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## Important Questions for Class 11

### Biology

#### Chapter 22 – Chemical Coordination and Integration

1 Mark

**1. What are hormones?**

**Ans:** Hormones (endocrines) are the secretions of endocrine glands.

**2. Name the gland of emergency.**

**Ans:** The adrenal gland is the gland of emergency.

**3. Which gland secrete glucagon?**

**Ans:** Glucagon is secreted from the alpha cells of the pancreas (endocrine gland).

**4. Distinguish between diabetes mellitus and diabetes insipidus.**

**Ans:** The difference between diabetes mellitus and diabetes insipidus are:

<b>Diabetes Mellitus</b>	<b>Diabetes Insipidus</b>
Diabetes mellitus is caused due to a lesser amount of secretion of insulin by $\beta$ cells of the Islet of Langerhans in the pancreas.	Diabetes insipidus is caused due to a lesser amount of secretion of ADH (vasopressin) by the posterior pituitary gland.

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**5. Name the hormones of fight or flight.**

**Ans:** Adrenaline and noradrenaline (Catecholamine hormones) are the hormones of flight or fight.

**6. Name the hormone secreted from the outermost cellular layer of the adrenal cortex?**

**Ans:** Aldosterone, a mineralocorticoid, is secreted from the outermost cellular layer (Zona glomerulosa) of the adrenal cortex.

**7. What is the function of Leydig cells?**

**Ans:** Leydig cells (interstitial cells) of the testes secrete testosterone hormone. It stimulates the development of external male sex characters such as beards, moustaches, and low-pitched voices in men and stimulates the formation of sperm in the testis.

**8. Name the gland which secretes vasopressin.**

**Ans:** Vasopressin (Antidiuretic hormone or ADH) is secreted by the posterior part of the pituitary gland.

**9. Name one mineralocorticoid.**

**Ans:** Aldosterone, a mineralocorticoid, is secreted from the Zona glomerulosa of the adrenal cortex.

**10. Which two systems coordinate and regulate the physiological functions of our body?**

**Ans:** The two systems that coordinate and regulate the physiological functions of our body are the neural system and the endocrine system.

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**11. What is the role of melanocyte-stimulating hormone?**

**Ans:** Melanocyte stimulating hormone acts (MSH) on melanocytes and regulates pigmentation of the skin. It is important for protecting the skin from UV rays and controlling appetite.

**12. Name the hormones which act antagonistically in order to regulate calcium Levels in the blood.**

**Ans:** The hormones that act antagonistically to regulate calcium levels in the blood are: - Thyrocalcitonin (TCT) and Parathyroid hormone (PTH).

**13. Give the names of any one glucocorticoid and one mineralocorticoid.**

**Ans:** Cortisol and aldosterone are glucocorticoid and mineralocorticoid respectively.

**14. How does atrial natriuretic factor decrease blood pressure?**

**Ans:** Atrial natriuretic factor (ANF) decreases blood pressure by triggering blood vessel dilation and excretion of sodium in the urine.

**15. Which structure is formed from the ruptured follicles in females? What is its role?**

**Ans:** The corpus luteum is a yellowish body formed after ovulation by a ruptured Graafian follicle in females secreting progesterone.

**16. Immunity of old persons becomes very weak. Give a reason.**

**Ans:** The immunity of old persons becomes very weak because the thymus gland degenerates with age.

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**17. What happens if a person suffers from prolonged hyperglycemia?**

**Ans:** If a person suffers from prolonged hyperglycemia, they are affected by diabetes mellitus, which causes loss of glucose through urine and the formation of harmful ketone bodies.

**18. What are the two modes through which the hypothalamus causes the release of hormones by the pituitary gland?**

**Ans:** The two modes through which the hypothalamus causes the release of hormones by the pituitary gland are: -

- (i) Through hypothalamic neurons, they control the anterior pituitary gland.
- (ii) Through neural regulation, they control the posterior pituitary gland.

**2 Marks Questions****1. Differentiate between hormone and neurohormone?**

**Ans:** The difference between hormones and neurohormones are:

	<b>Hormone</b>	<b>Neurohormone</b>
(i)	Secreted by endocrine glands.	Secreted by neurosecretory cells.
(ii)	It stimulates the growth and metabolism of endocrine glands and body cells.	It stimulates the secretion of hormones by the pituitary.

