NEET 2024 Zoology Q3 Question Paper with Solutions

Section A

151. Following are the stages of pathway for conduction of an action potential through the heart

A. AV bundle

B. Purkinje fibers

C. AV node

D. Bundle branches

E. SA node

Choose the correct sequence of pathway from the options given below:

(1) E-C-A-D-B

(2) A-E-C-B-D

(3) B-D-E-C-A

(4) E-A-D-B-C

Correct Answer: (1) E-C-A-D-B

Solution: The correct sequence for conduction of an action potential in the heart is:

$$\text{SA node} \rightarrow \text{AV node} \rightarrow \text{AV bundle} \rightarrow \text{Bundle branches} \rightarrow \text{Purkinje fibers}$$

Thus, the correct sequence is: (1) E-C-A-D-B.

Quick Tip

The action potential in the heart follows a specific sequence to ensure coordinated contraction: SA node → AV node → AV bundle → Bundle branches → Purkinje fibers.

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152. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on

(1) 5th segment

(2) 10th segment

(3) 8th and 9th segment

(4) 11th segment

Correct Answer: (2)

Solution: In cockroaches, anal cerci are present on the 10th segment in both sexes, which help in sensory functions.

Quick Tip

The anal cerci in cockroaches play a role in detecting air currents and vibrations.

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153. The flippers of the Penguins and Dolphins are the example of the

(1) Adaptive radiation

(2) Natural selection

(3) Convergent evolution

(4) Divergent evolution

Correct Answer: (3)

Solution: The flippers of penguins and dolphins are examples of convergent evolution, where species from different evolutionary backgrounds evolve similar traits.

Quick Tip

Convergent evolution results in the development of similar traits in unrelated species due to similar environmental pressures.

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154. Which of the following is not a component of Fallopian tube?

(1) Uterine fundus

(2) Isthmus

(3) Infundibulum

(4) Ampulla

Correct Answer: (1)

Solution: The Fallopian tube consists of components like the isthmus, infundibulum, and ampulla, but not the uterine fundus.

Quick Tip

The Fallopian tube helps in transporting eggs from the ovaries to the uterus and is not associated with the uterine fundus.

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155. Given below are some stages of human evolution.

Arrange them in correct sequence. (Past to Recent)

A. Homo habilis

B. Homo sapiens

C. Homo neanderthalensis

D. Homo erectus

Choose the correct sequence of human evolution from the options given below:

(1) D-A-C-B

(2) B-A-D-C

(3) C-B-D-A

(4) A-D-C-B

Correct Answer: (4)

Solution: Homo habilis (A) was one of the earliest members of the genus Homo, followed by Homo erectus (D), then Homo neanderthalensis (C), and finally Homo sapiens (B).

Quick Tip

Human evolution is a continuous process, with different species evolving over time.

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156. Which of the following is not a steroid hormone?

(1) Cortisol

(2) Testosterone

(3) Progesterone

(4) Glucagon

Correct Answer: (4) Glucagon

Solution: Glucagon is a peptide hormone, not a steroid hormone. Cortisol, testosterone, and progesterone are all steroid hormones, derived from cholesterol.

Quick Tip

Steroid hormones are lipophilic and are derived from cholesterol. Peptide hormones like glucagon are water-soluble.

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157. Match List I with List II:

List I	List II
$A.\alpha - I antitrypsin$	I.Cotton bollworm
B.Cry IAb	II.ADA deficiency
C.Cry IAc	III.Emphysema
D.Enzyme replacement therapy	IV.Corn borer

Choose the correct answer from the options given below:

(1) A-II, B-I, C-IV, D-III

(2) A-III, B-I, C-II, D-IV

(3) A-III, B-IV, C-I, D-II

(4) A-II, B-IV, C-I, D-III

Correct Answer: (3)

Solution:

- α-I antitrypsin deficiency leads to emphysema (III).
- Cry IAb is associated with cotton bollworm (I).

- Cry IAc is associated with corn borer (IV).
- Enzyme replacement therapy is used for ADA deficiency (II).

Quick Tip

Cry proteins are insecticidal and are used in genetically modified crops to protect them from pests like bollworm and corn borer.

