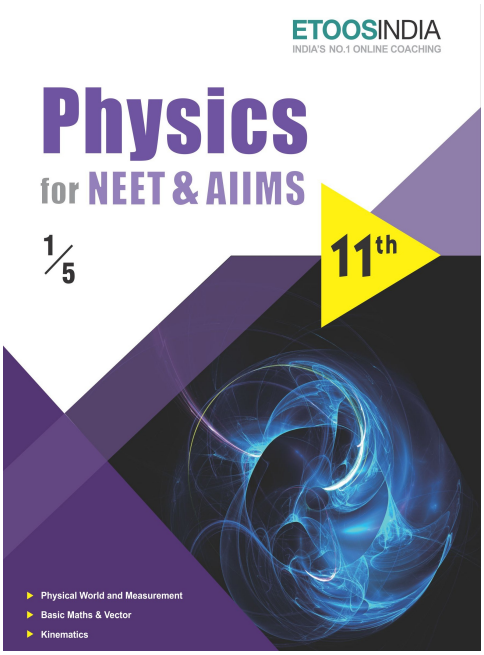
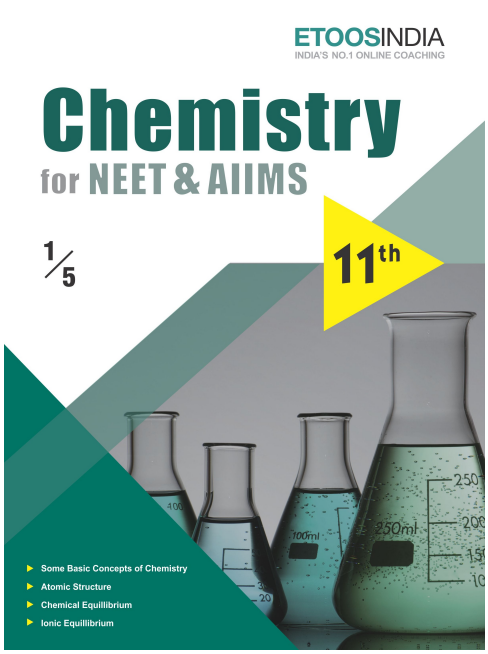
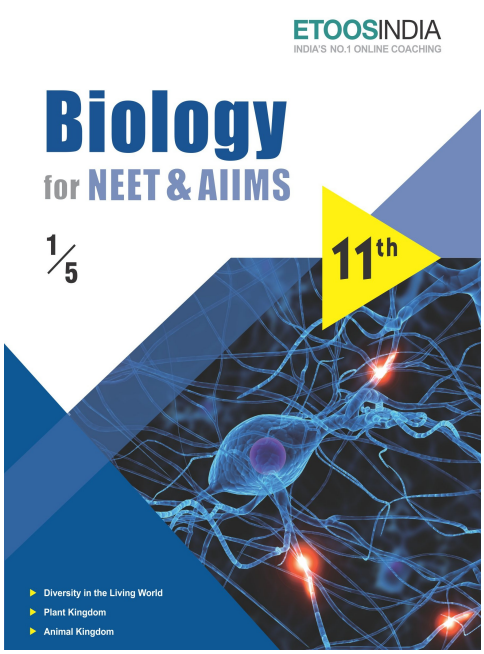
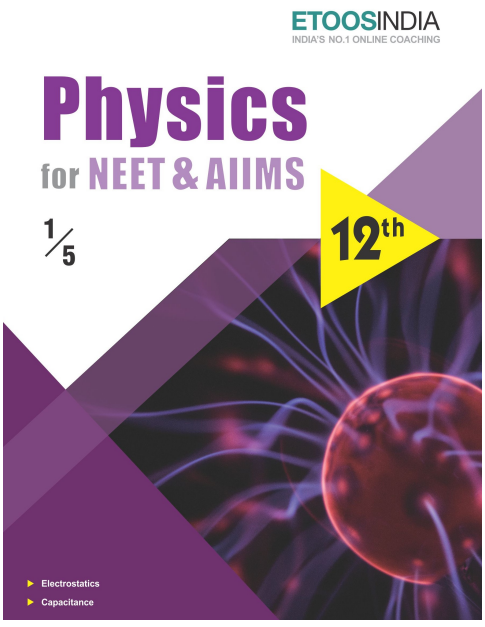
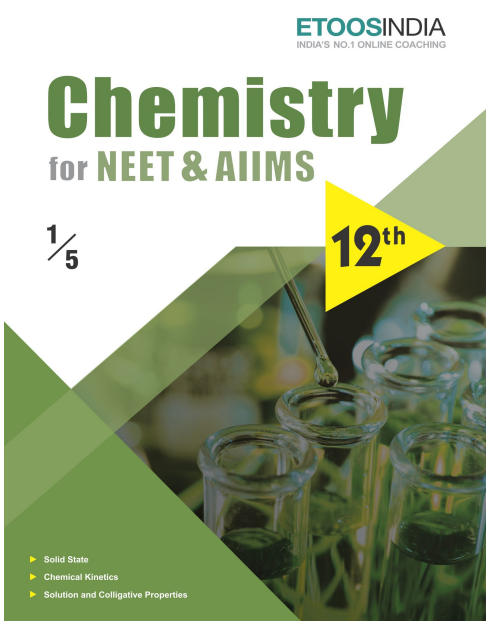
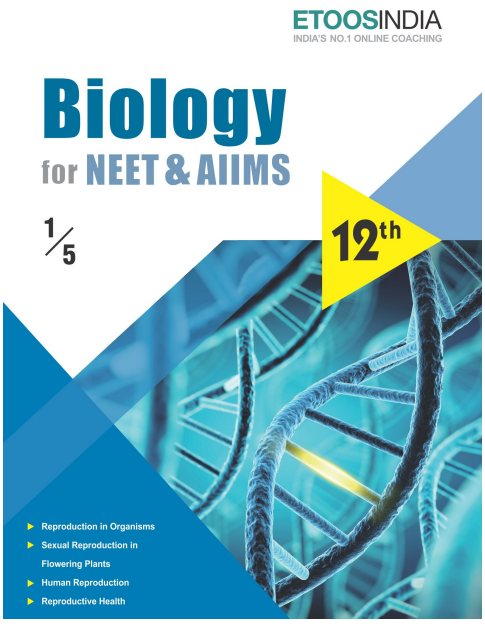












