

Important Questions Class 11 Biology Chapter 22

Chemical Coordination and integration

Question 1. What is the difference between hypothyroidism and hyperthyroidism?

Answer 1: Hypothyroidism is the low secretion of thyroxine hormone. Cretinism and Myxoedema are related to hyposecretion of the thyroid.

Hyperthyroidism refers to the hypersecretion of thyroid hormone. Thyrotoxicosis is a condition due to hyperactive thyroid glands.

Question 2: Inflammatory responses can be controlled by a particular steroid. Name the steroid, its source and also other important functions.

Answer 2: Inflammatory responses are controlled by steroid hormones called glucocorticoids. They are secreted by the adrenal cortex. The functions of glucocorticoids are:

- Gluconeogenesis: cortisol stimulates the conversion of non-carbohydrates into glucose or carbohydrates.
- Lipolysis
- Proteolysis
- Inhibition of cellular uptake
- The utilisation of amino acids.
- Cortisol plays an essential role in maintaining the cardiovascular system and the proper functioning of kidneys.
- Suppression of immune response.
- Production of RBCs.
- Relieves arthritis and prevents collagen fibre deposition.
- Anti-stress

Question 3. Describe hormones of the kidney and GI tract.

Answer 3: The hormones of the kidney are:

- Erythropoietin is secreted by the peritubular capillary network of uriniferous tubules of the kidney. It stimulates the production of RBC.
- Renin is secreted by the juxtaglomerular cells, which convert plasma protein angiotensinogen to angiotensin I and angiotensin II.

- Angiotensin II stimulates the adrenal cortex to secrete aldosterone.

The hormones of the GI tract are:

- Gastrin stimulates the secretion of gastric juice and HCL.
- Enterogastrone inhibits the release of gastric juice and regulates the mobility of food in the gut.
- Secretin increases the amount of pancreatic juice.
- Cholecystokinin contracts the gallbladder for the release of bile juice.
- Hepatocrinin stimulates the liver for the synthesis of bile juice.
- Enterocrinin stimulates intestinal glands for the secretion of intestinal juice.

Question 4. On an educational trip to Uttarakhand, Ketki and her friends observed that many local people had swollen necks. Please help Ketki and her friends find the solution to the following questions.

Which probable disease are these people suffering from?

- **How is it caused?**
- **What effect does this condition have on pregnancy?**

Answer 4:

1. The swollen neck is indicative of goitre disease.
2. This condition is hypothyroidism which is caused due to the deficiency of iodine.
3. The condition causes cretinism in pregnancy due to the defective development of the foetus.

Question 5. What is myxoedema?

Answer 5: Myxoedema is also known as Gull's disease. This is a condition due to a deficiency of thyroxine. Fat and protein metabolism reduces and accumulates under the face's skin. The affected person is lethargic and sensitive to cold. This is because of reduced energy and less heat production.

Question 6. Correct the following statements by replacing the term underlined.

Insulin is a steroid hormone.

TSH is secreted from the corpus luteum.

Tetraiodothyronine is an emergency hormone.

The pineal gland is located on the anterior part of the forebrain.

Answer 6:

1. Insulin is a proteinaceous hormone.
2. TSH is secreted from the thyroid gland.
3. Adrenalin is an emergency hormone.
4. The pineal gland is located on the dorsal side of the forebrain.

Question 7. What is the role played by the luteinising hormone in males and females?

Answer7: The role played by LH in females is:

- Ovulation is the release of female gamete from the ovary.
- It helps in the formation and maintenance of the corpus luteum.
- Stimulation of corpus luteum for the synthesis of progesterone hormone.

The role of LH in males:

- The hormone stimulates interstitial cells or Leydig cells for testosterone synthesis.
- It is also called Interstitial cell-stimulating hormone.
- Stimulates secretion of androgens from testes.

Question 8. What is cretinism?

Answer 8: This is a hypothyroid condition in which the child's physical, mental and sexual growth is affected. Such children have retarded growth and are dwarf and sterile. This is called cretin. A cretin child has protruded features of pot – belly, pigeon – chest and tongue.

Question 9. What is Grave disease?

Answer 9: Grave's disease is an autoimmune disease in which antibodies are produced which mimic the action of TSH. This is a thyrotoxic condition also called Grave's disease. BMR increases and produces restlessness. The body is lean, and the eyes have a bulge. Due to this, it is also called exophthalmic goitre.

