **Name stress hormone.**
   Adrenaline.
8. **What is homeostasis?**
   Maintenance of internal balance.
9. **Which hormone regulates calcium levels?**
   Parathyroid hormone.
10. **Name male sex hormone.**
    Testosterone.

Long Answer Questions

1. Describe the endocrine system and its functions.
   (Answer: definition, glands, hormones, regulation)
2. Explain the structure and functions of the pituitary gland.
3. Describe thyroid hormones and their disorders.
4. Explain adrenal gland hormones and their role in stress response.
5. Describe insulin and glucagon functions.
6. Explain the feedback mechanism with examples.
7. Discuss hormonal control of reproduction.
8. Describe disorders caused by growth hormone imbalance.
9. Explain the role of hypothalamus in coordination.
10. Write a note on endocrine disorders.

Multiple Choice Questions (MCQs)

1. The master gland is:
   A. Thyroid
   B. Pituitary
   C. Pineal
   D. Adrenals
   Answer: B
2. Hormones are secreted by:
   A. Exocrine glands
   B. Duct glands
   C. Endocrine glands
   D. Nerves
   Answer: C
3. Insulin is produced by:
   A. Liver
   B. Pancreas
   C. Thyroid
   D. Kidney
   Answer: B
4. Thyroxine requires:
   A. Iron
   B. Iodine
   C. Calcium
   D. Sodium
   Answer: B
5. Fight or flight hormone:
   A. Insulin
   B. Adrenaline
   C. Thyroxine
   D. Estrogen
   Answer: B

6. Diabetes mellitus is caused by deficiency of:
   A. Thyroxine
   B. Insulin
   C. GH
   D. PTH
   Answer: B
7. Hormone regulating metabolism:
   A. Thyroxine
   B. Insulin
   C. ADH
   D. Oxytocin
   Answer: A
8. ADH acts on:
   A. Heart
   B. Kidney
   C. Liver
   D. Lungs
   Answer: B
9. Which hormone regulates calcium?
   A. Insulin
   B. PTH
   C. GH
   D. Melatonin
   Answer: B
10. Melatonin is secreted by:
    A. Thyroid
    B. Pineal
    C. Pituitary
    D. Pancreas
    Answer: B
11. Growth hormone deficiency causes:
    A. Gigantism
    B. Dwarfism
    C. Goitre
    D. Diabetes
    Answer: B
12. Hormones act on:
    A. All cells
    B. Target cells
    C. Skin only
    D. Bones only
    Answer: B
13. Oxytocin helps in:
    A. Growth
    B. Childbirth
    C. Digestion

D. Respiration
Answer: B

14. Thyroid gland is located in:
    A. Brain
    B. Neck
    C. Abdomen
    D. Chest
    Answer: B
15. Hypersecretion of GH causes:
    A. Dwarfism
    B. Gigantism
    C. Goitre
    D. Diabetes
    Answer: B

Exam Tips & Value-Based Questions

Exam Tips

- Learn functions of each gland in a table form.
- Practice diagrams of endocrine glands.
- Focus on hormone disorders and causes.
- Understand feedback mechanisms clearly.
- Revise differences between nervous and endocrine control.

Value-Based Questions

1. Why should iodine be included in diet?
   Answer: Prevents thyroid disorders and supports metabolism.
2. How does hormonal balance maintain health?
   Answer: It regulates metabolism, growth, and homeostasis.
3. Why is stress management important?
   Answer: Excess adrenaline harms health.
4. How does diabetes awareness help society?
   Answer: Promotes healthy lifestyle and prevention.
5. Why is sleep essential for hormonal balance?
   Answer: Melatonin regulates biological rhythm.

Conclusion

Chemical Coordination and Integration is a vital chapter that explains how the human body maintains internal balance through chemical messengers called hormones. While the nervous system provides rapid and short-term responses, the endocrine system ensures long-lasting regulation of physiological processes. Together, they maintain coordination and integration necessary for survival.

The endocrine system consists of ductless glands that secrete hormones directly into the bloodstream. These hormones act on specific target organs equipped with receptors. The hormones

are powerful regulators and are effective even in very small quantities. They control metabolism, growth, reproduction, stress responses, water balance, and electrolyte balance.