CHAPTER 03

HUMAN REPRODUCTION

"Man perfected by society is the best of all animals he is the most terrible of all when he lives without law, and without justice".

"HANS SPEMANN (1869-1941)"

INTRODUCTION

The living world around us exhibits a vast range of life forms which make this planet a wonderful and amazing place to reside. The variety of living organism flourishing on earth is infinite. Similarly variety of relationships are known to occur at micro level, i.e. cellular level too. Such molecular interactions occur inside, around and among the cells, which reveal astonishing facts about life. The Second approach is philosophical one, which mainly focuses on purpose of life to living organisms. Biological classification is the scientific procedure to classify the organisms into different groups on the basis of their similarities and dissimilarities also placing the groups ina a hierarchy of categories.

Life is a chaacteristic quality that differentiate an inanimate (non-living) object from the animate (living) forms. It is a unique, complex organisation of molecules that expresses itself through chemical reactions which lead to growth, development, responsiveness, adaptation and reproduction. The objects exhibiting growth, development, responsiveness and other characteristics of life are designated as **living beings.**

INTRODUCTION

An organism to continue its own race go through the process of reproduction, produces off springs like its own. On combining, in sexual reproduction the organisms produce male and female gametes develop into a new individual. The formation of gametes takes place in the reproductive organs.

PRIMARY SEX ORGAN

Essential organs which form the gametes. In males, the gamete forming organs are the testes. In females, the corresponding organs are ovaries.

1. The male gametes is the spermatozoan.
2. The female gamete is the ovum.

SECONDARY SEX ORGAN

These form the passage for the gametes to help the union of male & female gametes.

In male , the secondary sex organs are epididymis, vas deferens, seminal vesicles, prostate, bulbourethral glands & penis while in female - Fallopian tube, uterus & vagina. (Breast is an accessory sex organ)

DEVELOPMENT OF SEX ORGAN

During intra uterine life (IUL) testis & ovary develop from mesoderm. They develop in abdominal cavity. At the time of birth, testes descend down into scrotal sac but ovaries remain in abdominal cavity.

MALE REPRODUCTIVE SYSTEM

- In man, one pair of testes are the main or primary reproductive organ. Size 4-5 cm × 2-3 cm
- The testes are located in a small bag like structure which is situated out side & below the abdominal cavity are called as scrotum or scrotal sac. The temperature of scrotal sac is 2 to 3°C lesser than body temperature.
- Scrotal sac is lined by **spermatic fascia** & **dartos muscle** internally.

  Dartos muscle helps in regulation of the temperature with in the scrotum during cold season,

  During warm season, it becomes relaxed & during cold season, it becomes contract.