Question 10. What are the effects of hypothyroidism during pregnancy on the development and maturation of a growing baby?

Answer 10: The deficiency of thyroid hormone in pregnancy adversely affects the growth and development of the child. The child's growth is stunted, called cretinism, mental retardation, deaf-mutism, abnormal skin, low IQ , etc.

Question 11. Calcium plays a vital role in the formation of bones. Write about the role of endocrine glands and hormones responsible for maintaining calcium homeostasis.

Answer 11: Parathyroid gland regulates calcium and phosphate metabolism. It regulates the concentration of calcium ions. The role of the parathyroid hormone is to increase the calcium level in the blood. Thus it acts on bone and stimulates the process of bone resorption, which is also called demineralisation and dissolution.

It also facilitates the reabsorption of calcium by renal tubules. This hormone increases calcium absorption from digested food and is a hypercalcemic hormone.

Question 12. Give an example of the following:

Hyperglycemic and hypoglycemic hormones.

Hypercalcemic hormone.

Gonadotropin hormone.

Progestational hormone

Blood pressure lowering hormone

Androgen and Oestrogens.

Answer 12:

1. Glucagon is a hyperglycemic hormone, and insulin is a hypoglycemic hormone.
2. The parathyroid hormone is hypercalcemic.
3. Gonadotropin hormones are Follicle-Stimulating Hormone (FSH) and Luteinizing Hormone (LH).
4. Progesterone is a progestational hormone.
5. Atrial Natriuretic Factor is the blood pressure lowering hormone.
6. Androgens are testosterone. Oestrogens are oestriol, oestradiol and oestrone.

Question 13. List the hormones secreted by:

Hypothalamus

Pituitary

Thyroid

Parathyroid

Adrenal

Pancreas

Answer 13:

1. Hypothalamus secretes the thyrotropin-releasing hormone, adrenocorticotropin-releasing hormone, gonadotropin-releasing hormone, somatotropin-releasing hormone, prolactin-releasing hormone and melanocyte-stimulating hormone.
2. The hormones secreted by the pituitary gland are:
 - Anterior pituitary or Pars distalis secretes Growth Hormone, Prolactin, Thyroid Stimulating Hormone, Adrenocorticotrophic Hormone, Luteinizing Hormone and Follicle Stimulating Hormone.
 - Pars intermedia secretes Melanocyte Stimulating Hormone.
 - Pars nervosa secretes oxytocin and vasopressin
1. The thyroid gland secretes Thyroxine and Triiodothyronine.
2. The parathyroid gland secretes parathyroid hormone.
3. The adrenal gland secretes:
 - Adrenal medulla secretes adrenaline and noradrenaline.
 - Adrenal cortex secretes glucocorticoids, and mineralocorticoids.. Aldosterone is the main mineralocorticoid in our body.
1. The pancreas has alpha, beta and delta cells. Alpha cells of the pancreas secrete glucagon, and beta cells secrete insulin. The delta cells secrete somatostatins.

Question 14. What are the functions of progesterone?

Answer 14: The role of progesterone is:

- Support pregnancy by forming the placenta.
- Prevent contraction in uterine walls.
- Act on mammary glands. It stimulates the formation of alveoli which store milk.
- Formation of mucus plug at the cervix

Question 15. Where is the pineal gland situated?

Answer 15: The pineal gland is a tiny, conical, reddish-grey-coloured gland located on the dorsal side of the forebrain between the cerebral hemispheres.

Question 16. What are the hormones of the adenohiphysis, and also write their target organs?

Answer 16: The anterior lobe of the pituitary gland is called adenohiphysis. The hormones and their target organs are:

- Somatotrophic Hormone (STH) or Growth Hormone (GH) stimulates the cells involved in growth. It is associated with normal growth, stunted growth and overgrowth of the body.
- Thyroid Stimulating Hormone (TSH) acts on the cell of the thyroid gland.
- Prolactin acts on the mammary gland and stimulates them during pregnancy and after childbirth. The activated glands synthesise milk.
- Adrenocorticotrophic Hormone (ACTH) act on the cortex of the adrenal gland and aid in the secretion of corticoids. It also regulates melanin pigmentation.
- Follicular Stimulating Hormone (FSH) acts on the ovarian follicle for the secretion of estrogen hormone. This regulates oogenesis in females and spermatogenesis in males.
- Luteinizing Hormone (LH) acts on the corpus luteum to secrete progesterone. In the male, it stimulates Leydig cells to secrete androgens. This is responsible for ovulation in females.

