

# Chemical Coordination and Integration

## Multiple Choice Questions

**Q1. Select the right match of endocrine gland and their hormones among the options given below.**

A.	Pineal	(i)	Epinephrine
B.	Thyroid	(ii)	Melatonin
C.	Ovary	(iii)	Estrogen
D.	Adrenal medulla	(iv)	Tetraiodothyronine

Options:

- (a) A–(iv), B–(ii), C–(iii), D–(i)
- (b) A–(ii), B–(iv), C–(i), D–(iii)
- (c) A–(iv), B–(ii), C–(i), D–(iii)
- (d) A–(ii), B–(iv), C–(iii), D–(i)

Ans:(d)

A.	Pineal	(ii)	Melatonin
B.	Thyroid	(iv)	Tetraiodothyronine
C.	Ovary	(iii)	Estrogen
D.	Adrenal medulla	(i)	Epinephrine

**Q2. Which of the following hormones is not secreted by anterior pituitary?**

- (a) Growth hormone
- (b) Follicle stimulating hormone
- (c) Oxytocin
- (d) Adrenocorticotrophic hormone

**Ans:** (c) The pars distalis region of pituitary, commonly called anterior pituitary, produces 6 Growth Hormone (GH), Prolactin (PRL), Thyroid Stimulating Hormone (TSH), Adrenocorticotrophic Hormone (ACTH), Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH). Neurohypophysis (pars nervosa) also known as posterior pituitary, stores and releases two hormones called oxytocin and vasopressin, which are actually synthesised by the hypothalamus and are transported axonally to neurohypophysis.

**Q3. Mary is about to face an interview. But during the first five minutes before the interview she experiences sweating, increased rate of heart beat, respiration, etc. Which hormone is responsible for her restlessness?**

- (a) Estrogen and progesterone
- (b) Oxytocin and vasopressin

**(c) Adrenaline and noradrenaline (d) Insulin and glucagon**

**Ans:**(c) Mary is about to face an interview. But during the first five minutes before the interview she experiences sweating, increased rate of heart beat, respiration, etc. Adrenaline and non-adrenaline hormone are responsible for her restlessness.

**Q4. The steroid responsible for balance of water and electrolytes in our body is**

**(a) Insulin (b) Melatonin (c) Testosterone (d) Aldosterone**

**Ans:** (d) Vasopressin acts mainly at the kidney and stimulates resorption of water and electrolytes by the distal tubules and thereby reduces loss of water through urine (diuresis). Hence, it is also called as anti-diuretic hormone (ADH).

**Q5. Thymosin is responsible for**

**(a) Raising the blood sugar level (b) Raising the blood calcium level**

**(c) Differentiation of T lymphocytes (d) Decrease in blood RBC**

**Ans:** (c) Thymosin is responsible for differentiation of T-lymphocytes.

**Q6. In the mechanism of action of a protein hormone, one of the second messengers is**

**(a) Cyclic AMP**

**(b) Insulin**

**(c) T<sub>3</sub>**

**(d) Gastrin**

**Ans:** (a) Hormones which interact with membrane-bound receptors normally do not enter the target cell, but generate secondary messengers (e.g., cyclic AMP, cGMP, DAG, IP<sub>3</sub>, Ca<sup>++</sup> etc.) which in turn regulate cellular metabolism.

**Q7. Leydig cells produce a group of hormones called**

**(a) Androgens (b) Estrogens**

**(c) Aldosterone (d) Gonadotropins**

**Ans:** (a) Leydig cells produce a group of hormones called androgens.

**Q8. Corpus luteum secretes a**

**(a) Prolactin (b) Progesterone (c) Aldosterone (d) Testosterone**

**Ans:** (b) Corpus luteum secretes progesterone.

**Q9. Cortisol is secreted from gland called**

**(a) Pancreas (b) Thyroid (c) Adrenal (d) Thymus**

**Ans:** (c) Cortisol is secreted from gland called adrenal.

**Q10. A hormone responsible for normal sleep-wake cycle is**

**(a) Epinephrine (b) Gastrin (c) Melatonin (d) Insulin**

**Ans:** (c) A hormone responsible for normal sleep-wake cycle is melatonin.

**Q11. Hormones are called chemical signals that stimulate specific target tissues. Which is the correct location of these receptors in case of protein hormones?**

**(a) Extra cellular matrix**

**(b) Blood**

**(c) Plasma membrane**

**(d) Nucleus**

**Ans:** (c) Protein hormone receptors present on the plasma membrane of the target cells are called membrane-bound receptors.