  Cremaster muscles line inside the wall of scrotal & inguinal canal region. It helps in elevation of testes.
- Each testis is attached to the dorsal body wall of the abdominal-cavity through a cord termed as the **Spermatic cord.** This cord is made up of elastin fibres & spermatic fascia. The contents of cord are vas deferens, gonadal veins, gonadal arteries, nerves and lymphatics.

  During embryonic stage, testes develop in abdominal cavity & they descend to reach the scrotum at the time of birth. When the testes does not descend to reach the scrotum but remain in abdominal cavity at the time of birth this conditions is called **undescended testes.** Such testis cannot develop and function properly and may develop malignancy. It is also called **cryptorchidism.**

  Orchiopexy : When the undescended testes are brought into scrotal sac by surgical process during childhood this process called as orchiopexy.

  Castration : Crushing of testes in bulls to convert them to bullocks. (This makes them more obidient due to fall in the level of testosterone)
- Each testis is attached to the walls of the scrotal-sac through flexible, elastic fibres. This group of fibres is called Gubernaculum.

Etoos Tips & Formulas

Male reproductive System -

Male reproductive organs

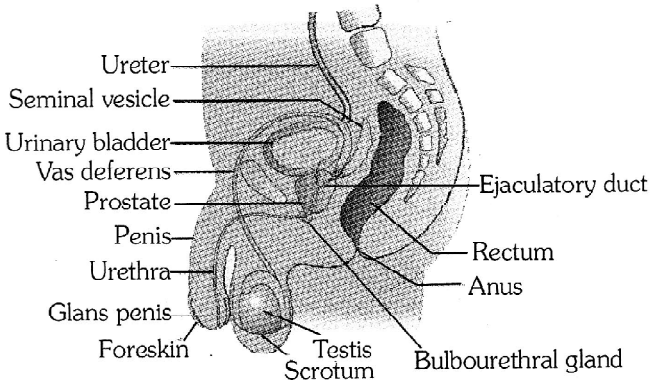
- Primary (Gametes forming organ)
  - Testes (Situated in extra abdominal Cavity) or Scrotum (2 – 2.5°c lower than normal body temp.)
- Secondary
  - →Epididymis-2
  - →Vasdeferens-2
  - →Seminal Vesicle-2
  - →Prostate-1
  - →Bulbourethral gland-2
  - →Penis 1

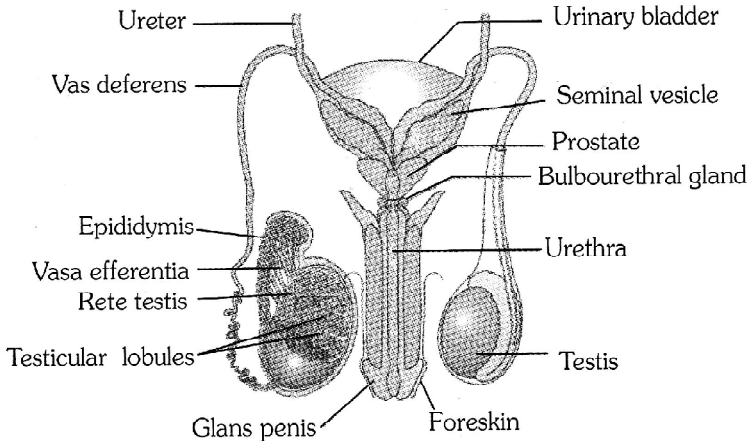
Testis

↓

internally testicular lobules (250)

- In interstitial spaces
  - In interstitial spaces → Contain Small blood Vessels and interstitial cells or Leydig's cells → Synthesis androgens
  - other immuno-competent cells(phagocytic cells)
- Seminiferous tubules in each lobules
  - Male germ cells (spermatogonia) → Mitotic & Meioticdiv. → Sperms
  - Sertoli cells → Provide nutrition to germ cells (spermatogonia)





SOLVED EXAMPLE

Ex.1 In human, the unpaired male reproductive structure is

Or

Which of the following is an accessory reproductive gland in male mammals

(A) Seminal vesicle **(B)** Prostate
(C) Bulbourethral gland **(D)** Testes
(E) Vas deferens

Sol. **(B)**

Ex.2 The abdominal passage which connects to the abdominal cavity with the scrotal sac in mammals is known as

(A) Spermatic canal **(B)** Neurenteric canal
(C) Inguinal canal **(D)** Haversion canal

Sol. **(C)** : Through this testes descend into scrotal sacs.