The hypothalamus plays a crucial role in linking the nervous system with the endocrine system. It regulates the pituitary gland through releasing and inhibiting hormones. The pituitary gland, often called the master gland, controls other endocrine glands and regulates growth, reproduction, and lactation.

The thyroid gland regulates metabolism through thyroxine and triiodothyronine hormones. Iodine is essential for their synthesis, and deficiency leads to goitre and hypothyroidism. The parathyroid glands maintain calcium balance through parathyroid hormone, which is essential for bone health and nerve function.

The adrenal glands help the body respond to stress. Adrenaline prepares the body for emergencies through the fight-or-flight response by increasing heart rate, blood pressure, and energy supply. The adrenal cortex hormones regulate metabolism, salt balance, and stress tolerance.

The pancreas plays a dual role. The islets of Langerhans regulate blood glucose levels through insulin and glucagon. Insulin lowers blood sugar, while glucagon raises it. A deficiency of insulin results in diabetes mellitus, one of the most common endocrine disorders worldwide.

The pineal gland regulates biological rhythms through melatonin secretion, ensuring proper sleep-wake cycles. The thymus gland supports immune development during childhood. Gonads regulate reproductive functions and secondary sexual characteristics through sex hormones.

Hormones function through feedback mechanisms, especially negative feedback, which maintains hormone levels within normal limits. This mechanism ensures homeostasis and prevents overproduction or underproduction of hormones.

Disorders due to hormonal imbalance highlight the importance of endocrine regulation. Growth hormone imbalance causes dwarfism or gigantism. Thyroid dysfunction leads to metabolic disturbances. Insulin deficiency results in diabetes. Awareness and early diagnosis help prevent complications.

Understanding Chemical Coordination and Integration is essential for students preparing for board exams and competitive examinations. It builds a foundation for topics like human physiology, health, and medicine. Learning this chapter also promotes awareness of healthy lifestyle choices, including balanced nutrition, stress management, and proper sleep.

In summary, Chemical Coordination and Integration explains how hormones regulate body functions and maintain harmony within the body. A well-coordinated endocrine system ensures proper growth, metabolism, and reproduction while maintaining internal balance. Mastering this chapter helps students understand the remarkable chemical control system that keeps the human body functioning smoothly.

Long Answer Questions with Answers

Chapter: Chemical Coordination and Integration (Class 11 Biology)

1. Describe the endocrine system and explain how it differs from the nervous system.

Answer:
The endocrine system is a network of ductless glands that secrete hormones directly into the bloodstream. These hormones regulate growth, metabolism, reproduction, and homeostasis.

Major endocrine glands include the hypothalamus, pituitary, thyroid, parathyroid, adrenal glands, pancreas, pineal gland, and gonads.

Differences from Nervous System:

Feature	Endocrine System	Nervous System
Signal	Hormones	Nerve impulses
Speed	Slow	Very fast
Duration	Long-lasting	Short-lived
Pathway	Bloodstream	Nerve fibers
Control	Growth & metabolism	Immediate responses

Thus, the nervous system provides rapid control, while the endocrine system provides prolonged regulation.

2. Explain the structure and functions of the pituitary gland.

Answer:
The pituitary gland is a pea-sized gland located below the hypothalamus and is called the **master gland** because it controls other endocrine glands.

It has two main parts:

Anterior Pituitary:

- Growth Hormone (GH): body growth
- TSH: stimulates thyroid gland
- ACTH: stimulates adrenal cortex
- FSH & LH: regulate reproductive organs
- Prolactin: milk production

Posterior Pituitary:

- ADH: maintains water balance
- Oxytocin: uterine contraction & milk ejection

It regulates growth, reproduction, metabolism, and water balance.

3. Describe thyroid gland hormones and the disorders associated with them.

Answer:
The thyroid gland is located in the neck and produces:

- Thyroxine (T4)
- Triiodothyronine (T3)

These hormones regulate metabolism, growth, and development. Iodine is essential for their synthesis.

