# CHAPTER -12 THE ENDOCRINE SYSTEM

## Progress Check 1

### Question 1

Fill in the blanks by selecting the appropriate alternative from those given in brackets.

(i) Regulation of activities inside the body are brought about by ..... and ..... systems. (nervous/digestive/endocrine)

(ii) Hormones are secreted directly into the ..... . (organs/lymph/blood)

(iii) Chemically, some hormones are ..... , some steroids, some ..... . (proteins/amines/carbohydrates)

(iv) Both ..... or deficiency of hormones lead to serious consequences. (excess/absence)

(v) Hormones produced in one species usually show ..... influence in other species. (similar/different)

***Answer***

(i) Regulation of activities inside the body are brought about by ***nervous*** and ***endocrine*** systems.

(ii) Hormones are secreted directly into the ***blood***.

(iii) Chemically, some hormones are ***proteins***, some steroids, some ***amines***.

(iv) Both ***excess*** or deficiency of hormones lead to serious consequences.

(v) Hormones produced in one species usually show ***similar*** influence in other species.

### Question 2

Give the characteristics of hormones pertaining to

(i) Site of action

(ii) Chemical nature

(iii) Manner of transportation.

***Answer***

(i) Site of action for hormones is their target organ or cells.

(ii) Hormones are either protein, amines or steroids.

(iii) Hormones are poured into blood by the glands and are transported through blood.

## Progress Check 2

### Question 1

Mention the three types of cells of the islets of Langerhans and the name of the hormone they secrete.

***Answer***

The three types of cells of islets of Langerhans and hormones secreted by them are:

1. Beta cells — insulin
2. Alpha cells — glucagon
3. Delta cells — somatostatin

**Question 2**

Mention the two principal ways in which insulin acts :

***Answer***

1. It promotes glucose utilisation by the body cells, thereby reducing the blood sugar level.
2. It stimulates deposition of extra glucose of the blood as glycogen in liver and muscles.

**Question 3**

Name the following conditions :

(i) Passage of much glucose in urine

(ii) Overdose of insulin makes the diabetic patient unconscious

***Answer***

(i) Diabetes mellitus

(ii) Insulin Shock

**Question 4**

List any three symptoms of diabetes mellitus.

***Answer***

Three symptoms of diabetes mellitus are:

1. High concentration of sugar in blood.
2. Excretion of more urine loaded with sugar.
3. Increased thirst due to loss of water through too much urination.

**Question 5**

Name the two categories of hormones secreted by adrenal cortex.

***Answer***

1. Glucocorticoids.

2. Sex corticoids.

**Question 6**

List any two effects of adrenaline.

***Answer***

Two effects of adrenaline are:

1. Thumping heart
2. Dry mouth

**Progress Check 3**

**Question 1**

Fill in the blanks with the correct alternative :

(i) Thyroid is located close to ..... (larynx/kidney).

(ii) Cretinism is caused due to ..... of thyroxin. (undersecretion/oversecretion)

(iii) Over-secretion of thyroxin causes ..... goitre. (simple/exophthalmic)

(iv) The condition showing swelling in face and hands and sluggishness due to hypothyroidism is called ..... (cretinism/myxoedema).

(v) The hormone concerned with facing dangers is ..... (thyroxine/cortisone/adrenaline).

(vi) Cortex and medulla are the two regions of ..... (thyroid/adrenal).

(vii) One of the effects of increased secretion of adrenaline is ..... . (Dry mouth / slowing of heart beat / arterioles of the digestive system dilate)

***Answer***

(i) Thyroid is located close to ***larynx***.

(ii) Cretinism is caused due to ***undersecretion*** of thyroxin.

(iii) Over-secretion of thyroxin causes ***exophthalmic*** goitre.

(iv) The condition showing swelling in face and hands and sluggishness due to hypothyroidism is called ***myxoedema***.

(v) The hormone concerned with facing dangers is ***adrenaline***.

(vi) Cortex and medulla are the two regions ***adrenal***.

(vii) One of the effects of increased secretion of adrenaline is ***Dry mouth***.

## Progress Check 4

**Question 1**

Mention if the following statements are true (T) or false (F). If false, rewrite the correct word (not words) striking out the single wrong one.

(i) Pituitary is of the size of a lemon.

(ii) Pituitary has three lobes — anterior, posterior and intermediate.

(iii) Oversecretion of growth hormone in adult causes gigantism.

(iv) Vasopressin secreted by anterior lobe controls reabsorption of water form kidney tubules.

***Answer***

(i) False
**Corrected Statement** — Pituitary is of the size of a ***pea***.

(ii) True

(iii) False
**Corrected Statement** — Oversecretion of growth hormone in an adult causes ***acromegaly***.

(iv) False
**Corrected Statement** — Vasopressin secreted by ***posterior*** lobe controls reabsorption of water form kidney tubules.