Ex.3 Sperm cells are produced in

(A) Seminiferous tubules **(B)** Interstitial cells
(C) Epididymis **(D)** Prostate gland

Sol. **(A)**

Ex.4 Secretions from which one of the following are rich in fructose, calcium and some enzymes

(A) Male accessory glands **(B)** Liver
(C) Pancreas **(D)** Salivary glands

Sol. **(A)** : Male accessory glands include a pair of seminal vesicles, a prostate gland, and pair of bulbourethral glands. Their secretions are called as seminal plasma, which is rich in fructose, has calcium and some enzymes.

Ex.5 The correct sequence of spermatogenetic stages leading to the formation of sperms in a mature human testis is

(A) Spermatocyte - spermatogonia-spermatid-sperms
(B) Spermatogonia-spermatocyte-spermatid-sperms
(C) Spermatid-spermatocyte-spermatogonia-sperms
(D) Spermatogonia-spermatid-spermatocyte-sperms

Sol. **(B)**

Ex.6 Which one of the following statements is false in respect of viability of mammalian sperm

(A) Sperm is viable for only up to 24 hours
(B) Survival of sperm depends on the pH of the medium and is more active in alkaline medium Â·
(C) Viability of sperm is determined by its motility
(D) Sperms must be concentrated in a thick suspension

Sol. **(D)**

Ex.7 In the absence of acrosome, the sperm

(A) Cannot penetrate the egg
(B) Cannot get energy
(C) Cannot get food
(D) Cannot swim

Sol. **(A)**

Ex.8 Supporting cells found in between the germinal epithelium of testes are called

Or

Which of the following cells are present in mammalian testes and help to nourish sperms

(A) Interstitial cells of Leydig
(B) Sertoli cells
(C) Granular cells
(D) Phagocytes

Sol. **(B)** : The germinal epithelium lining of the seminiferous tubules is made of two kinds of cell. A few larger cell columnar supporting cells are called sertoli cells or sustentacular cells or nurse cells.

Ex.9 Sertoli cells are found in

(A) Pancreas and secrete cholecystokinin
(B) Ovaries and secrete progesterone
(C) Adrenal cortex and secrete and adrenaline
(D) Seminiferous tubules.and provide nutrition to germ cells

Sol. **(D)**

Ex.10 What happens during fertilisation in humans after many sperms reach close to the ovum

(A) Cells of corona radiata trap all the sperms except one
(B) Only two sperms nearest the ovum penetrate zona pellucida
(C) Secretions of acrosome helps one sperm enter cytoplasm of ovum through zona pellucida
(D) All sperms except the one nearest to the ovum lose their tails

Sol. **(C)**

Ex.11 Withdrawal of which of the following hormones is the intermediate cause of menstruation

Or

Menstruation is triggered by an abrupt decline in the amount of

Or

Which hormone level reaches peak during luteal phase of menstrual cycle

(A) FSH-RH **(B)** Progesterone
(C) Estrogen **(D)** FSH

Sol. **(B)**

Exercise # 1 SINGLE OBJECTIVE NEET LEVEL

1. Cryptorchidism is the condition in man when
(A) There are two testis in each scrotum
(B) Testis do not descent into the scrotum
(C) Testis enlarge in the scrotum
(D) Testis degenerate in the scrotum

2. Bulbourethral gland is also known as
(A) Prostate gland (B) Cowper's gland
(C) Perineal gland (D) Meibomian gland

3. Which of the following is an accessory reproductive gland in male mammals
(A) Prostate gland
(B) Gastric gland
(C) Mushroom shaped gland
(D) Inguinal gland

4. Cowper's glands are present in
(A) Female mammals (B) Male mammals
(C) Both (A) and (B) (D) None

5. Seminiferous tubules develop central lumen after
(A) Birth (B) Prepuberal time
(C) Puberty (D) Old age

6. There are some special types of cells found in the seminiferous tubules known as sertoli cells. These are
(A) Germinal cells (B) Reproductive cells
(C) Somatic cells (D) Protective cells

7. There is a connective tissue cord extending between the testis and abdominal wall called
(A) Testis cord (B)Gubernaculum
(C) Mesentric cord (D) Spermatic cord

8. The elastic tissue connecting the cauda epididymis to the scrotal sac is
(A) Gubernaculum (B) Tendinous cord
(C) Scrotal ligament (D) Caput epididymis

9. The seminiferous tubules of the testis are lined by the germinal epithelium consisting of
(A) Cells of Sertoli (B) Spermatocytes
(C) Spermatogonium (D) Spermatids

