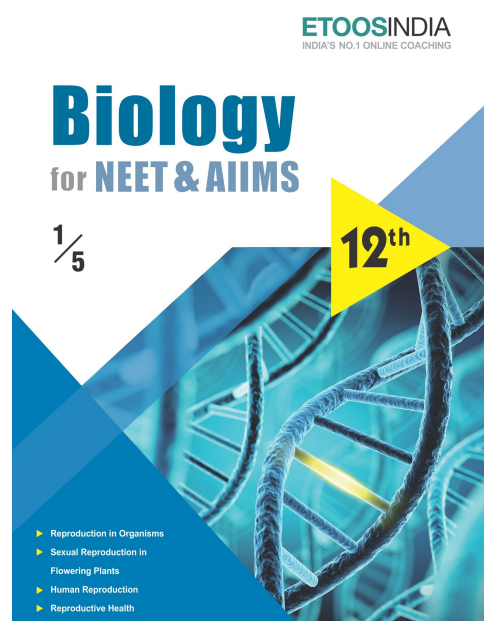
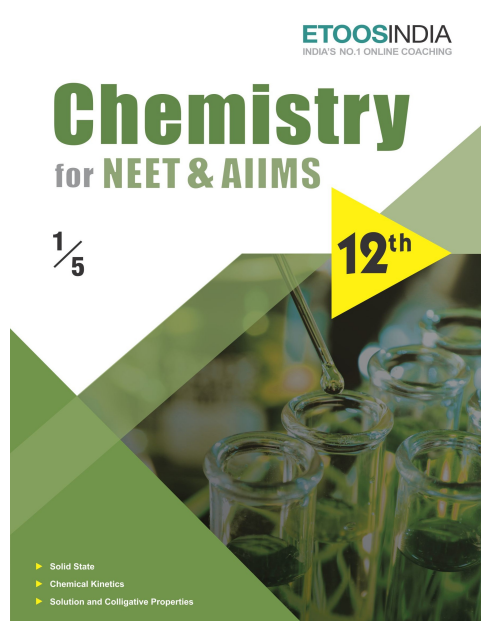
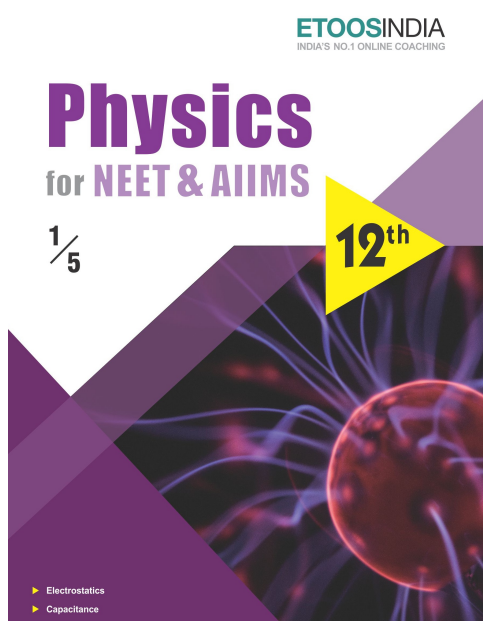
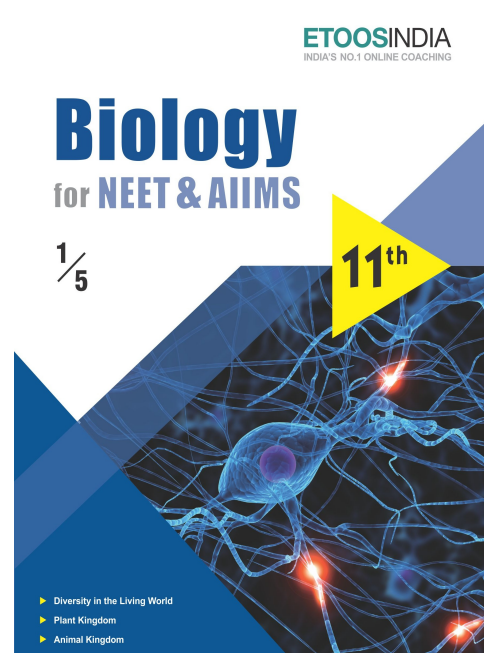
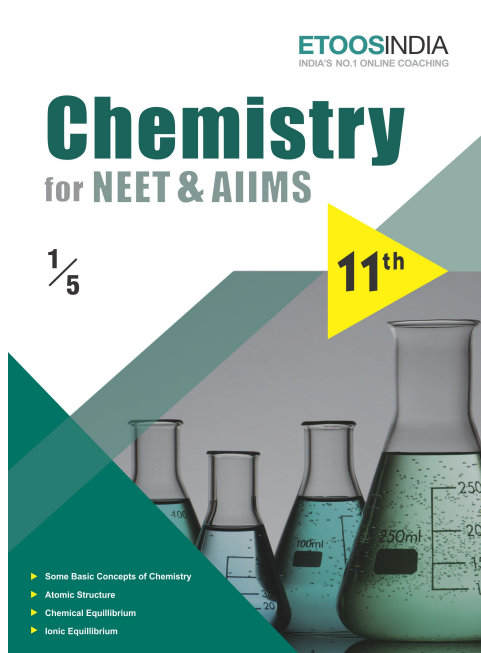
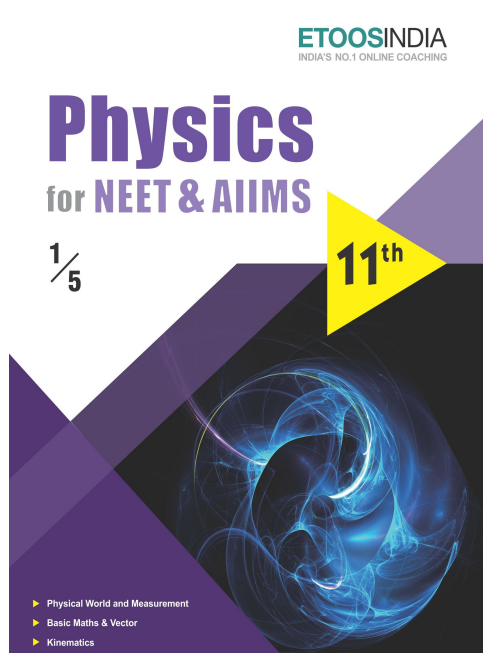