**Question 2**

Write the full forms of:

(i) TSH

(ii) LH

(iii) ACTH

(iv) ADH

***Answer***

(i) TSH — Thyroid Stimulating Hormone

(ii) LH — Luteinizing Hormone

(iii) ACTH — Adrenocorticotropic Hormone

(iv) ADH — Antidiuretic Hormone

**Question 3**

What causes the following?

(i) Acromegaly

(ii) Diabetes insipidus

***Answer***

(i) Oversecretion of growth hormone in adults causes acromegaly.

(ii) Deficiency of ADH causes diabetes insipidus.

**Multiple Choice Type**

**Question 1**

Which of the following is not an endocrine gland?

1. Adrenal gland
2. Pituitary gland
3. Thyroid gland
4. Sebaceous gland

***Answer***

Sebaceous gland

**Reason** — Sebaceous gland is present in skin and secretes oily sebum.

**Question 2**

Which of the following hormones stimulates milk secretion?

1. Prolactin
2. Oxytocin
3. Progesterone
4. Calcitonin

***Answer***

Prolactin

**Reason** — Prolactin is responsible for formation and secretion of milk.

**Question 3**

Oxytocin stimulates the contraction of:

1. Ovary
2. Ureter

3. Uterus
4. Breast

***Answer***

Uterus

**Reason** — Oxytocin stimulates the contraction of uterus during child birth.

**Question 4**

Hypersecretion of growth hormone causes :

1. Gigantism and Dwarfism
2. Acromegaly and Dwarfism
3. Gigantism and Acromegaly
4. Dwarfism and Virilism

***Answer***

Gigantism and Acromegaly

**Reason** — Hypersecretion of growth hormone in young age causes gigantism while in adults it causes acromegaly.

**Question 5**

A gland which secretes enzymes and hormones both is :

1. Adrenal
2. Pancreas
3. Thyroid
4. Pituitary

***Answer***

Pancreas

**Reason** — Pancreas secretes digestive juices as well as hormones like insulin and glucagon.

**Question 6**

Insulin is secreted by :

1. β-cells of Pancreas
2. δ-cells of Pancreas
3. α-cells of Pancreas

4. γ-cells of Pancreas

***Answer***

β-cells of Pancreas

**Reason** — β-cells of islet of Langerhans in Pancreas secrete insulin.

**Question 7**

Islets of Langerhans are located in the :

1. Kidneys
2. Liver
3. Throat
4. Pancreas

***Answer***

Pancreas

**Reason** — Islets of Langerhans are small group of cells present in pancreas.

**Question 8**

Exophthalmic goitre is caused due to the over activity of

1. Thymus
2. Thyroid
3. Parathyroid
4. Adrenal cortex

***Answer***

Thyroid

**Reason** — Over activity of thyroid leads to over secretion of thyroxine which further results in exophthalmic goitre.

**Question 9**

The hormone which causes stimulation of sympathetic nervous system is:

1. Thyroxine
2. Insulin
3. Prolactin
4. Adrenaline

***Answer***

Adrenaline

**Reason** — Adrenaline causes stimulation of sympathetic nervous system and prepares body for any emergency.

**Question 10**

The hormone which stimulates the breakdown of glycogen in the liver to glucose is:

1. Glucagon
2. Somatostatin
3. Insulin
4. None of these

***Answer***

Glucagon

**Reason** — Glucagon is responsible for breakdown of glycogen in the liver to glucose. It increases the level of glucose in blood.

**Question 11**

John tried to match the hormones with the disorders caused due to their hyposecretion. He tabulated the pairs as follows:

| **Hormones** | **Disorders caused due to hyposecretion** |
|---|---|
| P | Diabetes mellitus |
| Q | Diabetes insipidus |

Identify the correct pairs of hormones.

1. P - Insulin, Q - Vasopressin
2. P - Prolactin, Q - Insulin
3. P - Insulin, Q - Glucagon
4. P - Thyroxine, Q - Adrenaline

***Answer***

P - Insulin, Q - Vasopressin

**Reason**

The function of insulin is to regulate blood sugar levels and its hyposecretion causes diabetes mellitus (high blood sugar). The function of vasopressin is to help kidney in reabsorption of water and its hyposecretion causes diabetes insipidus.

**Assertion Reason type**

**Question 12**

**Assertion.** Hormones are the secretions from some glandular parts of the body which regulate certain physiological processes by chemical means.

**Reason.** Hormones are directly poured into the target organs which are usually very close to the source/gland secreting the hormones.

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**
Hormones are directly poured into the blood. The blood transports it to the target organ.

**Question 13**

**Assertion.** Adrenal medulla secretes glucocorticoids which regulate glucose levels of the blood.

**Reason.** Glucocorticoids, a kind of cortisone, stimulate the deposition of extra glucose in blood as glycogen in the liver and muscles. The roles of insulin and glucocorticoids are the same.