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158. Following are the stages of cell division:

A. Gap 2 phase

B. Cytokinesis

C. Synthesis phase

D. Karyokinesis

E. Gap 1 phase

Choose the correct sequence of stages from the options given below:

(1) C-E-D-A-B

(2) E-B-D-A-C

(3) B-D-E-A-C

(4) E-C-A-D-B

Correct Answer: (4)

Solution: The correct sequence of stages in cell division is:

1. Gap 1 phase (E)
2. Synthesis phase (C)
3. Gap 2 phase (A)
4. Karyokinesis (D)
5. Cytokinesis (B)

Quick Tip

Cell division includes interphase (G1, S, G2) and mitosis (karyokinesis and cytokinesis).

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159. Which one of the following factors will not affect the Hardy-Weinberg equilibrium?

(1) Genetic recombination

(2) Genetic drift

(3) Gene migration

(4) Constant gene pool

Correct Answer: (4)

Solution: A constant gene pool means no changes in allele frequencies, so it does not affect the Hardy-Weinberg equilibrium. Genetic recombination, genetic drift, and gene migration all influence allele frequencies.

Quick Tip

The Hardy-Weinberg equilibrium assumes that no evolutionary forces are acting on the population (no genetic drift, migration, mutation, or natural selection).

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160. Which of the following are Autoimmune disorders?

A. Myasthenia gravis

B. Rheumatoid arthritis

C. Gout

D. Muscular dystrophy

E. Systemic Lupus Erythematosus (SLE)

Choose the most appropriate answer from the options given below:

(1) A,B D only

(2) A,B E only

(3) B,C E only

(4) C,D E only

Correct Answer: (2)

Solution: Myasthenia gravis, rheumatoid arthritis, and systemic lupus erythematosus (SLE) are autoimmune disorders. Gout and muscular dystrophy are not autoimmune disorders.

Quick Tip

Autoimmune diseases occur when the immune system mistakenly attacks the body's own cells.

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161. Match List I with List II:

List I	List II
$A. Typhoid$	$I. Fungus$
$B. Leishmaniasis$	$II. Nematode$
$C. Ringworm$	$III. Protozoa$
$D. Filariasis$	$IV. Bacteria$

Choose the correct answer from the options given below:

(1) A-I, B-III, C-II, D-IV

(2) A-IV, B-III, C-I, D-II

(3) A-III, B-I, C-IV, D-II

(4) A-II, B-IV, C-III, D-I

Correct Answer: (2) A-IV, B-III, C-I, D-II

Solution:

A. Typhoid is caused by *Salmonella typhi*, a bacteria.

B. Leishmaniasis is caused by *Leishmania*, a protozoa.

C. Ringworm is caused by a fungus.

D. Filariasis is caused by *Wuchereria bancrofti*, a nematode.

Thus, the correct match is: (2) A-IV, B-III, C-I, D-II.

Quick Tip

Leishmaniasis and Filariasis are protozoal and nematode infections, respectively, while Ringworm and Typhoid are fungal and bacterial infections.

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162. Match List I with List II:

List I	List II
A.Expiratory capacity	I.Expiratory reserve volume + Tidal volume + Inspiratory volume
B.Functional residual capacity	II.Tidal volume + Expiratory reserve volume
C.Vital capacity	III.Tidal volume + Inspiratory reserve volume
D.Inspiratory capacity	IV.Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-I, D-III

(2) A-III, B-II, C-IV, D-I

(3) A-II, B-I, C-IV, D-III

(4) A-I, B-III, C-II, D-IV

Correct Answer: (1)

Solution:

- Expiratory capacity = Tidal volume + Expiratory reserve volume (II).
- Functional residual capacity = Expiratory reserve volume + Residual volume (IV).
- Vital capacity = Expiratory reserve volume + Tidal volume + Inspiratory reserve volume (I).
- Inspiratory capacity = Tidal volume + Inspiratory reserve volume (III).

Quick Tip

Vital capacity is the maximum amount of air a person can exhale after a maximum inhalation.

163. Match List I with List II:

List I	List II
A.Down's syndrome	I.11th chromosome
B.α – Thalassemia	II.'X' chromosome
C.β – Thalassemia	III.21st chromosome
D.Klinefelter's syndrome	IV.16th chromosome

Choose the correct answer from the options given below :

Correct Answer: (3) A-III, B-IV, C-I, D-II

Solution: Down's syndrome is caused by a trisomy of the 21st chromosome (III).