Disorders:

- **Goitre:** enlargement due to iodine deficiency
- **Hypothyroidism:**low hormone production
  - Cretinism (children)
  - Myxedema (adults)
- **Hyperthyroidism:** excess secretion (Graves disease)

Proper iodine intake prevents thyroid disorders.

4. Explain the hormones of the adrenal gland and their functions.

Answer:
The adrenal glands are located above the kidneys and consist of two regions:

Adrenal Cortex:

- Mineralocorticoids: regulate salt and water balance
- Glucocorticoids: regulate metabolism & stress response
- Sex corticoids: influence secondary sexual characteristics

Adrenal Medulla:

- Adrenaline and noradrenaline

These hormones prepare the body for emergencies by increasing heart rate, blood pressure, and energy supply. This is called the **fight-or-flight response**.

5. Explain the role of insulin and glucagon in maintaining blood glucose levels.

Answer:
Insulin and glucagon are secreted by the pancreas (Islets of Langerhans).

- **Insulin:** lowers blood glucose by promoting uptake and storage.
- **Glucagon:** raises blood glucose by converting glycogen into glucose.

Together, they maintain glucose homeostasis.

Disorder:
Insulin deficiency leads to diabetes mellitus.

6. Describe the mechanism of hormone action.

Answer:
Hormones act on target cells that possess specific receptors.

Steps:

1. Hormone travels through bloodstream.
2. Binds to receptor on target cell.
3. Activates cellular response.

Actions include:

- Activation of genes
- Regulation of enzymes
- Change in membrane permeability

Hormones ensure specific and regulated responses.

7. Explain the feedback mechanism in hormonal regulation.

Answer:
Hormone secretion is regulated through feedback mechanisms.

Negative Feedback:
Maintains hormone balance.
Example: Thyroid hormone regulates TSH secretion.

Positive Feedback:
Enhances hormone release.
Example: Oxytocin during childbirth.

This mechanism ensures homeostasis.

8. Describe the role of hypothalamus in chemical coordination.

Answer:
The hypothalamus is the link between the nervous and endocrine systems. It controls the pituitary gland.

It secretes:

- Releasing hormones
- Inhibiting hormones

It regulates body temperature, hunger, thirst, emotions, and hormonal balance.

Thus, it acts as the control center of endocrine regulation.

9. Discuss disorders caused by growth hormone imbalance.

Answer:

Hyposecretion (childhood):
→ Dwarfism (short stature)

Hypersecretion (childhood):
→ Gigantism (excessive height)

Hypersecretion (adulthood):
→ Acromegaly (enlargement of hands, feet, jaw)

Growth hormone is essential for normal body development.

10. Describe the role of gonadal hormones in reproduction.

Answer:

Testes (male):

- Testosterone
- Develops male secondary sexual characters
- Stimulates sperm formation

Ovaries (female):

- Estrogen: development of female characteristics
- Progesterone: maintains pregnancy & menstrual cycle

These hormones regulate reproductive functions and sexual development.

Assertion–Reason Questions

Chapter: Chemical Coordination and Integration (Class 11 Biology)

Directions: For each question, choose the correct option:

A. Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A.
B. Both A and R are true, but R is not the correct explanation of A.
C. A is true, but R is false.
D. A is false, but R is true.

1.

Assertion (A): Hormones act only on specific target organs.
Reason (R): Target organs possess specific receptors for hormones.

Answer: A

2.

Assertion (A): The pituitary gland is called the master gland.
Reason (R): It regulates the activity of other endocrine glands.

Answer: A

3.

Assertion (A): Iodine deficiency leads to goitre.
Reason (R): Iodine is necessary for the synthesis of thyroxine.

Answer: A

4.

Assertion (A): Adrenaline is known as the emergency hormone.
Reason (R): It prepares the body to respond to stress situations.

Answer: A

5.

Assertion (A): Insulin decreases blood glucose level.
Reason (R): Insulin promotes conversion of glucose into glycogen.

Answer: A

6.

Assertion (A): Growth hormone hypersecretion in adults causes gigantism.
Reason (R): Excess GH leads to abnormal growth of bones.

Answer: D
(Gigantism occurs in children; adults develop acromegaly.)

7.