Question 17. What is the role of the second messenger in protein hormone action?

Answer 17: The hormones which do not enter the target cells interact with specific receptors on the surface of the target cell membranes to generate second messengers. They are present on the inner surface of the plasma membrane and carry out all the hormone functions.

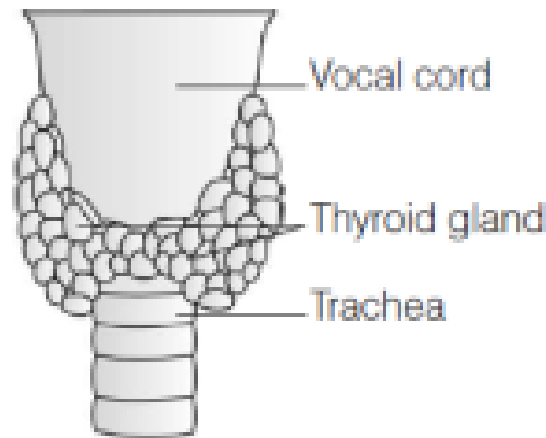
The molecules or compounds which act as the second messenger are:

- Cyclic Adenosine Monophosphate (cAMP)
- Cyclic Guanosine Monophosphate (cGMP)
- DiacylGlycerol (DAG)
- Inositol Triphosphate (ITP)
- Calcium

The heart muscle has two types of the second messenger. The cAMP is for adrenaline and stimulates the heartbeat. The cGMP is for acetylcholine and slows down the heartbeat.

Question 18. What is the origin and location of the thyroid gland?

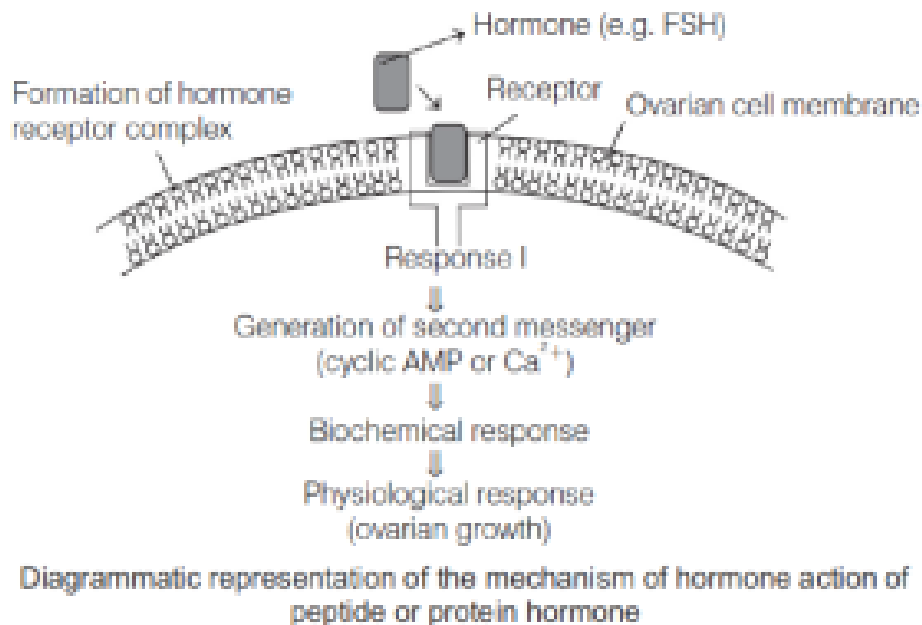
Answer 18: The thyroid gland is the largest endocrine gland of our body, endodermal in origin. It is bilobed and surrounds the front of the larynx. The lobes are located on either side of the neck's trachea and are interconnected by an isthmus.



Question 19.

- Give a diagrammatic representation of the mechanism of protein hormone action.
- Illustrate the difference between the mechanism of action of a protein and a steroid hormone.