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# CHEMICAL CONTROL AND INTEGRATION

*“Through art and science in their broadest senses it is possible to make a permanent contribution towards the improvement and enrichment of human life and it is these pursuits that we students are engaged in”.*

“FREDRICK SANGER (1918-2013)”

## INTRODUCTION

**A**s we have seen in earlier chapter the neural system provides a exact rapid coordination among organs. The neural coordination is fast but short-lived. It occurs for a short period of time. The nerve fibres are responsible for neural coordination do not innervate all cells of the body. hence, there is a need of another special kind of regulatory and coordinating system, so this regulation is carries out by chemical messengers called as **Hormones**, released by endocrine glands.

Therefore in this chapter, you will understand how different hormones regulate the cellular functions of the body and how these hormones help in coordination of different organs of the body.

### CHEMICAL CONTROL AND INTEGRATION

#### INTRODUCTION :

- The branch of biology which deals with the study of endocrine system and its physiology is known as **Endocrinology**.
- **“Thomas Addison”** is known as father of Endocrinology.  
Whereas the gland with duct is called exocrine gland which secretes enzyme etc. Endocrine glands pour their secretion directly into blood. These glands lack ducts, so these glands are called ductless glands.
- Where as, the work of co-ordination by endocrine system is slowly by secretion of some chemical substances.
- Co-ordination in the body of almost all the higher vertebrates is controlled by two systems **Nervous system** and **endocrine system**.

#### HORMONE :

- The term hormone was coined by **Starling**.
- First discovered hormone is **secretin**. It was discovered by **Bayliss & Starling in 1902**.
- Hormones are also called **“Primary messengers”** or **chemical messengers**.

#### Chemical Nature of Hormone :

The animal hormones may be classified into 6 categories.

1. **Protein** : The gonadotropic, thyrotropic and somatotropic hormones from the anterior lobe of pituitary are protein with high molecular weights.
2. **Steroids (Fat soluble)** : The hormones like cortisol and aldosterone from adrenal cortex, testosterone from interstitial cells of testes, estrogen and progesterone from Graaffian follicles of ovary and placenta are the examples of steroid hormones. The hormones contain cholesterol and bile salts.
3. **Fatty acid derivative** : - Prostaglandin
4. **Amino acid derivatives** : The hormones epinephrine and norepinephrine from the adrenal medulla and thyroxine from the thyroid gland are derived from amino acid.
5. **Short peptides** : The hormones oxytocin and vasopression from the posterior lobe of the pituitary gland are short peptides of 9 amino acid. The melanocyte stimulating hormone (MSH) from the intermediate lobe of the pituitary gland is also short peptide of 13 amino acids.
6. **Long peptides** : The hormones insulin from the pancreas, adrenocortico tropin (ACTH) from the anterior lobe of the pituitary gland, calcitonin from the parathyroid gland consists of 84 amino acids.

#### Physical & Chemical Specialities of Hormones : -

- Hormones are non-antigenic & non species specific substances.
- Hormones are soluble in water and are easily diffusible in tissues.
- The secretion of hormone is always in very small quantity because these are most reactive substances
- Hormones are destroyed after use.
- Hormones can not be stored in the body except Thyroxine.
- Hormones are soluble in water and blood.
- The molecules of most of the hormones are small, and their molecular weight is low.
- Liver and kidneys separate them from blood and decompose them. The waste product formed after decomposition, hormones are excreted with urine. It can not be reutilized.
- Usually, hormones do not participate in the metabolic activities of target cells but they affect and control the activity level of these target cells. Due to the effect of hormones, not only the rate of metabolic activities is effected but also the permeability of cell membrane is changed so the nature of reaction is also changed. so the nature of reaction is also changed.