10. By the contraction of spermatic cord the testis of man are not taken to the abdominal cavity. It is due to the following structure
(A) Narrowness of inguinal canal
(B) Attachment of testis by gubernaculum testis to the scrotal sac only
(C) Both (A) and (B)
(D) Fat bodies and gubernaculum present over the testis

11. Which cells in the testis secrete testosterone
(A) Interstitial cells or cells of Leydig
(B) Cells of the germinal epithelium
(C) Sertoli cells
(D) Secondary spermatocytes

12. If the vas deferens of a man is surgically disconnected
(A) Sperms in the semen will be without nuclei
(B) Semen will be without sperms
(C) Spermatogenesis will not occur
(D) Sperms in the semen will be non-motile

13. The capsule enclosing testis of mammal is called as
(A) Tunica albuginea (B) Tunica membrana
(C) Tunica vaginalis (D) Tunica vesculosa

14. The abdominal passage which connects the abdominal cavity with the scrotal sac in mammals is known as
(A) Spermatic canal (B) Neurenteric canal
(C) Inguinal canal (D) Haversion canal

15. If Cowper's glands are removed. They will affect
(A) Erection of penis (B) Sperms
(C) Sex recognition (D) Sexual behaviour

16. Gubernaculum cordis is a contractile structure that
(A) Pulls down the testis during breeding season into the scrotal sac
(B) Allows daily migration of the testis from the abdominal cavity into the scrotum
(C) Facilitates ejaculation of spermatozoa from the testis
(D) Keeps the testis in position

17. In man the two vasa deferentia open into
(A) Urinary bladder (B) Rectum
(C) Urethra (D) Penis

Exercise # 2 SINGLE OBJECTIVE AIIMS LEVEL

1. Functions of seminal fluid is/are
(A) Maintains the viability of sperms
(B) Maintains motility of sperms
(C) Provides proper *pH* and ionic strength
(D) All the above

2. In which animal the testes are abdominal during embryonic stages but migrate to scrotum just before birth where they remain throughout life
(A) Elephants (B) Men
(C) Rats (D) Whales

3. Ducts leading from the testes of rabbit are called
(A) Genital ducts (B) Spermatic ducts
(C) Urinary ducts (D) Vasa efferentia

4. The scrotal sac of a male mammal is homologous to
(A) Clitoris (B) Labia majora
(C) Vagina (D) Uterus

5. Which of the following is similar in function to Cowper's gland
(A) Bartholin's gland (B) Perineal gland
(C) Prostate gland (D) Rectal gland

6. Testes in rabbit are
(A) Inside the body
(B) On the sides of the kidneys
(C) In scrotal sacs
(D) On either side of dorsal aorta

7. Supporting cells found in between the germinal epithelium of testes are called
(A) Interstitial cells of Leydig
(B) Sertoli cells
(C) Granular cells
(D) Phagocytes

8. The testes of a great majority of mammals are typically enclosed in an extra abdominal sac, the scrotum. The temperature inside the scrotum is lower than that in the abdomen. What will happen if the temperature of the scrotum is artificially maintained to the level of abdominal temperature
(A) The germinal epithelium will produce a large quantity of androgen secretion
(B) The germinal epithelium of the testes will divide faster, thus producing more sperms
(C) The germinal epithelium of the testes will degenerate, resulting in sterility
(D) The germinal epithelium will carry out normal spermatogenesis

9. From the seminiferous tubules the spermatozoa pass into
(A) Epididymis (B) Vas deferens
(C) Seminal vesicle (D) Rete testis

10. Seminiferous tubules are found in
(A) Testis (B) Ovary
(C) Kidney (D) Lung

11. Cells of leydig are found in
(A) Kidney of rabbit (B) Kidney of frog
(C) Testis of frog (D) Testis of rabbit

12. Bidder's canal is found in
(A) Testes of frog (B) Kidney of frog
(C) Ovary of mammal (D) Kidney of mammal

13. Sertoli cells are found in
(A) Kidney of rabbit (B) Ovary of frog
(C) Testes of rabbit (D) Ovary of rabbit

14. In rabbit, head of the epididymis present at the head of the testis is called
(A) Vas deferens (B) Cauda epididymis
(C) Gubernaculum (D) Caput epididymis

15. Which of the following is the endocrine tissue of testes
(A) Epidermis (B) Inguinal canal
(C) Leydig cells (D) Spermatic cord

16. Phallic organs in cockroach are related to
(A) Male excretory system
(B) Male reproductive system
(C) Female excretory system
(D) Female reproductive system

17. In which of the following organism testes descends into scrotum in breeding season but in non-breeding season goes up
(A) Frog (B) Kangaroo
(C) Shrew (D) Bat