**2. What are gonadotropins?**

**Ans:** The gonadotropins are the gonad stimulating hormones secreted by the anterior lobe of the pituitary. They regulate ovarian and testicular function and are necessary for normal growth, sexual development and reproduction. The human gonadotropins are follicle-stimulating hormone (FSH) and luteinizing hormone (LH).

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### **3. Why is oxytocin called a 'birth hormone'?**

**Ans:** The Oxytocin hormone is known as the "birth hormone" because it stimulates vigorous contraction of the smooth muscles of the uterus during childbirth. When the newly born baby is hungry, it also causes the mother to produce milk via the mammary glands and stimulates vigorous contractions during milk ejection from the mammary gland.

### **4. What usually can cause over secretion of parathormone in the human body? List any two effects on the body because of this hormone.**

**Ans:** A tumour (noncancerous growth or adenoma) on the parathyroid glands causes the over-secretion/hypersecretion of parathormone. Two effects on the body because of excess secretion of parathormone in humans are: -

- (i) Due to demineralization, the bones become deformed and are easily fractured (osteoporosis).
- (ii) If left untreated, it can lead to osteitis fibrosa cystica in humans (OFC).

### **5. What is the function of the pineal gland?**

**Ans:** The functions of the pineal gland are: -

- (i) It secretes a hormone called melatonin.
- (ii) It reduces reproductive activity and may also delay sexual development in an individual.
- (iii) It regulates the circadian rhythms (sleep patterns) of the body.

### **6. Explain the hormones of the kidney and GI tract.**

**Ans:** Kidney: - Juxtaglomerular cells of the kidney secrete a peptide hormone called erythropoietin. It stimulates erythropoiesis or the formation of RBCs in the blood.

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GI tract (Gastrointestinal tract): -The endocrine cells found in various parts of the gastro-intestine tract secrete 4 peptide hormones. These are Gastrin, secretin, cholecystokinin (CCK) and gastric inhibitory peptide or GIP.

**7. In general, how steroid hormones affect changes in their target cells.**

**Ans:** Steroid hormones are lipid-soluble. These quickly pass through the plasma membrane of a target cell and enter the cytoplasm. They bind to intracellular receptor proteins, leading to the formation of a complex. This complex enters the nucleus and binds to specific regulatory sites on the chromosomes. This binding modifies gene expression and continues to increase transcription of the same genes. It may suppress some other genes. Finally, RNA is involved in protein synthesis. Lipid soluble hormones are longer-lasting but slow in action.

**8. What is the corpus luteum? How does it function as an endocrine gland?**

**Ans:** The corpus luteum is a yellowish body formed after ovulation by a ruptured Graafian follicle in females. It is a temporary endocrine gland within the ovary. It secretes the hormone progesterone. It plays an integral role in the regulation of the menstrual cycle and early pregnancy.

**9. Name the gland that functions as a biological clock in our body where it is located? Name its one secretion.**

**Ans:** The pineal gland functions as a biological clock because it regulates the circadian rhythms (sleep patterns) of the body. It is situated on the dorsal side of the forebrain. It secretes a hormone called melatonin.

**3 Marks Questions**

**1. Describe the physiological functions and disorders of the thyroid gland.**

**Ans:** The thyroid gland is a ductless endocrine gland that is situated in the front part of the neck. It has a butterfly-like shape. The main function of the thyroid gland is to produce two hormones-(i) Tri-iodothyronine ( $T_3$ ) hormone and (ii) Tetra-

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iodothyronine or Thyroxine hormone ( $T_4$ ). Both hormones play a very important role in the body stimulating all metabolic activities.

A. Physiological functions of the thyroid gland: -

- The thyroid gland is essential for growth and development.
- Thyroid hormones control the oxidation of food substances (mainly carbohydrates and proteins).
- Thyroid hormones are also responsible for controlling the basal metabolic rate (BMR).
- The thyroid gland also secretes thyrocalcitonin (TCT), a protein hormone, which regulates the  $Ca^{++}$  level in the blood.
- It promotes the differentiation of tissues.
- It enhances protein synthesis in almost all tissues of the body.
- It promotes the metamorphosis of tadpoles into adult frogs.