Answer 19:



Protein hormones

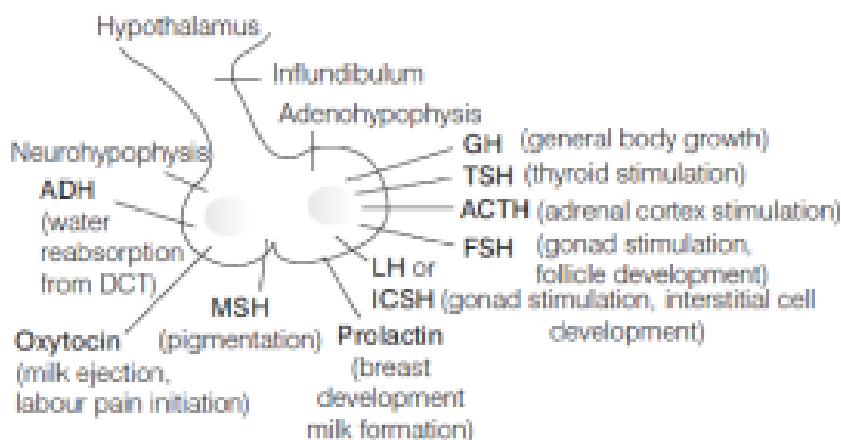
Steroid hormones

The interaction is with membrane-bound receptors.

The interaction is with the intracellular receptors.

The main function is to generate second messengers.	They regulate chromosomal function or genetic regulation by the interaction of hormone receptor complexes with the genome.
Regulation of cellular activities and metabolism	Responsible for physiological and developmental effects.
Water soluble in nature.	Lipid is soluble in nature.
An example includes cAMP	Examples include steroid hormones, iodothyronine, etc.

Question 20. Hypothalamus is a super master endocrine gland. Elaborate.



Pituitary hormones and their major hormones

Answer 20: Hypothalamus is responsible for regulating numerous body functions. It contains nuclei which are a group of neurosecretory cells. These nuclei produce hormones.

These hormones are responsible for the synthesis and secretion of pituitary hormones. There are two types of hormones produced by the hypothalamus. They are:

- The releasing hormone is responsible for the secretion of pituitary hormones.
- The inhibiting hormones are responsible for the inhibition of the secretion of pituitary hormones.

The hormones reach the pituitary gland through a portal circulatory system which regulates the functioning of the anterior pituitary. The posterior pituitary is under the direct regulation of the hypothalamus. The oxytocin and vasopressin are synthesised by the hypothalamus and are transported to the posterior pituitary.

The pituitary is the master gland of the endocrine system, but it is itself in control by the hormones released by the hypothalamus.

Question 21. state whether true or false

Pars distalis produce six trophic hormones.

B-lymphocytes provide cell-mediated immunity.

Insulin resistance results in a disease called diabetes mellitus.

Answer 21:

1. True
2. False.
3. True

Question 22. Write short notes on the functions of the following hormones.

Parathyroid hormone (PTH)

Thyroid hormones

Thymosins

Androgen

Estrogens

Insulin and glucagon

Answer 22:

1. Parathyroid hormone regulates calcium and phosphorus metabolism. It increases the level of calcium in the blood. It triggers the bone resorption process.
2. The function of thyroid hormones is:
 - Calcitonin is a hypocalcemic factor and decreases the amount of calcium in the blood.
 - Thyroxine regulates the basal metabolic rate and causes demineralization of bones. It also causes hyperglycemia by stimulating glycogenolysis and gluconeogenesis.
 - Triiodothyronine is responsible for thermoregulation of the body
1. Thymosin is produced by the thymus gland. Its functions are:
 - Produces lymphocytes which are related to immunity.
 - It stimulates the entire immune system.
 - It produces antibodies to provide humoral immunity.
 - It also differentiates T lymphocytes to trigger cell-mediated immunity.

1. The functions of Androgens are:

- Check the maturation and development of male accessory sex organs.
- The androgens stimulate puberty-associated changes in males and trigger the growth of muscles, facial and axillary hairs, etc.
- They act on the Central nervous system to influence male behaviour.
- Have anabolic effects on the metabolism of carbohydrates and proteins.
- Stimulate spermatogenesis.

1. Estrogen is responsible for

- The development of ovarian follicles and the female reproductive system.
- Regulates female sexual behaviour.
- Helps in the growth of the uterine endometrium layer during each menstrual cycle.
- Development of mammary glands.
- Stimulates the growth and activities of female secondary sex organs.