### *Etoos Tips & Formulas*

#### INTEGRATIVE SYSTEMS

- Neural system and endocrine system jointly co-ordinate and regulate the physiological functions of the body.
- Note: Nervous system provides rapid co-ordination where endocrine system provides slow co-ordination with different body parts.
- Hormone :- Secretion of endocrine glands (Ductless glands) called as hormones. "Hormones are non-nutrient chemicals which act as intercellular messenger and are produced in trace amounts."
- Note: Intercellular messenger = Passes message from one cell to another cell by binding with membrane bound receptors or receptors located inside the cell.
- Receptors :- Protein molecules specific for particular hormone molecules. "Position of Receptors - Located on cell surface or intracellular."
- Organised endocrine Glands (Whole gland) : Pituitary gland, Pineal gland, Thyroid.gland, Adrenal Gland, Pancreas, Parathyroid gland, Thymus and Gonads.
- Other unorganised endocrine tissue (Diffused tissue) : GIT, Kidney, Heart etc.

#### HYPOTHALAMUS

- Basal part (ventral part) of Diencephalon.
- Group of neurosecretory cells known as nuclei (Nuclei = group of cyton in CNS) secrete 7 releasing hormones (which stimulate secretion) and 3 inhibiting (which inhibit secretion) hormones. These hormone regulate the synthesis and secretion of pituitary hormones.
- Hypothalamo hypophyseal portal system regulate functions of anterior pituitary.
- In this portal system releasing and inhibiting hormones are transfer to anterior pituitary by hypophyseal portal vein and stimulate hormone synthesis & secretion of anterior pituitary.
- Posterior pituitary is under the direct regulation of the hypothalamus.
- Hormones of posterior pituitary are synthesised into hypothalamic nuclei (Paraventricular nuclei and supra optic nuclei) and secreted into posterior pituitary through axons. So these are stores and again release into body via blood stream.

#### PINEAL GLAND (Dorsal side of forebrain)

- Hormone = Melatonin
- Melatonin regulate 24 hours diurnal rhythms of body.
- Melatonin maintain rhythms of body like - sleep wake cycle, body temperature.
- Melatonin also influence metabolism, pigmentation, menstrual cycle and defense capability.
- After 7 year of birth pineal gland undergo involution and crystal of  $\text{CaCO}_3$  and  $\text{Ca}_3\text{PO}_4$  are deposited in it called "Brain sand".

**SOLVED EXAMPLE**

- Ex.1** In mechanism of hormone action, which of the following is not a second messenger  
 (A) Cyclic AMP (B) IP3  
 (C) Ca<sup>++</sup> (D) Mg<sup>++</sup>  
**Sol.** (D)
- Ex.2** ..... shows anti-allergic and anti-inflammatory effect  
 (A) Mineralocorticoids (B) Glucocorticoids  
 (C) Sexcorticoids (D) Noradrenaline  
**Sol.** (B)
- Ex.3** Which is the inhibitory hormone of GH  
 (A) Insulin (B) Parathormone  
 (C) Somatostatin (D) Testosterone  
**Sol.** (C)
- Ex.4** Endocrine glands  
 (A) Do not possess ducts  
 (B) Sometimes do not have ducts  
 (C) Pour their secretion into blood through ducts  
 (D) Always have ducts  
**Sol.** (A) : Endocrine glands are ductless glands their secretion flows directly into the blood stream.
- Ex.5** Select the mismatch pair from the following  
 (A) Oxytocin - Contraction of uterine muscles  
 (B) Insulin - Gluconeogenesis  
 (C) Prolactin - Milk production in mammary glands  
 (D) Glucagon - Glycogenolysis  
**Sol.** (B)
- Ex.6** Which is a 32 amino acid water soluble peptide hormone  
 (A) Gastrin (B) Calcitonin  
 (C) Glucagon (D) Insulin  
**Sol.** (B)
- Ex.7** One of the following cells secretes a hormone  
 (A) Cells of Leydig  
 (B) Cells of Sertoli  
 (C) Primary spermatocyte  
 (D) Secondary spermatocyte  
**Sol.** (A)
- Ex.8** The blood calcium level is lowered by the deficiency of  
 Or  
 The hormone that increases the blood calcium level and decreases its excretion by kidney is  
 Or  
 Tetany (Irregular muscle contraction) and osteoporosis are caused due to the deficiency of  
 (A) Both calcitonin and parathormone  
 (B) Calcitonin  
 (C) Parathormone  
 (D) Thyroxine  
**Sol.** (C) : Hypoparathyroidism results in hypocalcemia. Skeletal muscles fail to relax causing tetany and hyperparathyroidism result in osteoporosis i.e., dissolution of bone and hypercalcemia.
- Ex.9** Serotonin and Melatonin are hormones, secreted by  
 (A) Pancreas (B) Pineal body  
 (C) Pituitary gland (D) Thymus  
**Sol.** (B)
- Ex.10** Endemic goiter is a state of  
 (A) Increased thyroid function  
 (B) Normal thyroid function  
 (C) Decreased thyroid function  
 (D) Moderate thyroid function  
**Sol.** (C) : Endemic goitre is due to low iodine in soil and water in hilly areas.
- Ex.11** The co-ordinator between Nervous and endocrine system is  
 (A) Thalamus (B) Hypothalamus  
 (C) Epithalamus (D) Colliculus  
**Sol.** (B)
- Ex.12** Adrenaline is equivalent to which neurotransmitter  
 (A) GABA (B) Serotonin  
 (C) Epinephrine (D) Norepinephrine  
**Sol.** (C)
- Ex.13** Steroid hormones easily pass through the plasma membrane by simple diffusion because they  
 (A) Are water soluble  
 (B) Contain carbon and hydrogen  
 (C) Enter through pores  
 (D) Are lipid soluble  
**Sol.** (D)