18. In most mammals, the testes are located in scrotal sac for
(A) Spermatogenesis
(B) Sex differentiation
(C) More space to visceral organs
(D) Indepndent functioning of kidney

Exercise # 3 PART - 1 MATRIX MATCH COLUMN

1. Column -I contains terms and Column -II contains definitions. Match them correctly andchoose the right answer

Column - I	Column - II
A. Parturition	i. Attachment of zygote to endometrium
B. Gestation	ii. Release of egg from Graafian follicle
C. Ovulation	iii. Delivery of baby from uterus
D. Implantation	iv. Duration between pregnancy
E. Conception	v. Stoppage of ovulation and menstruation

(A) A -ii; B - iv; C - i; D - v; E - iii
(B) A -iv; B - iii; C - i; D - v; E - ii
(C) A -v; B - i; C - ii; D - iii; E - iv
(D) A -iii; B - iv; C - ii; D - i; E - v

2. Match between the following representing parts of the sperm and their functions and choose the correct option

Column - I	Column - II
A. Head	i. Enzymes
B. Middle piece	ii. Sperm motility
C. Acrosome	iii. Energy
D. Tail	iv. Genetic material

Options :
(A) A - ii; B - iv; C - i; D - iii
(B) A - iv; B - iii; C - i; D - ii
(C) A - iv; B - i; C - ii; D - iii
(D) A - ii; B - i; C - iii; D - iv

3. Match the following and choose the correct options

Column - I	Column - II
A. Trophoblast	i. Embedding of blastocyst in the endometrium
B. Cleavage	ii. Gropu of cells that would differentiate as embryo
C. Inner cell mass	iii. Outer layer of blastocyst attached to the endometrium
D. Implantation	iv. Mitotic division of zygote

Options :
(A) A - ii; B - i; C - iii; D - iv
(B) A - iii; B - iv; C - ii; D - i
(C) A - iii; B - i; C - ii; D - iv
(D) A - ii; B - iv; C - iii; D - i

4. Match Column -I with Column - II and select the correct option from the codes given below.

Column -I	Column - II
A. Cleavage	i. Fertilization
B. Morula	ii. Mitotic divisions
C. Polyspermy	iii. Endometric
D. Implantation	iv. Little mulberry

(A) A - ii; B - iv; C - i; D - iii
(B) A - i; B - iv; C - ii; D - iii
(C) A - iv; B - ii; C - i; D - iii
(D) A - ii; B - iv; C - iii; D - i

5. Match the column - I with column - II and select the correct option from the codes given below.

Column - I	Column - II
A. Hypothalamus	i. Sperm lysins
B. Acrosome	ii. Estrogen
C. Graafian follicle	iii. Relaxin
D. Leydig's cells	iv. GnRH
E. Parturition	v. Testosterone

(A) A - iv; B - i; C - ii; D - iii; E - v
(B) A - ii; B - i; C - iv; D - iii; E - v
(C) A - ii; B - i; C - v; D - iv; E - iii
(D) A - iii; B - iv; C - ii; D - i; E - v

Exercise # 4

PART - 1 PREVIOUS YEAR (NEET/AIPMT)

1. Cleavage in mammalian egg is [CBSE AIPMT 2000]
(A) Equal holoblastic
(B) Unequal holoblastic
(C) Superficial meroblastic
(D) Discoidal meroblastic

2. Which set is similar ? [CBSE AIPMT 2001]
(A) Coropus luteum – Graafian follicle
(B) Sebum – Sweat
(C) Bundle of His – Pacemaker
(D) Vit–B_7 – Niacin

3. What is true for cleavage ? [CBSE AIPMT 2002]
(A) Size of embryo increases
(B) Size of cells decreases
(C) Size of cells increases
(D) Size of embryo decreases

4. During embryonic development, the establishment of polarity along anterior/ posterior, dorsal/ventral or medial/lateral axis is called [CBSE AIPMT 2003]
(A) Anamorphosis (B) Pattern formation
(C) Organiser phenomena (D) Axis formation

5. Bartholin's glands are situated [CBSE AIPMT 2003]
(A) On either side of vagina in humans
(B) On either side of vas deference in humans
(C) On the sides of the head of some amphibians
(D) At the reduced tail end of birds

6. Ovulation in the human female normally takes place during the menstrual cycle -[CBSE AIPMT 2004]
(A) At the mid secretory phase
(B) Just before the end of the secretory cycle
(C) At the beginning of the proliferative phase
(D) At the end of the proliferative phase