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***

Both A and R are False.

**Explanation**
Adrenal cortex secretes glucocorticoids which regulate glucose levels of the blood. Glucocorticoids help regulate blood glucose levels by promoting gluconeogenesis.

**Question 14**

**Assertion.** Oversecretion of insulin causes hyperglycemia or diabetes mellitus.

**Reason.** Oversecretion of insulin can lead to hypoglycemia by causing excessive uptake of glucose from the blood into the cells, which in turn can lead to increased insulin resistance and ultimately result in hyperglycemia or diabetes mellitus.

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**
Under-secretion of insulin causes hyperglycemia or diabetes mellitus.

**Question 15**

**Assertion.** Cretinism is a condition which affects adults causing dwarfism and mental retardation.

**Reason.** Cretinism is a kind of hypothyroidism. This disease occurs due to the defective development, or early atrophy (degeneration), of the thyroid.

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**
Cretinism is a condition which affects children causing dwarfism and mental retardation. The thyroid gland degenerates in early childhood.

**Very Short Answer Type**

**Question 1**

**Name the following:**

(a) The hormone produced by adrenal medulla.

(b) The condition caused by the over secretion of insulin.

(c) The hormone secreted by β (beta) cells of the islets of Langerhans.

(d) The interconnection between the two lobes of thyroid gland (technical term).

(e) The hormone whose under secretion causes more urine formation.

(f) The hormone which stimulates the entire sympathetic nervous system.

***Answer***

(a) Adrenaline

(b) Hypoglycemia

(c) Insulin

(d) Isthmus

(e) Anti-diuretic hormone (Vasopressin)

(f) Adrenaline

**Question 2**

What would a child suffer from, if there was hyposecretion from his thyroid?

***Answer***

If there was hyposecretion of the thyroid gland in a child, the child will suffer from cretinism. The symptoms of cretinism are dwarfism, mental retardation, etc.

**Question 3**

Choose the odd one out from each series and write the category of the remaining terms:

(a) Simple goitre, Cretinism, Pellagra, Myxoedema

(b) Alpha cells, Beta cells, Gamma cells, Delta cells

(c) Somatotropin, Prolactin, Oxytocin, Luteinizing hormone

(d) Thyroid, Pituitary, Prostate, Parathyroid

(e) Thyroxine, Insulin, Thiamine, Glucagon

***Answer***

(a) **Odd term**: Pellagra
**Category**: Diseases caused due to hypothyroidism

(b) **Odd term**: Gamma cells
**Category**: Islet of Langerhans

(c) **Odd term**: Oxytocin
**Category**: Hormones secreted by anterior part of pituitary gland

(d) **Odd term**: Prostate
**Category**: Endocrine glands

(e) **Odd term**: Thiamine (It is a vitamin)
**Category**: Hormones

**Question 4**

**Write full forms of the following abbreviations:**

(a) **ACTH**

(b) **TSH**

(c) **ADH**

(d) **LH**

(e) **FSH**

***Answer***

(a) **ACTH** — Adrenocorticotropic Hormone

(b) **TSH —** Thyroid Stimulating Hormone

(c) **ADH** — Antidiuretic Hormone

(d) **LH** — Luteinizing Hormone

(e) **FSH** — Follicle Stimulating Hormone

**Question 5**

Identify the odd one in each of the following and mention what the rest are:

(a) Larynx; glucagon; testosterone; prolactin

(b) Adrenaline; penicillin; insulin; thyroxine

(c) Stomach; ileum; liver; adrenaline

(d) TSH; GH; ADH; insulin

(e) Iodine; cretinism; goitre; myxoedema

***Answer***

(a) **Larynx** is the odd one here because glucagon; testosterone and prolactin are **hormones** whereas **Larynx is the sound box**.

(b) **Penicillin** is the odd one here because adrenaline; insulin; thyroxine are **hormones** whereas **Penicillin is an antibiotic**.

(c) **Adrenaline** is the odd one here because stomach, ileum and liver are the **organs of the digestive system** whereas **Adrenaline is a hormone**.

(d) **Insulin** is the odd one here because TSH, GH, ADH are the **hormones** secreted by the pituitary gland whereas **Insulin is secreted by the pancreas**.

(e) **Iodine** is the odd one here because cretinism, goitre, myxoedema are the conditions which occur due to **undersecretion of thyroxine** (Hypothyroidism) whereas **Iodine is required for the synthesis of thyroxine hormone**.