Assertion (A): The hypothalamus links the nervous and endocrine systems.
Reason (R): It secretes releasing and inhibiting hormones that control the pituitary gland.

Answer: A

8.

Assertion (A): ADH helps maintain water balance in the body.
Reason (R): ADH increases water reabsorption in the kidneys.

Answer: A

9.

Assertion (A): Parathyroid hormone regulates calcium levels in blood.
Reason (R): Calcium is essential for nerve impulse transmission and bone health.

Answer: B

10.

Assertion (A): Hormones act faster than nerve impulses.
Reason (R): Hormones travel through the bloodstream.

Answer: D

Multiple Choice Questions

1. Which system regulates long-term activities of the body?

A. Nervous system
B. Digestive system
C. Endocrine system
D. Respiratory system
Answer: C

2. Hormones are secreted by:

A. Exocrine glands
B. Duct glands
C. Endocrine glands
D. Neurons
Answer: C

3. The pituitary gland is located:

A. Above the heart
B. Below the hypothalamus
C. In the abdomen
D. Near the kidneys
Answer: B

4. Which hormone is responsible for body growth?

A. Thyroxine
B. Growth hormone
C. Insulin
D. Adrenalin
Answer: B

5. The thyroid gland requires which element to function properly?

A. Iron
B. Calcium
C. Iodine
D. Sodium
Answer: C

6. Enlargement of the thyroid gland is called:

A. Diabetes
B. Goitre
C. Dwarfism
D. Gigantism
Answer: B

7. The hormone that regulates blood sugar level is:

A. Thyroxine
B. Insulin
C. Melatonin
D. Oxytocin
Answer: B

8. Which gland secretes melatonin?

A. Pituitary
B. Thyroid
C. Pineal
D. Pancreas
Answer: C

9. The fight-or-flight hormone is:

A. Insulin
B. Thyroxine
C. Adrenaline
D. Estrogen
Answer: C

10. ADH primarily affects the:

A. Liver
B. Kidneys
C. Heart
D. Lungs
Answer: B

11. Which hormone helps in uterine contraction during childbirth?

A. Oxytocin
B. Prolactin
C. Estrogen
D. Testosterone
Answer: A

12. The endocrine part of the pancreas is called:

A. Nephrons
B. Islets of Langerhans
C. Alveoli
D. Glomerulus
Answer: B

13. Deficiency of insulin results in:

A. Goitre
B. Diabetes mellitus
C. Dwarfism
D. Acromegaly
Answer: B

14. Which hormone regulates calcium levels in blood?

A. Growth hormone
B. Parathyroid hormone
C. Insulin
D. Melatonin
Answer: B

15. Hypersecretion of growth hormone in childhood causes:

A. Dwarfism
B. Gigantism
C. Goitre
D. Diabetes
Answer: B

16. The master gland of the endocrine system is:

A. Pineal
B. Thyroid
C. Pituitary
D. Adrenal
Answer: C

17. Which hormone regulates sleep-wake cycle?

A. Melatonin
B. Insulin
C. Thyroxine
D. Cortisol
Answer: A

18. Testosterone is produced in the:

A. Ovaries
B. Thyroid
C. Testes
D. Pancreas
Answer: C

19. Hormones travel through the body via the:

A. Nerves
B. Bloodstream
C. Lymph nodes
D. Muscles
Answer: B

20. Negative feedback mechanism helps to:

A. Stop digestion
B. Maintain hormone balance
C. Increase heart rate
D. Produce enzymes
Answer: B

Case-Based Questions

Read each case carefully and answer the questions that follow.

Case Study 1: Thyroid Health and Iodine Intake

Riya lives in a mountainous region where iodine content in soil and water is low. She developed swelling in the neck and feels tired, gains weight easily, and has slow mental activity.

Questions:

1. Which endocrine gland is affected?
   Answer: Thyroid gland
2. What is the likely disorder?
   Answer: Goitre with hypothyroidism
3. Which hormone deficiency causes this condition?
   Answer: Thyroxine deficiency
4. Why is iodine important for this gland?
   Answer: Iodine is required for synthesis of thyroid hormones.