7. Grey crescent is the area - [CBSE AIPMT 2004]
(A) At the point of entry of sperm into ovum
(B) Just opposite to the site of entry of sperm into ovum
(C) At the animal pole
(D) At the vegetal pole

8. If mammalian ovum fails to get fertilised, which one of the following is unlikely
(A) Corpus luteum will disintegrate
(B) Estrogen secretion further vdecreases
(C) Primary follicle starts developing
(D) Progesterone secretion rapidly declines

9. Which part of ovary in mammals acts as an endocrine gland after evolution? [CBSE AIPMT 2007]
(A) Graafian follicle (B) Stroma
(C) Germinal epithelium (D) Vitelline membrane

10. In humans, at the end of the first meiotic division, the male germ cells differentiate into the: [CBSE AIPMT 2008, 1994]
(A) secondary spermatocytes
(B) primary spermatocytes
(C) spermatogonia
(D) spermatids

11. Which extra embryonic membrane in humans prevents desiccation of the embryo inside the uterus? [CBSE AIPMT 2008]
(A) Chorion (B) Allantois
(C) Yolk sac (D) Amnion

12. Which one of the following statements is incorrect about menstruation? [CBSE AIPMT 2008]
(A) During normal menstruation about 40 ml blood is lost
(B) The menstrual fluid can easily clot
(C) At menopause in the female, there is especially abrupt increase in gonadotropic hormones
(D) The beginning of the cycle of menstruation is called menarche

13. Which of the following is the correct matching of the events occurring during menstrual cycle ? [CBSE AIPMT 2009]
(A) Ovulation LH and FSH attain peak level and sharp fall in the secretion of progesterone
(B) Proliferative phase
Rapid regeneration of myometrium and maturation of Grafian follicle
(C) Development of corpus luteum Secretory phase and increased secretion of progesterone
(D) Menstruation Breakdown of myometrium and ovum not fertilized

MOCK TEST

1. Which of the following depicts the correct pathway of transport of sperms?
(A) Rete testis → Efferent ductules → Epididymis → Vas deferens
(B) Rete testis → Epididymis → Efferent ductules → Vas deferens
(C) Rete testis → Vas deferens → Efferent ductules → Epidydymis
(D) Efferent ductules → Rete testis → Vas deferens → Epididymis

2. Which one of these is not an accessory glands in male reproductive system?
(A) Cowper's gland (B) Prostate gland (C) Bartholin's gland (D) Seminal vesicle

3. Vasa efferentia are muscular tubes, each of which connects
(A) an epididymis to vas deferens (B) vas deferens to seminal vesicle
(C) rete testis to vas deferens (D) rete testis to epididymis

4. In human, the unpaired male reproductive structure is
(A) seminal vesicle (B) prostate (C) bulbourethral gland (D) testes
(E) vas deferens

5. The part of Fallopian tube closest to the ovary is
(A) infundibulum (B) isthmus (C) ampulla (D) cervix

6. Bartholin's glands are homologous to
(A) bulbourethral glands (B) seminal vesicle (C) prostate gland (D) glans penis

7. Changes in GnRH pulse frequency in females is controlled by circulating levels of
(A) progesterone only (B) progesterone and inhibin
(C) estrogen and progesterone (D) estrogen and inhibin

8. Identify the correct statement on 'inhibin'.
(A) Is produced by granulosa cells in ovary and inhibits the secretion of LH
(B) Is produced by nurse cells in testes and inhibits the secretion of LH
(C) Inhibits the secretion of LH, FSH and prolactin
(D) Is produced by granulosa cells in ovary and inhibits the secretion of FSH

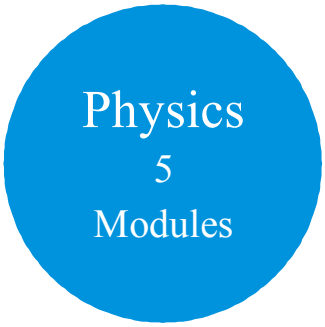
9. Human primary spermatocyte contains
(A) 22 autosomes and an X-chromosome (B) 22 autosomes and a Y-chromosome
(C) 22 autosomes and an X or Y chromo-some (D) 22 pairs of autosomes and XY chromosomes.

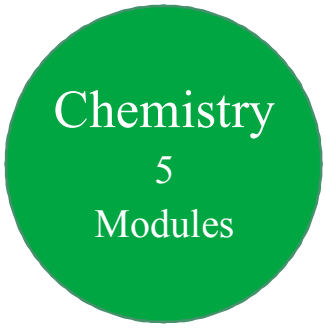
10. Select the incorrect statement.
(A) LH and FSH decrease gradually during the follicular phase.
(B) LH triggers secretion of androgens from the Leydig cells.
(C) FSH stimulates the sertoli cells which help in spermiogenesis.
(D) LH triggers ovulation in ovary.