B. Disorders of the thyroid gland: -

- (i) Goitre: - The under secretion (hyposecretion) of the thyroid leads to the enlargement of thyroid tissues. The neck protrudes in front as a collar known as endemic goitre.
- (ii) Hyperthyroidism: - It is a condition in which the thyroid gland produces excess thyroid hormones.
- (iii) Cretinism: - It is caused by extreme hypothyroidism in childhood and infancy. The symptoms include delayed growth (mental, bodily, and sexual), thickening of the skin and subcutaneous tissues, a potbelly, and a protruding tongue.
- (iv) Myxoedema (mucous swelling): - A condition caused by under secretion of the thyroid at the adult stage. The symptoms include dry, coarse skin, loss of hair, swelling of the face, slowed heart rate and lack of alertness.

**2. Write the full form of ADH and describe how it affects the functioning of kidney tubules.**

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**Ans:** The full form of ADH is an Antidiuretic Hormone (vasopressin).

It affects kidney tubules in the following ways: -

- (i) It regulates the volume and osmolarity of the urine.
- (ii) It controls how much water the kidneys excrete.
- (iii) It acts in the distal convoluted tubule (DCT), collecting tubule and collecting ducts (CD).
- (iv) It also regulates arterial blood pressure.

### 3. Differentiate between exocrine, endocrine and heterocrine glands.

**Ans:** The between exocrine, endocrine and heterocrine glands are: -

	<b>Exocrine Gland</b>	<b>Endocrine Gland</b>	<b>Heterocrine Gland</b>
(i)	It has a duct.	It is a ductless gland.	It is partly endocrine and partly exocrine.
(ii)	The ducts transport their secretions to the internal organs or the surface of the body.	Their secretions are transported to the target organs by the blood	The endocrine part releases hormones into the bloodstream while the exocrine part into ducts associated with it.
(iii)	Example: Salivary gland in mouth, lacrimal glands, digestive glands, mammary glands.	Example: Parathyroid, thyroid, pituitary and adrenal glands.	Example: Pancreas, ovary and testis.

### 4. Name the $T_3$ and $T_4$ components of thyroid hormone. Explain their specific function.



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**Ans:** Thyroxin or tetra-iodothyronine is the  $T_4$  component of thyroid hormone and has 4 atoms of iodine. Tri-iodothyronine is the  $T_3$  component of thyroid hormone and has 3 atoms of iodine.  $T_4$  and  $T_3$  have identical effects on target cells. They are called together TH (Thyroid hormone)

Specific functions of tetra-iodothyronine and triiodothyronine are:

- (i) They regulate basal metabolic rate (BMR).
- (ii) They play a major role in the metabolism of carbohydrates, proteins and fats.
- (iii) They are essential for growth and development.
- (iv) They help in the metamorphosis of frogs.

### 5. Differentiate between vitamins, hormones and enzymes.

**Ans:** The difference between vitamins, hormones and enzymes are:

	<b>Vitamin</b>	<b>Hormone</b>	<b>Enzymes</b>
(i)	It is carried in the food.	It is carried by blood.	It is not carried by blood.
(ii)	It is used up during the process.	It is used up during the metabolic reaction.	It remained unchanged after the reaction.
(iii)	It is obtained from food.	It is secreted by an endocrine gland.	It is formed by the exocrine gland.
(iv)	It may be an organic acid, amide, amine, ester, alcohol or steroid.	It may be a glycoprotein, steroid or polypeptide.	It is always proteinaceous.

(v)	It acts as a coenzyme.	It acts as a stimulating substance.	It acts as a biocatalyst.
(vi)	Its deficiency causes deficiency diseases.	Its excess, as well as deficiency, causes many hormonal disorders and diseases.	It is required in a small amount.

**6. A patient was complaining of frequent urination, excessive thirst, hunger and tiredness. His fasting glucose level was found higher than 130mg / dL on two occasions:**

**(i) Name the disease.**

**(ii) Give the root cause of this disease.**

**(iii) Explain why the blood glucose level is higher than 130mg / dL .**

**Ans:**

(i) The person is suffering from the disease diabetes mellitus.

(ii) Root cause of this disease: - The failure of the  $\beta$ cells of the islets of Langerhans of the pancreas to produce adequate amounts of insulin.

(iii) Due to the lack of secretion of insulin the blood glucose level is higher than 130mg / dL .