**Exercise # 1****SINGLE OBJECTIVE****NEET LEVEL**

1. The follicle stimulating hormone is secreted from  
(A) Posterior lobe of pituitary gland  
(B) Reproductive gland  
(C) Thyroid gland  
(D) Anterior lobe of pituitary gland
2. "Sella turcica" is a  
(A) Depression in brain enclosing pituitary  
(B) Cavity of skull enclosing ears  
(C) Covering of testis  
(D) Kind of endocrine gland
3. I.C.S.H. in male acts on  
(A) Cells of leydig (B) Sertoli cells  
(C) Spermatids (D) Spermatogonia
4. Diabetes insipidus disease is caused due to the deficiency of hormone produced by  
(A) Pituitary (B) Adrenal  
(C) Pancreas (D) Thyroid
5. Growth hormone of pituitary is more effective in  
(A) Presence of thyroxine  
(B) Absence of thyroxine  
(C) Absence of Insulin  
(D) Presence of adrenaline
6. Median eminence is part of  
(A) Anterior pituitary (B) Hypothalamus  
(C) Neurohypophysis (D) None of these
7. The two lobes of thyroid gland are joined by horizontal connection called  
(A) Inter thyroidal connective  
(B) Inter thyroidal commissure  
(C) Intermediary lobe  
(D) Isthmus
8. Hyper secretion of Parathyroid hormone result in  
(A) Stronger bones due to increased incorporation of calcium in them  
(B) Deposition of calcium in various skeletal structure  
(C) No effect on the constitution of bones  
(D) Weaker bones due to increased removal of calcium from them
9. Hyposecretion of aldosterone causes  
(A) Gull's disease (B) Grave's disease  
(C) Cushing's disease (D) Addison's disease
10. The hormones that initiates ejection of milk stimulates milk production and growth of ovarian follicles are respectively known as  
(A) PRL, OT and LH (B) OT, PRL and FSH  
(C) LH, PRL and FSH (D) PRL, OT and LH
11. Mammalian thymus is mainly concerned with  
(A) Regulation of body temperature  
(B) Regulation of body growth  
(C) Immunological functions  
(D) Secretion of thyrotropin
12. A hormone is :-  
(A) An enzyme (B) Chemical messenger  
(C) Primary messenger (D) 2 and 3 both
13. The receptor for protein hormones are present on  
(A) Nucleus  
(B) Endoplasmic reticulum  
(C) Cytoplasm  
(D) Cell-surface
14. Hormones are :-  
(A) Internal secretion mostly discharged in the blood by endocrine glands  
(B) Secretion of exocrine glands  
(C) Chemical substances secreted into the gut  
(D) Inorganic catalysts
15. Hormones are :  
(A) Produced in low amount  
(B) Easily diffusible  
(C) Non - antigenic  
(D) All
16. Hormones are :-  
(A) Destroyed after use  
(B) Not destroyed after use  
(C) Non antigenic  
(D) 1 and 3 both

**Exercise # 2**

**SINGLE OBJECTIVE**

**AIIMS LEVEL**

1. A hormone is  
(A) An enzyme  
(B) Chemical messenger  
(C) Primary messenger  
(D) both 2 and 3
2. Integrative system in the body are  
(A) Endocrine system  
(B) Nervous system  
(C) Blood vascular system  
(D) Both endocrine and nervous system
3. Hormones are  
(A) Internal secretion mostly discharged in the blood by endocrine glands  
(B) Secretion of endocrine glands  
(C) Chemical substances secreted into the gut  
(D) Inorganic catalysis
4. Term "Hormone" was coined by  
(A) W.M. Baylis                      (B) E.H. Schally  
(C) E.H. Starling                      (D) Harris
5. Hormones are chemically  
(A) Amino acid                      (B) Protein  
(C) Steroid                              (D) All
6. Pituitary gland does not control the secretory activity of  
(A) Thyroid                              (B) Adrenal cortex  
(C) Adrenal medulla                      (D) Testes
7. Which of the following controls spermatogenesis  
(A) FSH                                      (B) LTH  
(C) LH                                        (D) Vasopressin
8. Adrenaline increases  
(A) Heart beat                              (B) Blood pressure  
(C) Both (A) & (B)                      (D) None
9. Immuno competent process of T-lymphocyte occur in  
(A) Bone marrow  
(B) Cortex part of thymus  
(C) Peyer's patches  
(D) Medulla part of thymus
10. Norepinephrin hormone is secreted from  
(A) Zona glomerulosa  
(B) Zona fasciculata  
(C) Zona reticularis  
(D) Medulla of adrenal
11. Which of the following is not paired correctly  
(A) Myxoedema - swollen facial tissues  
(B) Insulin - raises blood glucose  
(C) Parathyroid - tetany  
(D) Cretinism - mentally retarded
12. A patient of diabetes mellitus excreted glucose in urine even when he kept in a carbohydrate free diet. It is because  
(A) Fats are catabolised to form glucose  
(B) Amino acids are catabolised in liver  
(C) Amino acids are discharged in blood stream from liver  
(D) Glycogen from muscles are discharged in blood stream from liver
13. Match the list I with list II  
(A) Adenohypophysis                      (A) Epinephrine  
(B) Adrenal medulla                        (B) Somatotropin  
(C) Parathyroid gland                      (C) Thymosin  
(D) Thymus gland                              (D) Parathormone  
(A) A = 3, B = 1, C = 4, D = 2  
(B) A = 1, B = 2, C = 3, D = 4  
(C) A = 2, B = 1, C = 4, D = 3  
(D) A = 4, B = 3, C = 2, D = 1
14. If receptor molecule is removed from target organ for hormone action, the target organ will  
(A) Continue to respond but require higher concentration of hormone  
(B) Continue to respond but in opposite way  
(C) Continue to respond without any difference  
(D) Not respond to hormone