-Thalassemia is associated with mutations on the 16th chromosome (IV).

-Thalassemia is caused by mutations on the 11th chromosome (I).

Klinefelter's syndrome is linked to the 'X' chromosome (II).

Quick Tip

Down's syndrome is characterized by an extra chromosome 21. Klinefelter's syndrome results from the presence of an extra X chromosome in males.

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164. Given below are two statements:

Statement I: FSH acts upon ovarian follicles in female and Leydig cells in male.

Statement II: Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human beings.

Choose the correct answer from the options given below:

(1) Both Statement I and Statement II are true and R is the correct explanation of A

(2) Both Statement I and Statement II are true but R is NOT the correct explanation of A

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Correct Answer: (4) Statement I is false but Statement II is true

Solution: Statement I is false because FSH acts on granulosa cells in females and Sertoli cells in males, not on Leydig cells. Statement II is true as estrogen is secreted by growing ovarian follicles and androgens by Leydig cells.

Quick Tip

FSH stimulates the granulosa cells in females and Sertoli cells in males, while LH stimulates the Leydig cells in males.

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165. Match List I with List II:

List I	List II
A.Pleurobrachia	I.Mollusca
B.Radula	II.Ctenophora
C.Stomochord	III.Osteichthyes
D.Air bladder	IV.Hemichordata

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-II, B-I, C-IV, D-III

(3) A-II, B-IV, C-I, D-III

(4) A-IV, B-III, C-II, D-I

Correct Answer: (2)

Solution: Pleurobrachia is a ctenophore (II). Radula is a characteristic of Mollusca (I). Stomochord is a feature of Hemichordata (IV). Air bladder is found in Osteichthyes (III).

Quick Tip

Ctenophores are marine invertebrates, and the radula is a feeding organ found in mollusks.

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166. Match List I with List II:

List I (Sub-Phases of Prophase I)	List II (Specific Characters)
A.Diakinesis	I.Synaptonemal complex formation
B.Pachytene	II.Completion of terminalisation of chiasmata
C.Zygotene	III.Chromosomes look like thin threads
D.Leptotene	IV.Appearance of recombination nodules

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-I, B-II, C-IV, D-III

(3) A-II, B-IV, C-I, D-II

(4) A-IV, B-III, C-II, D-I

Correct Answer: (3) A-II, B-IV, C-I, D-II

Solution:

- Diakinesis involves terminalisation of chiasmata (II).
- Pachytene is marked by the appearance of recombination nodules (IV).
- Zygotene is when the synaptonemal complex forms (I).
- Leptotene is characterized by chromosomes appearing as thin threads (III).

Quick Tip

Prophase I of meiosis has distinct stages: leptotene, zygotene, pachytene, diplotene, and diakinesis.

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167. The "Ti plasmid" of Agrobacterium tumefaciens stands for

(1) Tumour inhibiting plasmid

(2) Tumor independent plasmid

(3) Tumor inducing plasmid

(4) Temperature independent plasmid

Correct Answer: (3)

Solution: The Ti plasmid in Agrobacterium tumefaciens induces the formation of tumors in plants by transferring part of the plasmid DNA to the plant genome.

Quick Tip

The Ti plasmid is a key tool in plant genetic engineering, used to insert foreign genes into plant cells.

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168. Match List I with List II:

List I	List II
A.Cocaine	I.Effective sedative in surgery
B.Heroin	II.Cannabis sativa
C.Morphine	III.Erythroxylum
D.Marijuana	IV.Papaver somniferum

Choose the correct answer from the options given below: (1) A-IV, B-III, C-I, D-II

(2) A-I, B-III, C-II, D-IV

(3) A-II, B-I, C-III, D-IV

(4) A-III, B-IV, C-I, D-II

Correct Answer: (4) A-III, B-IV, C-I, D-II

Solution:

- Cocaine is derived from Erythroxylum (III).
- Heroin is derived from Papaver somniferum (IV).
- Morphine is an effective sedative in surgery (I).
- Marijuana is derived from Cannabis sativa (II).