5. Suggest one preventive measure.
   Answer: Use iodized salt.

Case Study 2: Emergency Stress Response

While walking in a forest, Aman suddenly sees a snake and his heart rate increases, breathing becomes rapid, and he feels alert and ready to run.

Questions:

1. Which gland is responsible for this response?
   Answer: Adrenal gland
2. Name the hormone released.
   Answer: Adrenalin (epinephrine)
3. What is this response called?
   Answer: Fight-or-flight response
4. How does this hormone help in emergency situations?
   Answer: It increases heart rate, blood pressure, and energy supply.
5. Which part of the adrenal gland secretes this hormone?
   Answer: Adrenal medulla

Case Study 3: Growth Abnormalities

Rahul, a 10-year-old boy, is significantly shorter than his classmates. Medical examination shows deficiency of a hormone responsible for growth.

Questions:

1. Which hormone is deficient?
   Answer: Growth hormone
2. Which gland secretes this hormone?
   Answer: Pituitary gland
3. What condition may develop due to this deficiency?
   Answer: Dwarfism
4. At what stage does this disorder occur?
   Answer: Childhood
5. What is the role of this hormone?
   Answer: It stimulates growth of bones and body tissues.

Case Study 4: Blood Sugar Regulation

Meena often feels excessive thirst, frequent urination, and fatigue. Her blood glucose level is higher than normal.

Questions:

1. Which gland regulates blood glucose?
   Answer: Pancreas

2. Which hormone is insufficient?
   Answer: Insulin
3. Name the disorder.
   Answer: Diabetes mellitus
4. What is the function of insulin?
   Answer: It lowers blood glucose level.
5. Which cells secrete insulin?
   Answer: Beta cells of Islets of Langerhans

Case Study 5: Sleep Disturbance and Biological Clock

Rohit frequently uses his phone late at night and has difficulty sleeping. His sleep cycle is disturbed.

Questions:

1. Which gland regulates sleep-wake cycle?
   Answer: Pineal gland
2. Name the hormone responsible.
   Answer: Melatonin
3. How does screen exposure at night affect this hormone?
   Answer: It reduces melatonin secretion.
4. What is the function of melatonin?
   Answer: Regulates biological rhythm and sleep cycle.
5. Suggest one healthy habit to improve sleep.
   Answer: Avoid screens before bedtime.

Case Study 6: Calcium Balance in the Body

An elderly patient experiences brittle bones and muscle spasms. Doctors suspect imbalance in calcium regulation.

Questions:

1. Which gland regulates calcium levels?
   Answer: Parathyroid glands
2. Name the hormone involved.
   Answer: Parathyroid hormone (PTH)
3. What is the main function of this hormone?
   Answer: Maintains calcium and phosphate balance.
4. Why is calcium important for the body?
   Answer: Essential for bones, muscles, and nerve function.
5. What may happen if calcium levels fall drastically?
   Answer: Muscle cramps and nerve dysfunction.

Sample Question Paper

Class 11 Biology
Chapter: Chemical Coordination and Integration

Time: 1 Hour
Maximum Marks: 35

Section A: Very Short Answer (1 Mark each)

(Attempt all questions)

1. Define hormone.
2. Which gland is called the master gland?
3. Name the hormone that regulates blood glucose level.
4. Which hormone maintains water balance in the body?
5. Name the hormone secreted by the pineal gland.

Section B: Short Answer Questions (2 Marks each)

1. State two differences between endocrine and exocrine glands.
2. What is the role of iodine in thyroid function?
3. Name the hormones secreted by adrenal medulla and state one function.
4. What is negative feedback regulation?
5. Name the endocrine part of pancreas and its hormones.

Section C: Short Answer Questions (3 Marks each)

1. Explain the functions of parathyroid hormone.
2. Describe the role of insulin and glucagon in maintaining blood sugar level.
3. Write a short note on hypothalamus.

Section D: Long Answer Questions (5 Marks each)

1. Describe the structure and functions of the pituitary gland.
   OR
   Explain the hormones of thyroid gland and related disorders.
2. Explain the fight-or-flight response and the role of adrenal glands in stress management.