**Exercise # 3****PART - 1****MATRIX MATCH COLUMN**

1. Match Column-I with Column - II and select the correct option from the codes given below.
- |                   |                        |
|-------------------|------------------------|
| <b>Column - I</b> | <b>Column - II</b>     |
| A. Testis         | i. Pigmentation        |
| B. Ovaries        | ii. Atrophies in adult |
| C. Thymus         | iii. Estrogen          |
| D. Melanin        | iv. Testosterone       |
- (A) A-iii, B-iv, C-i, D-ii      (B) A-ii, B-iii, C-iv, D-i      (C) A-iv, B-iii, C-ii, D-i      (D) A-i, B-iv, C-ii, D-iii
2. Match Column - I with Column - II and select the correct option from codes given below.
- |                       |                                   |
|-----------------------|-----------------------------------|
| <b>Column - I</b>     | <b>Column - II</b>                |
| A. Hypothalamus       | i. Relaxin                        |
| B. Anterior pituitary | ii. Estrogen                      |
| C. Testis             | iii. FSH and LH                   |
| D. Ovary              | iv. Androgen                      |
|                       | v. Gonadotropin releasing hormone |
- (A) A-v, B-iii, C-iv, D-ii      (B) A-v, B-iii, C-ii, D-iv      (C) A-i, B-ii, C-iv, D-iii      (D) A-iii, B-v, C-iv, D-ii
3. Match Column - I with Column - II and select the correct option from codes given below.
- |                       |   |
|-----------------------|---|
| <b>Column - I</b>     | <b>Column - II</b>                            |
| A. Oxytocin           | i. Stimulates ovulation                       |
| B. Prolactin          | ii. Implantation and maintenance of pregnancy |
| C. Lutenising hormone | iii. Lactation after child birth              |
| D. Progesterone       | iv. Uterine contraction during labour         |
|                       | v. Reabsorption of water by nephrons          |
- (A) A-v, B-iv, C-i, D-ii      (B) A-iv, B-i, C-ii, D-iii      (C) A-iv, B-iii, C-i, D-ii      (D) A-v, B-iii, C-ii, D-i
4. Match Column - I with Column -II and select the correct option from the codes given below.
- |                   |   |
|-------------------|---|
| <b>Column - I</b> | <b>Column - II</b>                        |
| A. Thyroid        | i. Acts on the renal tubules              |
| B. Adrenal        | ii. Regulates blood calcium levels        |
| C. Pituitary      | iii. Maintains diurnal rhythm of our body |
| D. Pineal         | iv. Acts on the melanocytes               |
- (A) A-iv, B-iii, C-ii, D-i      (B) A-iii, B-iv, C-i, D-ii      (C) A-iv, B-ii, C-iii, D-i      (D) A-ii, B-i, C-iv, D-iii
5. Match Column-I with Column - II and select the correct option from the codes given below.
- |                    |   |
|--------------------|---|
| <b>Column - I</b>  | <b>Column - II</b>  |
| A. FSH             | i. Transported axonally to neurohypophysis from hypothalamus                    |
| B. MSH             | ii. Acts on melanocytes and regulates pigmentation of skin                      |
| C. Vasopressin     | iii. Stimulates the growth and (ADH) development of ovarian follicles in female |
| D. Pars intermedia | iv. In human, it is almost merged with pars distalis                            |
- (A) A-iii, B-ii, C-i, D-iv      (B) A-i, B-ii, C-iii, D-iv      (C) A-iv, B-iii, C-ii, D-i      (D) A-iii, B-ii, C-iv, D-i