**Question 6**

Match the terms given in column A with those in column B.

| **Column A** | **Column B** |
|---|---|
| (a) Adrenaline | (i) Hypoglycemia |
| (b) Adrenal virilism | (ii) Hyperglycemia |
| (c) Addison's disease | (iii) Mental retardation |
| (d) Acromegaly | (iv) Eyes are protruded |
| (e) Cushing's syndrome | (v) Excessive growth of bones in face |
| | (vi) Emergency hormone |
| | (vii) Masculine characters |

***Answer***

| **Column A** | **Column B** |
|---|---|
| (a) Adrenaline | (vi) Emergency hormone |
| (b) Adrenal virilism | (vii) Masculine characters |
| (c) Addison's disease | (i) Hypoglycemia |
| (d) Acromegaly | (v) Excessive growth of bones in face |
| (e) Cushing's syndrome | (ii) Hyperglycemia |

**Question 7**

Given below are group of terms. In each group the first pair indicates the relationship between the two terms. Suggest the suitable word(s) for the fourth place.

(a) Beta cells : Insulin :: Alpha cells : ..... .

(b) Children : Cretinism :: Adults : ..... .

(c) Undersecretion : Dwarfism :: Oversecretion : ..... .

(d) Diabetes mellitus : Insulin :: Diabetes insipidus : ..... .

***Answer***

(a) Beta cells : Insulin :: Alpha cells : ***Glucagon***.

(b) Children : Cretinism :: Adults : ***Myxoedema***.

(c) Undersecretion : Dwarfism :: Oversecretion : ***Gigantism***.

(d) Diabetes mellitus : Insulin :: Diabetes insipidus : ***Antidiuretic hormone (ADH)***.

**Short Answer Type**

**Question 1**

Mention the name of diseases based on the clues/ symptoms given below:

(a) Urine is loaded with sugar.

(b) Swelling in the neck.

(c) Dwarfism and mental retardation in children.

(d) Eyes are protruded.

(e) Excessive growth of bones in the face, hands and feet.

***Answer***

(a) Hyperglycemia

(b) Simple goitre

(c) Cretinism

(d) Exophthalmic goitre

(e) Acromegaly in adults and gigantism in children.

**Question 2**

Write the exact location of each of the following glands:

(a) Thyroid

(b) Adrenal

(c) Pancreas

(d) Pituitary

***Answer***

(a) **Thyroid** — It is situated in the front part of the neck just below the larynx.

(b) **Adrenal** — It is present as a cap on the top of each kidney.

(c) **Pancreas** — It is located behind the stomach in the upper left abdomen.

(d) **Pituitary** — It hangs from the base of the mid-brain below the hypothalamus.

**Question 3**

Name the following:

(a) Three hormones secreted from Islets of Langerhans of pancreas.

(b) Two types of cortical hormones.

(c) Six hormones secreted from anterior pituitary.

(d) Two hormones secreted from posterior pituitary.

(e) The emergency hormone.

(f) Diseases caused due to hypothyroidism.

(g) Symptoms of cretinism.

(h) Abnormalities caused due to hypersecretion of growth hormone.

***Answer***

(a) Three hormones secreted from islets of Langerhans of pancreas are —

1. Insulin
2. Glucagon
3. Somatostatin

(b) Two types of cortical hormones are —

1. Glucocorticoids
2. Mineralocorticoids

(c) Six hormones secreted from anterior pituitary are —

1. Growth hormone (somatostatin)

2. Prolactin
3. Adreno-corticotropic hormone (ACTH)
4. Thyroid stimulating hormone (TSH)
5. Follicle stimulating hormone (FSH)
6. Luteinizing hormone (LH)

(d) Two hormones secreted from posterior pituitary are —

1. Antidiuretic hormone (ADH) or Vasopressin
2. Oxytocin

(e) The emergency hormone is —

1. Adrenaline

(f) Diseases caused due to hypothyroidism —

1. Simple goitre
2. Cretinism
3. Myxoedema

(g) Symptoms of cretinism —

1. Mental retardation
2. Dwarfism

(h) Abnormalities caused due to hypersecretion of growth hormone

1. Gigantism
2. Acromegaly

**Question 4**

Write the main function of each of the following hormones.

| **Hormones** | **Functions** |
|---|---|
| (a) Thyroxine | ..... |
| (b) Adrenaline | ..... |
| (c) Insulin | ..... |

| Hormones | Functions |
|---|---|
| (d) Glucagon | ..... |
| (e) Vasopressin | ..... |

***Answer***

| Hormones | Functions |
|---|---|
| (a) Thyroxine | Promotes tissue metabolism, growth and differentiation. |
| (b) Adrenaline | Causes stimulation of sympathetic nervous system. Prepares body for any emergency. |
| (c) Insulin | Reduces the blood sugar level. |
| (d) Glucagon | Increases the blood sugar level. |
| (e) Vasopressin | Increases reabsorption of water from kidneys, contraction of blood vessels causing rise in blood pressure. |

**Question 5**

Name the hormones responsible for the given functions.

| Functions | Hormones |
|---|---|
| (a) Contraction of uterine muscles during child birth | ..... |
| (b) Maintenance of corpus luteum | ..... |
| (c) Milk formation and secretion | ..... |
| (d) Development of external sex characters in males | ..... |
| (e) Stimulation of sympathetic nervous system | ..... |

***Answer***

| Functions | Hormones |
|---|---|
| (a) Contraction of uterine muscles during child birth | Oxytocin |
| (b) Maintenance of corpus luteum | Luteinizing hormone (LH) |
| (c) Milk formation and secretion | Prolactin |
| (d) Development of external sex characters in males | Testosterone |
| (e) Stimulation of sympathetic nervous system | Adrenaline |

**Question 6**

If you stand to make your maiden speech before a large audience, your mouth dries up and heart rate increases. What brings about these changes?