Quick Tip

Morphine and heroin are derived from the opium poppy, while marijuana comes from Cannabis sativa.

169. Which one is the correct product of DNA dependent RNA polymerase to the given template?

$3'$TACATGGCAAATATCCATTCA$5'$

(1) 5' AUGUACCGUUUAUAGGUAAGU 3'

(2) 5' AUGUAAAGUUUAUAGGUAAGU 3'

(3) 5' AUGUACCGUUUAUAGGGAAGU 3'

(4) 5' ATGTACCGTTTATAGGTAAGT 3'

Correct Answer: (1) 5' AUGUACCGUUUAUAGGUAAGU 3'

Solution: The correct RNA sequence transcribed from the template strand is 5' AUGUACCGUUUAUAGGUAAGU 3'. RNA polymerase synthesizes the RNA strand in the 5' $\rightarrow$ 3' direction, complementary to the DNA template.

Quick Tip

DNA-dependent RNA polymerase uses the DNA template strand to synthesize an RNA strand complementary to the template.

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170. Match List I with List II:

List I	List II
A.Pons	I.Provides additional space for Neurons, regulates posture and balance.
B.Hypothalamus	II.Controls respiration and gastric secretions.
C.Medulla	III.Connects different regions of the brain.
D.Cerebellum	IV.Neurosecretory cells

Choose the correct answer from the options given below:

(1) A-II, B-III, C-I, D-IV

(2) A-III, B-IV, C-II, D-I

(3) A-I, B-III, C-II, D-IV

(4) A-II, B-I, C-III, D-IV

Correct Answer: (2)

Solution:

- Pons connects different regions of the brain (III).
- Hypothalamus has neurosecretory cells (IV).
- Medulla controls respiration and gastric secretions (II).
- Cerebellum provides additional space for neurons, regulates posture and balance (I).

Quick Tip

The pons and medulla are part of the brainstem, which controls vital functions like respiration and heartbeat.

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171. Match List I with List II:

List I	List II
A.Lipase	I.Peptide bond
B.Nuclease	II.Ester bond
C.Protease	III.Glycosidic bond
D.Amylase	IV.Phosphodiester bond

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-III, B-II, C-I, D-IV

(3) A-II, B-IV, C-I, D-III

(4) A-IV, B-I, C-III, D-II

Correct Answer: (3) A-II, B-IV, C-I, D-III

Solution:

- Lipase acts on ester bonds (II).

- Nuclease acts on phosphodiester bonds (IV).
- Protease breaks peptide bonds (I).
- Amylase acts on glycosidic bonds (III).

Quick Tip

Lipase, Nuclease, Protease, and Amylase are enzymes that break down different bonds in molecules like fats, nucleic acids, proteins, and carbohydrates.

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172. Which of the following is not a natural/traditional contraceptive method?

(1) Coitus interruptus
(2) Periodic abstinence
(3) Lactational amenorrhea
(4) Vaults

Correct Answer: (4)

Solution: Vaults are not a natural or traditional contraceptive method. Coitus interruptus, periodic abstinence, and lactational amenorrhea are all traditional methods.

Quick Tip

Traditional contraceptive methods are those that do not involve modern medical interventions but rely on behavior or biological processes.

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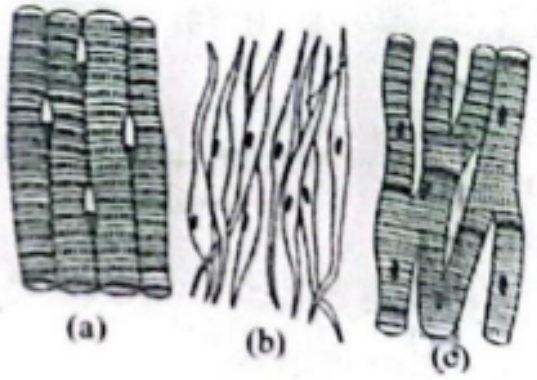
173. Three types of muscles are given as a, b, and c. Identify the correct matching pair along with their location in the human body:



Muscle Name/Location:

(1) (a) Smooth - Toes, (b) Skeletal – Legs, (c) Cardiac – Heart

(2) (a) Skeletal - Triceps, (b) Smooth – Stomach, (c) Cardiac – Heart

(3) (a) Skeletal - Biceps, (b) Involuntary – Intestine, (c) Smooth – Heart

(4) (a) Involuntary – Nose tip, (b) Skeletal – Bone, (c) Cardiac – Heart

Correct Answer: (2) (a) Skeletal - Triceps, (b) Smooth – Stomach, (c) Cardiac – Heart

Solution: Skeletal muscles (voluntary) are attached to bones like triceps. Smooth muscles (involuntary) are found in organs like the stomach. Cardiac muscles are located in the heart.