Section E: Case-Based Question (5 Marks)

1. A 12-year-old child shows excessive height growth compared to peers. Medical tests reveal abnormal hormone secretion.

Answer the following:

a) Name the hormone responsible.
b) Which gland secretes it?
c) What condition is this called?
d) What happens if this hormone is deficient in childhood?
e) Mention one function of this hormone.

Solutions

Section A: Very Short Answers

1. Define hormone.
A hormone is a chemical messenger secreted by endocrine glands into the bloodstream to regulate activities of specific target organs.

2. Which gland is called the master gland?
The pituitary gland is called the master gland because it controls the activity of other endocrine glands.

3. Name the hormone that regulates blood glucose level.
Insulin regulates blood glucose level by lowering it.

4. Which hormone maintains water balance in the body?
Antidiuretic hormone (ADH) maintains water balance by increasing water reabsorption in the kidneys.

5. Name the hormone secreted by the pineal gland.
Melatonin.

Section B: Short Answer Questions

6. State two differences between endocrine and exocrine glands.

Endocrine Glands	Exocrine Glands
Ductless glands	Have ducts
Secrete hormones into blood	Secrete substances through ducts

7. What is the role of iodine in thyroid function?
Iodine is essential for the synthesis of thyroid hormones (T3 and T4). Deficiency leads to goitre and reduced metabolism.

8. Name the hormones secreted by adrenal medulla and state one function.
Hormones: Adrenaline and noradrenaline
Function: Prepare the body for emergency situations by increasing heart rate and energy supply.

9. What is negative feedback regulation?
Negative feedback regulation is a mechanism in which increased levels of a hormone inhibit further secretion to maintain hormonal balance.

10. Name the endocrine part of pancreas and its hormones.
The endocrine part is the Islets of Langerhans.

Hormones: Insulin and glucagon.

Section C: Short Answer Questions

11. Explain the functions of parathyroid hormone.
Parathyroid hormone (PTH) regulates calcium and phosphate levels in blood. It increases blood calcium levels by acting on bones, kidneys, and intestines. It is essential for bone strength and nerve function.

12. Describe the role of insulin and glucagon in maintaining blood sugar level.
Insulin lowers blood glucose by promoting uptake and storage of glucose as glycogen in liver and muscles.
Glucagon increases blood glucose by converting stored glycogen into glucose.
Together, they maintain glucose homeostasis.

13. Write a short note on hypothalamus.
The hypothalamus is a part of the brain that links the nervous system with the endocrine system. It controls the pituitary gland by releasing hormones and helps regulate body temperature, hunger, thirst, and emotions.

Section D: Long Answer Questions

14. Describe the structure and functions of the pituitary gland.

The pituitary gland is a small pea-sized gland located at the base of the brain below the hypothalamus.

Parts and Hormones:

Anterior Pituitary:

- Growth hormone (growth)
- TSH (stimulates thyroid)
- ACTH (stimulates adrenal cortex)
- FSH & LH (reproductive functions)
- Prolactin (milk production)

Posterior Pituitary:

- ADH (water balance)
- Oxytocin (childbirth and milk ejection)

Functions:
Controls other endocrine glands, growth, reproduction, and water balance.

OR

Explain the hormones of thyroid gland and related disorders.

The thyroid gland secretes thyroxine (T4) and triiodothyronine (T3), which regulate metabolism, growth, and development.

Disorders:

- Goitre: enlargement due to iodine deficiency
- Hypothyroidism: slow metabolism, weight gain
- Hyperthyroidism: excessive metabolism and weight loss

15. Explain the fight-or-flight response and the role of adrenal glands in stress management.

During stressful or emergency situations, the adrenal medulla releases adrenaline and noradrenaline. These hormones increase heart rate, blood pressure, breathing rate, and glucose release, providing energy and alertness. This prepares the body to face danger, known as the fight-or-flight response.

Section E: Case-Based Question

a) Name the hormone responsible.
Growth hormone

b) Which gland secretes it?
Pituitary gland

c) What condition is this called?
Gigantism

d) What happens if this hormone is deficient in childhood?
Dwarfism occurs.

e) Mention one function of this hormone.
It stimulates growth of bones and body tissues.