**Q12. Choose the correct option among the following:**

Column A		Column B	
A.	Epinephrine	(i)	Stimulates in muscle growth
B.	Testosterone	(ii)	Decrease in blood pressure
C.	Glucagon	(iii)	Decrease in liver glycogen content
D.	Atrial natriuretic factor	(iv)	Increases heart beat

**Options:**

- (a) A–(ii), B–(i), C–(iii), D–(iv)  
 (b) A–(iv), B–(i), C–(iii), D–(ii)  
 (c) A–(i), B–(ii), C–(iii), D–(iv)  
 (d) A–(i), B–(iv), C–(ii), D–(iii)

Ans. (b)

A.	Epinephrine	(iv)	Increases heart beat
B.	Testosterone	(i)	Stimulates in muscle growth
C.	Glucagon	(iii)	Decrease in liver glycogen content
D.	Atrial natriuretic factor	(ii)	Decrease in blood pressure

**Very Short Answer Type Questions**

**Q1. There are many endocrine glands in human body. Name the glands which is absent in male and the one absent in female.**

**Ans:** In Males—Ovary and in Females—Testis.

**Q2. Which of the two adrenocortical layers, zona glomerulosa and zona reticularis lies outside enveloping the other?**

**Ans:** Outer layer—Zona glomerulosa  
 Inner layer—Zona reticularis

**Q3. What is erythropoiesis? Which hormone stimulates it?**

**Ans:** Formation of RBC is known as erythropoiesis and the hormone erythropoietin stimulates the process.

**Q4. Name the only hormone secreted by pars intermedia of the pituitary gland.**

**Ans:** MSH or Intermedin

**Q5. Name the endocrine gland that produces calcitonin and mention the role played by this hormone.**

**Ans:** Thyroid gland also secretes a protein hormone called thyrocalcitonin (TCT) which regulates the blood calcium levels. TCT is secreted by 'C' cells of thyroid glands. TCT is a hypocalcaemic hormone which lowers the blood calcium level by increasing calcium deposition in the bones, so checks osteoporosis.

**Q6. Name the hormone that helps in cell-mediated immunity.**

**Ans:** Thymosin.

### Short Answer Type Questions

**Q1. What is the role-played by luteinizing hormones in males and females respectively?**

**Ans:** LH stimulates the synthesis and secretion of androgens called male hormones. In females, LH is essential for ovulation. In females, LH induces ovulation of fully mature follicles (graafian follicles) and maintains the corpus luteum formed from the remnants of the graafian follicles after ovulation.

**Q2. What is the role of second messenger in hormone action?**

**Ans:** Hormones which do not enter the target cell, interact with specific receptors located on the surface of the target cell membranes and generate second messengers (e.g., cAMP) on the inner side of plasma membrane. The second messenger, in turn, carries out all the hormonal functions.

**Q3. On an educational trip to Uttaranchal, Ketki and her friends observe that many local people were having swollen necks. Please help Ketki and her friends to find out the solutions to the following questions.**

**a. Which probable disease are these people suffering from?**

**b. How is it caused?**

**c. What effect does this condition have on pregnancy?**

**Ans:** a. Goitre

b. Iodine deficiency in diet

c. Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.

**Q4. George comes on a vacation to India from US. The long journey disturbs his biological system and he suffers from jet lag. What is the cause of his discomfort?**

**Ans:** George comes on a vacation to India from US. The long journey disturbs his biological system and he suffers from jet lag. It is due to the disturbance in diurnal rhythm. Melatonin plays a very important role in the regulation of a 24-hour (diurnal) rhythm of our body. For example, it helps in maintaining the normal rhythms of sleep-wake cycle, body temperature.

**Q5. Inflammatory responses can be controlled by a certain steroid. Name the steroid, its source and also its other important functions.**

**Ans:** Glucocorticoids, particularly cortisol, produce anti-inflammatory reactions and suppress the immune response. Cortisol stimulates the RBC production. Glucocorticoids stimulate gluconeogenesis, lipolysis and proteolysis; and inhibit cellular uptake and utilisation of amino acids. Cortisol is also involved in maintaining the cardio-vascular system as well as the kidney functions.

**Q6. Old people have weak immune system. What could be the reason?**

**Ans:** Thymus is degenerated in old individual resulting in a decreased production of thymosins. As a result the immune responses of old persons become weak.

**Q7. What are the effects of hypothyroidism (observed during pregnancy) on the development and maturation of a growing baby?**

**Ans:** Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.

**Q8. Mention the difference between hypothyroidism and hyperthyroidism.**

**Ans:** Iodine is essential for the normal rate of hormone synthesis in the thyroid.

Deficiency of iodine in our diet results in hypothyroidism and enlargement of the thyroid gland, commonly called goitre. Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc. In adult women, hypothyroidism may cause menstrual cycle to become irregular. Due to cancer of the thyroid gland or due to development of nodules of the thyroid glands, the rate of synthesis and secretion of the thyroid hormones is increased to abnormal high levels leading to a condition called hyperthyroidism which adversely affects the body physiology.

**Q9. You have learnt that a characteristic feature of endocrine system is the presence of feedback loops. By this what is meant if hormone A stimulates gland 'X' to secrete hormone B, the production of 'A' could be modified when the level of B changes in our blood. An example is the relation between hormones LH and estrogen (E2). An old woman exhibits the following features. High levels of LH in blood but low levels of E2 in the blood. Another woman exhibits high level of LH in blood and also high level of E2 in the blood. Where is the defect in both these women? Provide suitable diagram to support this answer.**

**Ans:** If an old woman exhibits the high levels of LH in blood but low levels of E2 in the blood then it may be due to any abnormality in the anterior pituitary.

If an old woman exhibits the high levels of LH in blood and high levels of E2 in the blood then it may be due to any abnormality in the anterior pituitary or ovary.