***Answer***

When we stand to make our maiden speech before a large audience, our mouth dries up and heart rate increases and it is due to secretion of adrenaline hormone by adrenal glands. Adrenaline is the hormone which prepares the body to meet any emergency situation. Adrenaline makes the heart beat faster. At the same time, it stimulates the constriction of the arterioles of the digestive system reducing the blood supply of the digestive system which makes the mouth dry.

**Question 7**

Given below is a table designed to give the names of the glands, the hormones produced, their chief functions, the effects of over secretion and under secretion in respect of thyroid, pituitary and pancreas. Fill up the blanks 1-13.

| S.No. | Source Gland cells | Hormone produced | Chief function | Effect of oversecretion | Effect of undersecretion |
|---|---|---|---|---|---|
| 1. | (1) ..... | Thyroxine | (2) ..... | (3)..... | (4)..... |
| 2. | Beta cells of Islets of Langerhans | (5) ..... | Promotes glucose utilisation by the body cells | (6) ..... | (7) ..... |

| S.No. | Source Gland cells | Hormone produced | Chief function | Effect of oversecretion | Effect of undersecretion |
|---|---|---|---|---|---|
| 3. | (8) ..... | Growth hormone | (9) ..... | (10) ..... | Dwarfism |
| 4. | (11)..... | Vasopressin | Increases reabsorption of water from kidney tubules | (12) ..... | (13) ..... |

***Answer***

| S.No. | Source Gland cells | Hormone produced | Chief function | Effect of over secretion | Effect of under secretion |
|---|---|---|---|---|---|
| 1. | ***Thyroid*** | Thyroxine | ***Regulates basal metabolism*** | ***Exophthalmic goiter*** | ***Simple goiter, cretinism in children and myxoedema in adults*** |
| 2. | Beta cells of Islets of Langerhans | ***Insulin*** | Promotes glucose utilization by the body cells | ***Hypoglycemia*** | ***Diabetes mellitus*** |
| 3. | ***Anterior pituitary*** | Growth hormone | ***Promotes growth of the whole body*** | ***Gigantism*** | Dwarfism |
| 4. | ***Posterior pituitary*** | Vasopressin | Increases reabsorption of water from kidney tubule | ***More concentrated and less amount of urine,*** | ***Diabetes insipidus*** |

| S.No. | Source Gland cells | Hormone produced | Chief function | Effect of over secretion | Effect of under secretion |
|---|---|---|---|---|---|
| | | | | ***Elevation of blood pressure*** | |

**Question 8**

Complete the following table by filling in the blanks numbered 1 to 7.

| Gland | Hormone secreted | Effect on body |
|---|---|---|
| (1) ..... | (2) ..... | Regulates basal metabolism |
| Pancreas ("beta" cells) | (3) ..... | Controls blood sugar |
| (4) ..... | (5) ..... | Increases heart beat |
| (6) ..... | Thyroid stimulating hormone | (7)..... |

***Answer***

| Gland | Hormone secreted | Effect on body |
|---|---|---|
| ***Thyroid*** | ***Thyroxine*** | Regulates basal metabolism |
| Pancreas ("beta" cells) | ***Insulin*** | Controls blood sugar level |
| ***Adrenal gland*** | ***Adrenaline*** | Increases heart beat |
| ***Anterior pituitary*** | Thyroid stimulating hormone | ***Stimulates thyroxine secretion*** |

**Question 9**

Complete the following table by filling in the blank spaces numbered 1 to 8.

| Gland | Secretions | Effect on body |
|---|---|---|
| (1) ..... | Oestrogen | (2) ..... |
| Alpha cells of islets of Langerhans | (3) ..... | (4) ..... |
| (5) ..... | (6) ..... | Protruding eyes |
| (7) ..... | (8) ..... | Gigantism |

***Answer***

| Gland | Secretions | Effect on body |
|---|---|---|
| ***Ovary*** | Oestrogen | ***Development of secondary sexual characteristics*** |
| Alpha cells of islets of Langerhans | ***Glucagon*** | ***Raises blood sugar level*** |
| ***Thyroid*** | ***Hypersecretion of thyroxine*** | Protruding eyes |
| ***Anterior pituitary*** | ***Hypersecretion of Growth hormone*** | Gigantism |

**Descriptive Type**

**Question 1**

Define the following terms:

(a) Endocrine system

(b) Hormones

(c) Myxoedema

***Answer***

(a) **Endocrine system** — Endocrine system consists of several endocrine glands/glandular cells which activate each other and work as a system to bring about overall chemical coordination in the body.