**Exercise # 4**

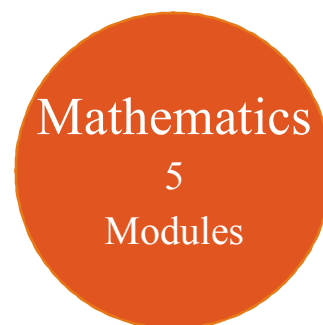
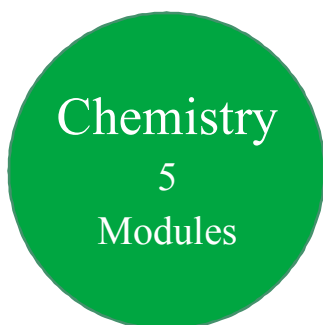
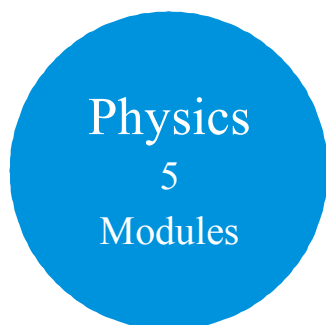
**PART - 1**

**PREVIOUS YEAR (NEET/AIPMT)**

1. A common scent - producing gland among mammals is [CBSE AIPMT-2000]  
 (A) anal gland (B) prostate  
 (C) adrenal gland (D) Bartholin's gland
2. Melanocyte stimulating Hormone (MSH) is produced by [CBSE AIPMT-2000]  
 (A) anterior pituitary  
 (B) posterior pituitary  
 (C) pars intermedia of pituitary  
 (D) parathyroid
3. Melatonin is secreted by [CBSE AIPMT-2000]  
 (A) skin (B) thymus  
 (C) pituitary (D) pineal gland
4. Which steroid is used for transformation ? [CBSE AIPMT-2002]  
 (A) Cortisol (B) Cholesterol  
 (C) Testosterone (D) Progesterone
5. Adrenaline directly affects [CBSE AIPMT-2002]  
 (A) SA node  
 (B)  $\beta$ -cells of Langerhans  
 (C) dorsal root of spinal cord  
 (D) epithelial cells of stomach
6. Melanin protects from [CBSE AIPMT-2002]  
 (A) UV-rays (B) visible rays  
 (C) infra-red rays (D) X-rays
7. When both ovaries are removed from rat which hormone is decreased in blood ? [CBSE AIPMT-2002]  
 (A) Oxytocin  
 (B) Prolactin  
 (C) Estrogen  
 (D) Gonadotropic releasing factor
8. Mainly which type of hormones control the menstrual cycle in human beings. [CBSE AIPMT-2002]  
 (A) FSH (B) LH  
 (C) FSH, LH estrogen (D) Progesterone
9. Acromegaly is caused by [CBSE AIPMT-2002]  
 (A) Epinephrine (B) Progesterone  
 (C) Prostaglandin (D) Oestrogen
10. Which one of the following hormones is a modified amino acid ? [CBSE AIPMT-2004]  
 (A) Epinephrine (B) Progesterone  
 (C) Prostaglandin (D) Oestrogen
11. Which of the following hormones is not a secretion product of human placenta ? [CBSE AIPMT-2004]  
 (A) Human chorionic gonadotropin  
 (B) Prolactin  
 (C) Oestrogen  
 (D) Progesterone
12. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency ? [CBSE AIPMT-2004]  
 (A) Luteinising hormone - Failure of ovulation  
 (B) Insulin - Diabetes insipidus  
 (C) Thyroxine - Tetany  
 (D) Parathyroid hormone - Diabetes mellitus
13. Chemically hormones are [CBSE AIPMT-2004]  
 (A) biogenic amines only  
 (B) proteins, steroids and biogenic amines  
 (C) proteins only  
 (D) steroids only
14. Which of the following is an accumulation and release centre of neurohormones [CBSE AIPMT-2006]  
 (A) Posterior pituitary lobe  
 (B) Intermediate lobe of the pituitary  
 (C) Hypothalamus  
 (D) Anterior pituitary lobe
15. A steroid hormone which regulates glucose metabolism is [CBSE AIPMT-2006]  
 (A) cortisol (B) corticosterone  
 (C) 11-deoxycorticosterone  
 (D) cortisone
16. Sertoli cells are regulated by the pituitary hormone known as [CBSE AIPMT-2006]  
 (A) FSH (B) GH  
 (C) prolactin (D) LH
17. Which hormone causes dilation of blood vessels, increased oxygen consumption and glucogenesis ? [CBSE AIPMT-2006]  
 (A) ACTH (B) Insulin  
 (C) Adrenaline (D) Glucagon