1. The functions of insulin are:

- Regulates glucose homeostasis.
- Bring about glycogenesis.
- Decrease gluconeogenesis.
- Decrease glycogenolysis
- Decrease catabolism of proteins and fats.
- Increase the synthesis of fat in the adipose tissues from fatty acids.

The functions of glucagon are:

- Glucagon maintains normal blood glucose levels.
- Trigger gluconeogenesis.
- Contribute to hyperglycemia.
- Reduces glycogenesis.
- Enhance lipolysis.

Question 23. Briefly mention the mechanism of action of FSH.

Answer 23: The mechanism of action of FSH is explained as

- FSH molecules bind to the receptor protein located on the surface of the cell and form a hormone-receptor complex.
- The complex formation releases the enzyme called adenylate cyclase.
- This enzyme forms cAMP (cyclic adenosine monophosphate) from the ATP in the cell from the receptor site. The step also requires the presence of magnesium ions.

- The hormone-receptor complex changes the permeability of the cell membrane to allow the passage of materials.
- Regulation of cellular activities.
- Generation of response.

Question 24. Write a note on the melanocyte-stimulating hormone.

Answer 24: Melanocyte stimulating hormone is produced by Pars intermedia of the pituitary gland. This hormone acts on the melanocytes and regulates the pigmentation of the skin. Hypersecretion of this hormone causes hyperpigmentation of the skin.

Question 25. A milkman is very upset one morning as his cow refuses to give any milk. The milkman's wife gets the calf from the shed. On fondling by the calf, the cow gives sufficient milk. Describe the role of the endocrine gland and the pathway associated with this response.

Answer 25: The fondling by the calf stimulates the release of oxytocin from the posterior pituitary. Milk is ejected from the mammary glands due to the contraction of the smooth muscles by the action of oxytocin.

Question 26. Explain the following

Exocrine gland

Endocrine gland

Hormones

Answer 26:

1. The exocrine gland pours its secretion on the surface or to a particular region by means of ducts. The example includes sebaceous glands, sweat glands, salivary glands, etc.
2. Endocrine glands are also known as ductless glands. They pour their secretion into the blood to reach the target organ.
3. Hormones are chemical substances acting as intracellular messengers. They are produced in trace amounts by the body.

Question 27. State the functions of adrenaline and noradrenaline

Answer 27: The function of these hormones are:

- They are the emergency hormones or the hormones of the fight or flight.
- Increase alertness
- Dilatation of pupil.

- Piloerection, which means the raising of hairs on hands and legs.
- Increase heartbeat.
- Increase rate of respiration.
- They increase the concentration of glucose in the blood by breaking down glycogen
- Stimulates the breakdown of lipids and proteins.

Question 28. What are the different types of hormones?

Answer 28: There are four different types of hormones based on their chemical nature. They are:

- Peptide, polypeptide and protein hormones. Examples include insulin, glucagon, pituitary hormones, hypothalamus hormones, etc.
- Steroid hormones include cortisol, testosterone, estrogen and progesterone.
- Iodothyronine includes thyroid hormones.
- Amino acid derivatives include epinephrine.

Question 29. What are the types of hormone receptors?

Answer 29: There are two types of hormone receptors namely membrane-bound receptors and intracellular receptors. Membrane-bound receptors are present on the surface of the target cells and intracellular receptors are present inside the nucleus of the target cell i.e nuclear receptor.

Question 30. Why in old age people there is a gradual weakening of the immune system?

Answer 30: In an old person, there is degeneration of the thymus gland which weakens the immune system. Thymosin produces cells involved in the immunity of the body. This gland is prominent at the time of birth but it atrophies in adults and with continued atrophy is degenerates in old age. The thymus gland is both a lymphatic organ and an endocrine gland.

Question 31. Why is adrenaline secreted by our body in the cold?

Answer 31: Adrenaline is produced in our body on exposure to cold. It causes vasoconstriction of the blood vessels and prevents heat loss. Shivering is the rhythmic contraction of the muscles to generate heat. On the other hand, adrenaline raises the metabolic rate by breaking down fats.

Question 32. Why is melatonin called an anti-ageing hormone?

Answer 32: Melatonin delays puberty so, it is called an anti-ageing hormone.