(b) **Hormones** — Hormone is a secretion from some glandular part of the body, which is poured directly into blood and which acts on the target organs or cells of the same individual, bringing about coordination between distant parts of the body.

(c) **Myxoedema** — Myxoedema is a condition which occurs in adults due to hypothyroidism in which the person becomes sluggish with swelling of the face and hands.

**Question 2**

**Distinguish between the following pairs:**

(a) Exocrine and endocrine glands (secretory substance and example)

(b) Enzymes and hormones (mode of transport and target organ)

(c) Nervous control and hormonal control (transmission and effect)

(d) Diabetes mellitus and diabetes insipidus (cause and symptoms)

(e) Addison's disease and Cushing's syndrome (cause and sugar level)

***Answer***

(a) Difference between exocrine and endocrine glands (secretory substance and example):

| **Exocrine glands** | **Endocrine glands** |
|---|---|
| Exocrine glands secrete their products like sweat, enzyme, mucus, sebum, saliva, milk, etc. into ducts. | Endocrine glands secrete their products, known as hormones, directly into the bloodstream. |
| Examples of exocrine glands are Sweat glands, Salivary glands, Sebaceous glands, etc. | Examples of endocrine glands are Thyroid, Pituitary, Adrenal, Pancreas. |

**(b) Difference between enzymes and hormones (mode of transport and target organ):**

| **Enzymes** | **Hormones** |
|---|---|
| Enzymes function intracellularly or within the confines of specific organs. They are not released into the bloodstream. | Hormones are released into the bloodstream by endocrine glands. |
| Enzymes do not have target organs. Instead, they act on their substrates at the cellular level and are highly specific for the reactions they catalyze. | Hormones have specific target organs or tissues usually away from their source. |

**(c) Difference between nervous control and hormonal control (transmission and effect):**

| Nervous control | Hormonal control |
|---|---|
| Effect is only short-lived. | Effect is short term or long lasting. |
| Transmitted electro-chemically through nerve fibres and chemically across synapses. | Transmitted chemically through blood. |

**(d) Difference between diabetes mellitus and diabetes insipidus (cause and symptoms):**

| Diabetes mellitus | Diabetes insipidus |
|---|---|
| Caused due to insufficient secretion of insulin. | Caused due to insufficient secretion of anti-diuretic hormone (ADH) |
| High concentration of sugar in blood. | No sugar in urine |

**(e) Difference between Addison's disease and Cushing's syndrome (cause and sugar level):**

| Addison's disease | Cushing's syndrome |
|---|---|
| Caused due to hyposecretion of cortisone | Caused due to hypersecretion of cortisone |
| Low blood sugar level | High blood sugar level |

**Question 3**

**Give reason:**

(a) Adrenaline is often described as the emergency hormone.

(b) Pituitary is popularly called as the master gland.

(c) People living in the low Himalayan hilly regions often suffer from goitre.

(d) Simple goitre can be prevented by using iodised salt in food.

***Answer***

(a) Adrenaline is known as the Emergency hormone because it prepares the body to meet any emergency situation, for "fight" i.e. to face danger or for "flight" i.e. to run away from it. Extra energy and strength is

provided to the body in that situation. It stimulates the sympathetic nervous system. When excited or angry, the adrenal medulla produces a lot of Adrenaline preparing the body for any emergency.

(b) Pituitary is popularly called as the master gland because it controls the functioning of all the other endocrine glands.

(c) People living in the low Himalayan hilly regions often suffer from goitre because iodine is deficient in the soil of those regions and hence, in the food grown there. Insufficient iodine produces less thyroxine which results in goitre.

(d) Iodised salt contains iodine which is an active ingredient in the production of thyroxine. Hence, it is recommended to use iodised salt in food to prevent simple goitre.

**Question 4**

Identify the gland with the help of following clues:

(a) The gland is like a cap on top of each kidney.

(b) The gland is both a duct gland as well as a ductless gland.

(c) A bilobed (butterfly-shaped) gland.

(d) The gland is located in mid-brain below the hypothalamus.