1. Cells die at the time of release of secretory materials in  
(A) holocrine gland      (B) apocrine gland      (C) merocrine gland      (D) mixed gland
2. Gonadotropin releasing hormone is transferred to anterior pituitary by  
(A) left coronary artery      (B) hypophyseal portal veins  
(C) axons of neurosecretory cells      (D) nuclei of hypothalamus
3. Function of the somatostatin is to  
(A) stimulate pituitary synthesis and release gonadotropins  
(B) inhibit the release of gonadotropins from pituitary  
(C) stimulate pituitary and promotes the secretion of growth hormone  
(D) inhibit the release of growth hormone from the pituitary  
(E) stimulate the secretion of thyrotropin from thyroid.
4. The posterior pituitary gland is not a 'true' endocrine gland because  
(A) it is provided with a duct      (B) it only stores and releases hormones  
(C) it is under the regulation of hypothalamus      (D) it secretes enzymes.
5. Secretion of which of the following hormones is not pituitary dependent?  
(A) Triiodothyronine      (B) Testosterone      (C) Glucocorticoids      (D) Parathyroid hormone
6. Diabetes insipidus is related to  
(A) ADH      (B) glucagon      (C) insulin      (D) TSH
7. The hormone 'melatonin' is secreted by the gland  
(A) pineal      (B) thyroid      (C) pituitary      (D) adrenal
8. Graves' disease is caused due to  
(A) hyposecretion of thyroid gland      (B) hypersecretion of thyroid gland  
(C) hyposecretion of adrenal gland      (D) hypersecretion of adrenal gland
9. Deficiency of thyroxine in an adult causes a disease characterised by low BMR, low body temperature, scaly skin etc. The disease is  
(A) myxoedema      (B) cretinism      (C) Grave's disease      (D) Basedow's disease
10. Which of the following statements is wrong?  
(A) Sella turcica is a bony cavity where the pituitary gland is located  
(B) Parathyroid hormone decreases the  $Ca^{2+}$  levels in blood.  
(C) Thymosins play a major role in T cell differentiation.  
(D) The middle layer of adrenal cortex is zona fasciculata.  
(E) Insulin stimulates glycogenesis.
11. Match correctly.  
(A) Thyroxine – tetanus  
(B) Insulin – diabetes insipidus  
(C) Adrenaline – hepatitis  
(D) Parathyroid – tetany

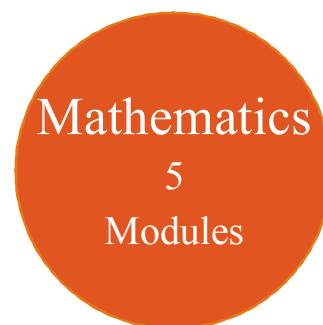
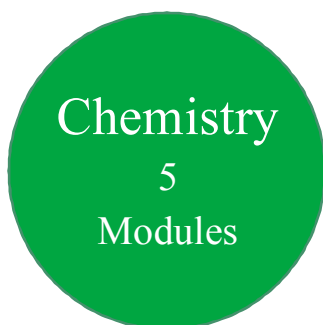
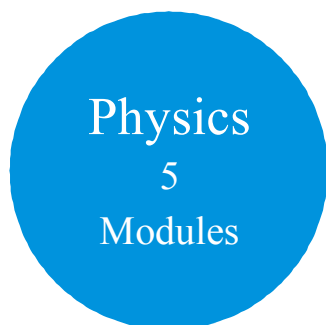
# 11<sup>th</sup> Class Modules Chapter Details



| PHYSICS  | CHEMISTRY   | BIOLOGY  |
|--|---|--|
| <p><b>Module-1</b></p> <ol style="list-style-type: none"> <li>1. Physical World &amp; Measurements</li> <li>2. Basic Maths &amp; Vector</li> <li>3. Kinematics</li> </ol> <p><b>Module-2</b></p> <ol style="list-style-type: none"> <li>1. Law of Motion &amp; Friction</li> <li>2. Work, Energy &amp; Power</li> </ol> <p><b>Module-3</b></p> <ol style="list-style-type: none"> <li>1. Motion of system of particles &amp; Rigid Body</li> <li>2. Gravitation</li> </ol> <p><b>Module-4</b></p> <ol style="list-style-type: none"> <li>1. Mechanical Properties of Matter</li> <li>2. Thermal Properties of Matter</li> </ol> <p><b>Module-5</b></p> <ol style="list-style-type: none"> <li>1. Oscillations</li> <li>2. Waves</li> </ol> | <p><b>Module-1(PC)</b></p> <ol style="list-style-type: none"> <li>1. Some Basic Concepts of Chemistry</li> <li>2. Atomic Structure</li> <li>3. Chemical Equilibrium</li> <li>4. Ionic Equilibrium</li> </ol> <p><b>Module-2(PC)</b></p> <ol style="list-style-type: none"> <li>1. Thermodynamics &amp; Thermochemistry</li> <li>2. Redox Reaction</li> <li>3. States Of Matter (Gaseous &amp; Liquid)</li> </ol> <p><b>Module-3(IC)</b></p> <ol style="list-style-type: none"> <li>1. Periodic Table</li> <li>2. Chemical Bonding</li> <li>3. Hydrogen &amp; Its Compounds</li> <li>4. S-Block</li> </ol> <p><b>Module-4(OC)</b></p> <ol style="list-style-type: none"> <li>1. Nomenclature of Organic Compounds</li> <li>2. Isomerism</li> <li>3. General Organic Chemistry</li> </ol> <p><b>Module-5(OC)</b></p> <ol style="list-style-type: none"> <li>1. Reaction Mechanism</li> <li>2. Hydrocarbon</li> <li>3. Aromatic Hydrocarbon</li> <li>4. Environmental Chemistry &amp; Analysis Of Organic Compounds</li> </ol> | <p><b>Module-1</b></p> <ol style="list-style-type: none"> <li>1. Diversity in the Living World</li> <li>2. Plant Kingdom</li> <li>3. Animal Kingdom</li> </ol> <p><b>Module-2</b></p> <ol style="list-style-type: none"> <li>1. Morphology in Flowering Plants</li> <li>2. Anatomy of Flowering Plants</li> <li>3. Structural Organization in Animals</li> </ol> <p><b>Module-3</b></p> <ol style="list-style-type: none"> <li>1. Cell: The Unit of Life</li> <li>2. Biomolecules</li> <li>3. Cell Cycle &amp; Cell Division</li> <li>4. Transport in Plants</li> <li>5. Mineral Nutrition</li> </ol> <p><b>Module-4</b></p> <ol style="list-style-type: none"> <li>1. Photosynthesis in Higher Plants</li> <li>2. Respiration in Plants</li> <li>3. Plant Growth and Development</li> <li>4. Digestion &amp; Absorption</li> <li>5. Breathing &amp; Exchange of Gases</li> </ol> <p><b>Module-5</b></p> <ol style="list-style-type: none"> <li>1. Body Fluids &amp; Its Circulation</li> <li>2. Excretory Products &amp; Their Elimination</li> <li>3. Locomotion &amp; Its Movement</li> <li>4. Neural Control &amp; Coordination</li> <li>5. Chemical Coordination and Integration</li> </ol> |