### 5 Marks Questions

**1. Name the hormone that regulates each of the following and mention the source of it.**

**1) Urinary elimination of water.**

**2) Storage of glucose as glycogen.**

**3)  $\text{Na}^+$  and  $\text{K}^+$  metabolism.**

**4) Basal metabolic rate.**

**5) Descent of testes into scrotum.**

**Ans:**

	<b>Activity</b>	<b>Hormone</b>	<b>Source</b>
1)	Urinary elimination of water	Anti Diuretic Hormone (ADH)	Posterior pituitary
2)	Storage of glucose as glycogen	Insulin Glucagon	Islets of Langerhans
3)	Na <sup>+</sup> and K <sup>+</sup> metabolism	Aldosterone	Adrenal cortex
4)	Basal Metabolic Rate	Thyroxine or tetra-iodothyronine ( T <sub>4</sub> ) and Triiodothyronine ( T <sub>3</sub> )	Thyroid Gland
5)	Descends of the testis into the scrotum	Follicle Stimulating Hormone (FSH)	Anterior pituitary

**2. Explain the hormones of the adrenal gland and their action on target tissue in a tabular form.**

**Ans:** The hormones of the adrenal gland and their action on target tissue in a tabular form are:

	<b>Hormones of the adrenal gland</b>	<b>Principal Action</b>	<b>Target tissue</b>
1)	Mineralocorticoids (Aldosterone)	(i) They regulate electrolytes, osmotic pressure, blood pressure and body fluid volume.	Kidney tubules

		<p>(ii) It stimulates the reabsorption of <math>\text{Na}^+</math> and water.</p> <p>(iii) It eliminates the <math>\text{K}^+</math> and phosphate ions.</p>	
2)	Glucocorticoids (cortisol, corticosterone & cortisone)	<p>(i) They raise blood glucose levels.</p> <p>(ii) They promote gluconeogenesis (formation of glucose), lipolysis (breakdown of lipids) and proteolysis (the breakdown of plasma proteins).</p> <p>(iii) They increase the availability of amino acids for enzyme synthesis by the liver and general resistance in the long term.</p> <p>(iv) Stimulates anti-inflammatory and allergic responses</p> <p>(v) Suppresses immune responses (antibody production).</p>	Liver
3)	Gonadocorticoids (Androgens and oestrogens)	<p>(i) They are secreted by adults in low concentrations.</p> <p>(ii) Their effects are usually insignificant.</p> <p>(iii) They stimulate the development of secondary sexual characteristics, such as the growth of facial hair, pubic hair and axial hair, especially in males.</p>	Gonads

4)	Adrenaline	<p>(i) Rise in blood pressure.</p> <p>(ii) Increases the rate of heartbeat, constriction of skin and visceral/smooth muscle, dilation of arterioles of heart and skeleton.</p> <p>(iii) Stimulates the breakdown of lipids and proteins.</p> <p>(iv) Increases in oxygen consumption.</p> <p>(v) Erection of hairs (piloerection) and dilation of pupils.</p> <p>(vi) They initiate stress responses.</p>	Skeletal muscles, fat cells, cardiac muscles, smooth muscles, blood vessels.
5)	Noradrenaline hormones	It stimulates reactions similar to those produced by adrenaline.	Same as adrenaline

### 3. Explain the mechanism of hormone action.

**Ans:** Mechanism of Hormone Action: - The mechanism of hormone action in the human body is grouped into two categories:

A. Fixed membrane receptor mechanism

B. Mobile receptor mechanism

A. Fixed membrane receptor mechanism:

(i) This type of mechanism is exhibited by the water-soluble hormones such as the growth hormone, oxytocin, ADH, etc., made up of amines or proteins.

(ii) These hormones are unable to penetrate through the lipid membrane. These hormones bind to their target receptor present on the cell membrane.

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(iii) The enzyme adenylyl cyclase in the cell membrane is activated when the hormone binds to the specific target receptor. This aids in the synthesis of cyclic AMP (cAMP).

(iv) Cyclic AMP (cAMP) acts as a secondary messenger. It diffuses through the cell membrane and causes biochemical changes by activating various enzyme activities.

#### B. Mobile Receptor Mechanism:

(i) Lipid soluble hormones, such as fatty acids and steroids, exhibit this type of mechanism because they can easily pass through the plasma membrane.

(ii) They have intracellular receptors. Hormones bind to the target receptor, which activates the enzymatic activity of cells and causes biochemical changes.

(iii) The hormone-receptor complex initiates DNA transcription.

(iv) The mRNA is converted into protein. This protein alters the biochemistry of the cell.

# ACTION OF FSH