***Answer***

(a) Adrenal

(b) Pancreas

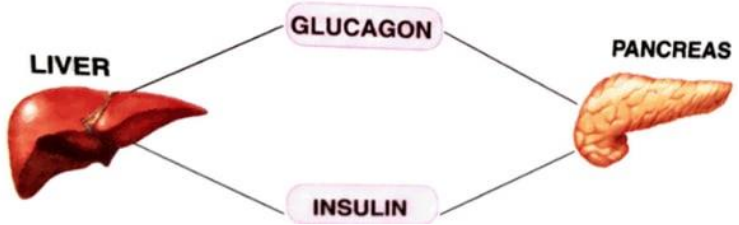
(c) Thyroid

(d) Pituitary

**Structured / Application / Skill Type**

**Question 1**

Study the diagram given below and then answer the questions that follow:




(a) **Name** the cells of the pancreas that produce (1) glucagon (2) insulin.

(b) **State** the main function of (1) glucagon and (2) insulin.

(c) **Why** is the pancreas referred to as an exo-endocrine gland?

(d) **Why** is insulin not given orally but is injected into the body?

(e) **What** is the technical term for the cells of the pancreas that produce endocrine hormones?

(f) **Where** in the body is the Pancreas located?

***Answer***

(a) **Glucagon** is produced by the **Alpha cells of the islets of Langerhans**.
**Insulin** is produced by the **Beta cells of the islets of Langerhans**.

(b) The main function of **Glucagon** is to **raise the blood glucose levels** by stimulating the breakdown of glycogen to glucose in the liver.
The main function of **Insulin** is to **maintain the levels of glucose** (sugar) in the blood.

(c) Exocrine glands are those glands which deliver their secretions to the target through ducts. An endocrine gland is one which does not pour its secretions into a duct but directly into the blood. As an exocrine gland the pancreas secrete pancreatic juices into the duodenum for digestion. As an endocrine gland, it has special groups of hormone-secreting cells called Islets of Langerhans which are scattered in the entire gland. The islet cells produce three hormones — insulin, glucagon and somatostatin which are poured directly into the blood. Hence, the pancreas is an exo-endocrine gland.

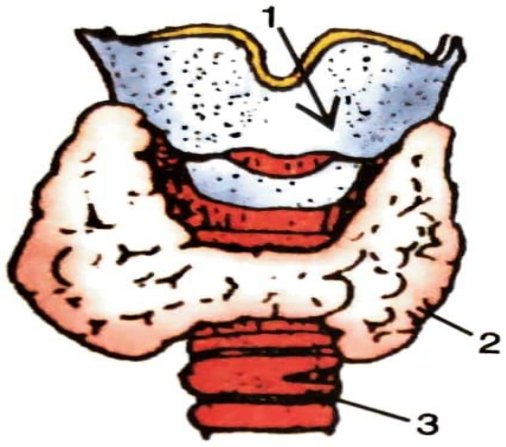
(d) Insulin is not administered orally because the digestive juices degrade insulin making it ineffective. Hence, to avoid its degradation, Insulin is injected into the body.

(e) Islets of Langerhans

(f) The Pancreas is located in the abdomen behind the stomach.

**Question 2**

Given ahead is a portion from the human body showing some important structure in ventral (front) view.




(a) **Where** is this portion located in the body?

(b) **Name** the structures numbered 1-3.

(c) **State** one main function of each of the structures named above.

(d) **Is** there any duct to carry the secretions from the structure numbered 2? If so, give its name.

***Answer***

(a) This portion is located in the neck region above the sternum.

(b) The structures numbered 1-3 are:

- 1 → Larynx
- 2 → Thyroid gland
- 3 → Trachea

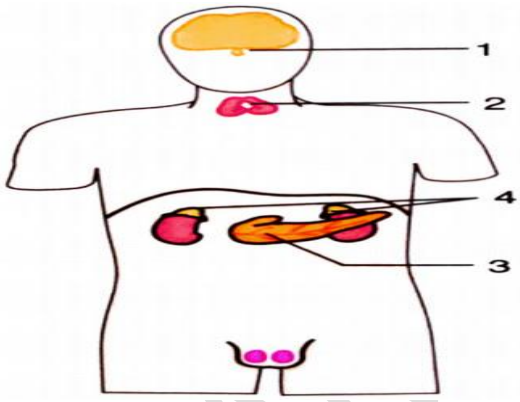
(c) One main function of each of these structures is:

1. **Larynx** is the voice box containing vocal cords. It helps in producing sound.
2. **Thyroid gland** produces thyroxine and calcitonin which are essential hormones.
3. **Trachea** is the wind pipe that helps in passing air to and from the respiratory system while breathing.

(d) Structure 2 is the thyroid gland. It is an endocrine gland, so it is ductless and pours its secretions directly into the blood. Hence, there is no duct.

**Question 3**

Given below is an outline diagram of human body showing position of certain organs.




(a) Name the parts numbered 1 to 4.

(b) What is common to all these parts in regard to the nature of their functions?

(c) Name the nutrient element which is essential for the normal working of part 2.