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<http://www.etoosindia.com/smartmall/bookList.do>

# 12<sup>th</sup> Class Modules Chapter Details



| PHYSICS  | CHEMISTRY  | BIOLOGY  |
|--|--|--|
| <p><b>Module-1</b></p> <ol style="list-style-type: none"> <li>1. Electrostatics</li> <li>2. Capacitance</li> </ol> <p><b>Module-2</b></p> <ol style="list-style-type: none"> <li>1. Current Electricity</li> <li>2. Magnetic Effect of Current and Magnetism</li> </ol> <p><b>Module-3</b></p> <ol style="list-style-type: none"> <li>1. Electromagnetic Induction</li> <li>2. Alternating Current</li> </ol> <p><b>Module-4</b></p> <ol style="list-style-type: none"> <li>1. Geometrical Optics</li> <li>2. Wave Optics</li> </ol> <p><b>Module-5</b></p> <ol style="list-style-type: none"> <li>1. Modern Physics</li> <li>2. Nuclear Physics</li> <li>3. Solids &amp; Semiconductor Devices</li> <li>4. Electromagnetic Waves</li> </ol> | <p><b>Module-1(PC)</b></p> <ol style="list-style-type: none"> <li>1. Solid State</li> <li>2. Chemical Kinetics</li> <li>3. Solutions and Colligative Properties</li> </ol> <p><b>Module-2(PC)</b></p> <ol style="list-style-type: none"> <li>1. Electrochemistry</li> <li>2. Surface Chemistry</li> </ol> <p><b>Module-3(IC)</b></p> <ol style="list-style-type: none"> <li>1. P-Block Elements</li> <li>2. Transition Elements (d &amp; f block)</li> <li>3. Co-ordination Compound</li> <li>4. Metallurgy</li> </ol> <p><b>Module-4(OC)</b></p> <ol style="list-style-type: none"> <li>1. HaloAlkanes &amp; HaloArenes</li> <li>2. Alcohol, Phenol &amp; Ether</li> <li>3. Aldehyde, Ketone &amp; Carboxylic Acid</li> </ol> <p><b>Module-5(OC)</b></p> <ol style="list-style-type: none"> <li>1. Nitrogen &amp; Its Derivatives</li> <li>2. Biomolecules &amp; Polymers</li> <li>3. Chemistry in Everyday Life</li> </ol> | <p><b>Module-1</b></p> <ol style="list-style-type: none"> <li>1. Reproduction in Organisms</li> <li>2. Sexual Reproduction in Flowering Plants</li> <li>3. Human Reproduction</li> <li>4. Reproductive Health</li> </ol> <p><b>Module-2</b></p> <ol style="list-style-type: none"> <li>1. Principles of Inheritance and Variation</li> <li>2. Molecular Basis of Inheritance</li> <li>3. Evolution</li> </ol> <p><b>Module-3</b></p> <ol style="list-style-type: none"> <li>1. Human Health and Disease</li> <li>2. Strategies for Enhancement in Food Production</li> <li>3. Microbes in Human Welfare</li> </ol> <p><b>Module-4</b></p> <ol style="list-style-type: none"> <li>1. Biotechnology: Principles and Processes</li> <li>2. Biotechnology and Its Applications</li> <li>3. Organisms and Populations</li> </ol> <p><b>Module-5</b></p> <ol style="list-style-type: none"> <li>1. Ecosystem</li> <li>2. Biodiversity and Conservation</li> <li>3. Environmental Issues</li> </ol> |

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