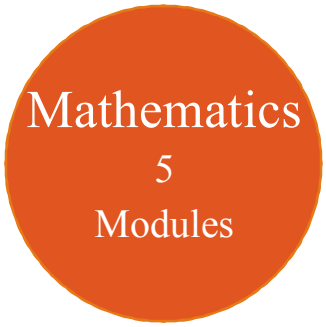
11. Which of the following is responsible for the production of progesterone, (the hormone responsible for the maintenance of endometrium)?
(A) Uterus (B) Graafian follicle (C) Corpus luteum (D) Ovary

12. Corpus luteum is maintained in a woman, under the effect of
(A) prolactin (B) progesterone
(C) human chorionic gonadotropin (D) somatomammotropin

11th Class Modules Chapter Details

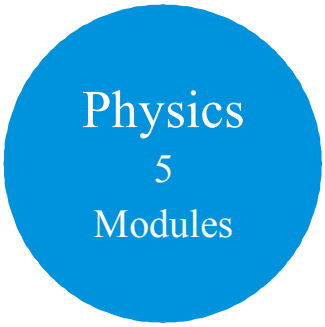


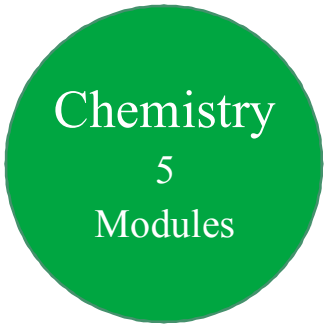


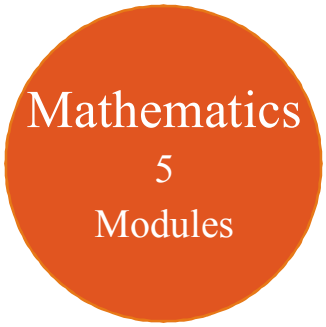


PHYSICS	CHEMISTRY	BIOLOGY
Module-1 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics **Module-2** 1. Law of Motion & Friction 2. Work, Energy & Power **Module-3** 1. Motion of system of particles & Rigid Body 2. Gravitation **Module-4** 1. Mechanical Properties of Matter 2. Thermal Properties of Matter **Module-5** 1. Oscillations 2. Waves	**Module-1(PC)** 1. Some Basic Conceps of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium **Module-2(PC)** 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) **Module-3(IC)** 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block **Module-4(OC)** 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry **Module-5(OC)** 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds	**Module-1** 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom **Module-2** 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals **Module-3** 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition **Module-4** 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases **Module-5** 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

12th Class Modules Chapter Details







PHYSICS

Module-1

1. Electrostatics
2. Capacitance

Module-2

1. Current Electricity
2. Magnetic Effect of Current and Magnetism

Module-3

1. Electromagnetic Induction
2. Alternating Current

Module-4

1. Geometrical Optics
2. Wave Optics

Module-5

1. Modern Physics
2. Nuclear Physics
3. Solids & Semiconductor Devices
4. Electromagnetic Waves

CHEMISTRY

Module-1(PC)

1. Solid State
2. Chemical Kinetics
3. Solutions and Colligative Properties

Module-2(PC)

1. Electrochemistry
2. Surface Chemistry

Module-3(IC)

1. P-Block Elements
2. Transition Elements (d & f block)
3. Co-ordination Compound
4. Metallurgy

Module-4(OC)

1. HaloAlkanes & HaloArenes
2. Alcohol, Phenol & Ether
3. Aldehyde, Ketone & Carboxylic Acid

Module-5(OC)

1. Nitrogen & Its Derivatives
2. Biomolecules & Polymers
3. Chemistry in Everyday Life

BIOLOGY

Module-1

1. Reproduction in Organisms
2. Sexual Reproduction in Flowering Plants
3. Human Reproduction
4. Reproductive Health

Module-2

1. Principles of Inheritance and Variation
2. Molecular Basis of Inheritance
3. Evolution

Module-3

1. Human Health and Disease
2. Strategies for Enhancement in Food Production
3. Microbes in Human Welfare

Module-4

1. Biotechnology: Principles and Processes
2. Biotechnology and Its Applications
3. Organisms and Populations

Module-5

1. Ecosystem
2. Biodiversity and Conservation
3. Environmental Issues