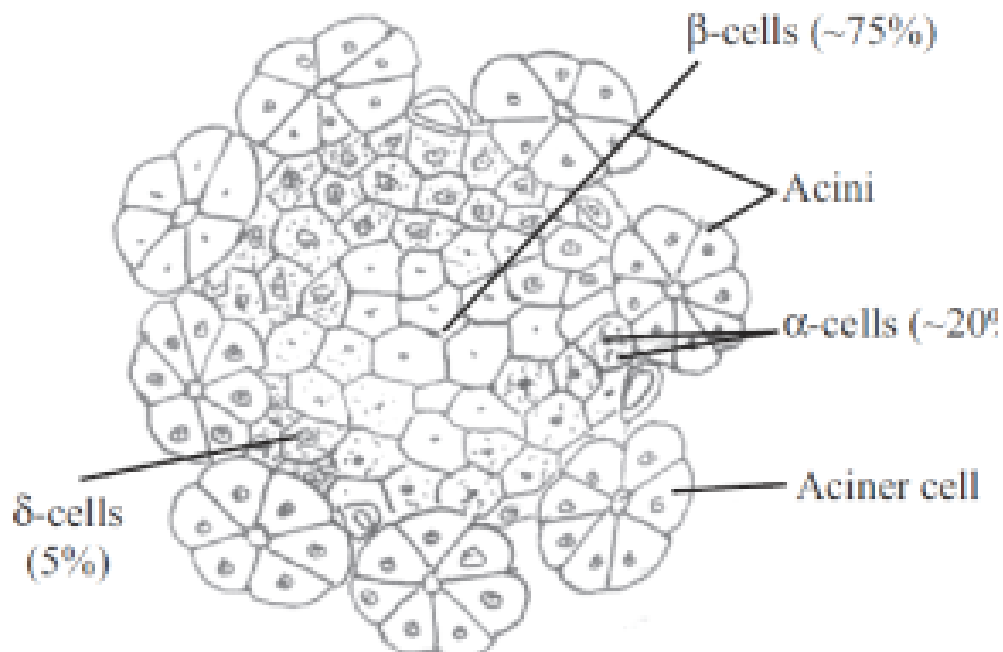
Question 33. Which endocrine gland is known as the biological clock and why?

Answer 33: The pineal gland is called the biological clock because it secretes melatonin. This gland receives photoperiod information via a neural circuit from the eyes. It maintains diurnal variation or the circadian rhythm in animals and decides the breeding season in them.

Question 34. Why is vasopressin called an anti-diuretic hormone?

Answer 34: Vasopressin acts on kidneys and thereby helps in water and electrolyte resorption preventing diuresis. The hyposecretion of vasopressin causes Diabetes insipidus.

Question 35. What are the different types of cells of the pancreas? Mention their hormonal function.



Answer 35: The endocrine part of the pancreas contains a large group of cells called Islets of Langerhans.

The islets of Langerhans have three types of cells:

- Alpha cells which constitute 10 -20 %
- Beta cells which constitute 70 – 80 %
- Delta cells constitute 5 %.

Alpha cells secrete glucagon hormone.

Beta cells secrete insulin.

Delta cells secrete somatostatin hormone also called growth hormone release inhibiting hormone. It acts as a paracrine factor to inhibit the secretion of alpha and beta cells. It also stimulates collagen formation.

Question 36. Write a note on insulin.

Answer 36: Insulin is secreted by beta cells of the pancreas. It contains zinc and sulfur. Insulin is a glycogenic hormone that causes glycogenesis. The glucose is converted to glycogen in the liver and muscle cells. It is a hypoglycemic factor and reduces the amount of glucose in the blood.

Insulin is lipogenic and aids in the synthesis of fat from glucose. The hyposecretion of glucose causes hyperglycemia which means increased glucose levels in the blood.

Question 37. Match the following:

T4	Hypothalamus
PTH	Thyroid
GnRH	Pituitary
LH	Parathyroid

Answer 37:

1. T4	1. Thyroid
1. PTH	1. Parathyroid
1. GnRH	1. Hypothalamus
1. LH	1. Pituitary

Question 38. Enumerate the hormonal disorder of the parathyroid gland.

Answer 38: Hyposecretion of PTH causes tetany, and hypersecretion causes osteoporosis.