***Answer***

(a) The parts numbered 1-4 are:

- 1 → Pituitary gland
- 2 → Thyroid gland
- 3 → Pancreas

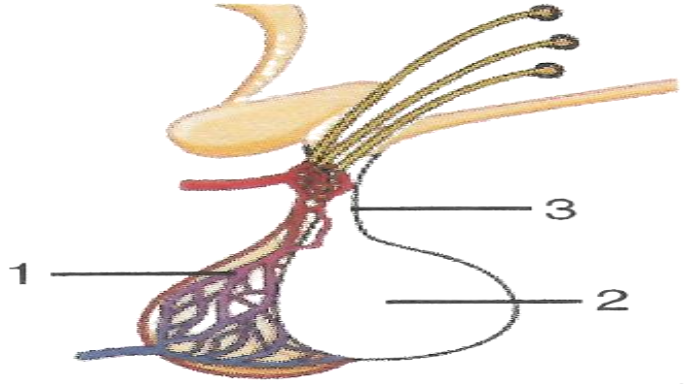
- 4 → Adrenal Glands

(b) All the glands shown in the above diagram are endocrine glands. They secrete essential hormones and pour their secretions directly into the blood.

(c) Iodine is essential for the normal working of Thyroid gland.

**Question 4**

The diagram given alongside shows an endocrine gland in the human body. Study the diagram and answer the following questions :




(a) Identify the gland. Write its specific location in the human body.

(b) Label the guidelines 1, 2 and 3 shown in the figure.

(c) Name any two secretions from part 1 and two from part 2.

(d) The deficiency of which hormone causes Diabetes insipidus? How is this condition different from Diabetes mellitus with respect to the abnormal substances present in the urine.

***Answer***

(a) The gland shown is Pituitary gland. It hangs from the base of the mid-brain below the hypothalamus.

(b)

- 1 → Anterior lobe
- 2 → Posterior lobe
- 3 → Hypophysial stalk

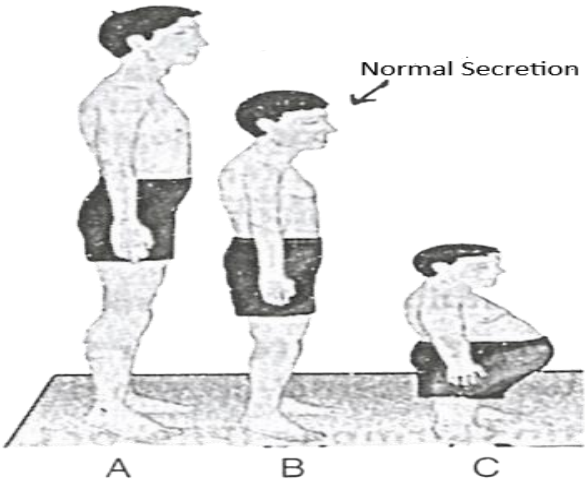
(c) Two secretions from part 1 are Growth hormone and Thyroid Stimulating Hormone.

Two secretions from part 2 are ADH and Oxytocin

(d) The deficiency of ADH causes Diabetes insipidus. Urine does not contain any glucose in this condition but in Diabetes mellitus there is glucose present in the urine.

**Question 5**

Human height is mainly controlled by genetic factors but hormonal secretion is also equally important in regulating the height. Study the figures given below and answer the questions that follow :




(a) Which of the above figures (A/B/C) is suffering from hyposecretion of the growth hormone?

(b) Name the disorder shown in figure A.

(c) Mention the gland which secretes 'Growth Hormone'.

***Answer***

(a) C

(b) Gigantism

(c) Anterior lobe of pitutary gland

**Think and Connect**

**Question 1**

Compare the hormonal response with the nervous response with respect to their speed, transmission and general nature of changes brought about.

***Answer***

| **Hormonal Response** | **Nervous Response** |
|---|---|
| Usually slow. | Immediate/Rapid. |
| Transmitted chemically through blood. | Transmitted electro-chemically through the nerve fibres and chemically across synapses. |

| Hormonal Response | Nervous Response |
|---|---|
| Affects different organs (widespread in body). | Affects only the particular muscles or the gland (local). |
| Effect is short term or long-lasting. | Effect only short-lived. |
| Can affect growth. | Cannot affect growth. |
| Can bring about specific chemical changes and regulates metabolism. | Does not influence chemical changes and cannot regulate metabolism. |
| Cannot be modified by learning from previous experience. | Can be modified to some extent by learning from previous experience. |

**Question 2**

Mention three important differences between the action of hormones and that of nerves in the regulatory mechanism of our body.

***Answer***

| Action of Hormones | Action of Nerves |
|---|---|
| The effect of hormones can be short-lived or long lasting. | The effect of nervous response is always short-lived. |
| Cannot be modified by the previous learning experiences. | Can be modified by the previous learning experiences. |
| Affects different organs (widespread in body). | Affects only the particular muscles or the gland (local). |