Quick Tip

Muscles are classified into skeletal, smooth, and cardiac based on structure, control, and location.

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174. Which of the following statements is incorrect?

(1) A bio-reactor provides optimal growth conditions for achieving the desired product

(2) Most commonly used bio-reactors are of stirring type

(3) Bio-reactors are used to produce small scale bacterial cultures

(4) Bio-reactors have an agitator system, an oxygen delivery system and foam control system

Correct Answer: (3) Bio-reactors are used to produce small scale bacterial cultures

Solution: Bio-reactors are typically used for large-scale production of microorganisms, not just small-scale bacterial cultures. They are designed to maintain optimal conditions for high-yield production.

Quick Tip

Bio-reactors are essential for large-scale fermentation processes, such as the production of antibiotics or biofuels.

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175. Given below are two statements:

One is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.

Reason R: Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby. **In the light of the above statements, choose the most appropriate answer from the options given below:**

(1) Both A and R are correct and R is the correct explanation of A

(2) Both A and R are correct but R is NOT the correct explanation of A

(3) A is correct but R is not correct

(4) A is not correct but R is correct

Correct Answer: (1)

Solution: Breast-feeding is essential for infant health, and colostrum contains antibodies that help develop resistance against infections, making both statements true. The reason correctly explains the assertion.

Quick Tip

Breast-feeding provides crucial nutrients and antibodies through colostrum, which is the first milk produced after birth.

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176. Which of the following factors are favourable for the formation of oxyhaemoglobin

in alveoli?

(1) High pO2 and High pCO2

(2) High pO2 and Lesser H+ concentration

(3) Low pCO2 and High H+ concentration

(4) Low pCO2 and High temperature

Correct Answer: (2)

Solution: High partial pressure of oxygen (pO2) and lower concentration of hydrogen ions (H+) favour the formation of oxyhaemoglobin in the alveoli.

Quick Tip

Oxyhaemoglobin is formed when oxygen binds to hemoglobin, primarily in the lungs where oxygen levels are high and pH is less acidic.

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177. Match List I with List II:

List I	List II
A.Common cold	I.Plasmodium
B.Haemozoin	II.Typhoid
C.Widal test	III.Rhinoviruses
D.Allergy	IV.Dust mites

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-III, D-I

(2) A-I, B-III, C-II, D-IV

(3) A-III, B-I, C-II, D-IV

(4) A-IV, B-II, C-III, D-I

Correct Answer: (3) A-III, B-I, C-II, D-IV

Solution:

- Common cold is caused by Rhinoviruses (III).
- Haemozoin is released in blood due to ruptured RBCs after Plasmodium infection (I).

- Widal test is used to confirm typhoid fever (II).
- Allergy is caused due to dust mites (IV).

Quick Tip

Rhinoviruses are the main cause of common cold, while Haemozoin is produced in Plasmodium infection.

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178. Consider the following statements:

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

Correct Answer: (2) A only

Solution:

- Annelids are true coelomates, meaning they have a body cavity completely lined with mesoderm (A).
- Poriferans are neither coelomates nor pseudocoelomates, they lack a true body cavity.
- Aschelminthes (roundworms) are pseudocoelomates, not acoelomates.
- Platyhelminthes (flatworms) are acoelomates, lacking a body cavity.

Quick Tip

Coelomates have a true coelom, pseudocoelomates have a false cavity, and acoelomates lack a body cavity.

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179. Match List I with List II:

List I	List II
A.Non-medicated IUD	I.Multiload 375
B.Copper releasing IUD	II.Progestogens
C.Hormone releasing IUD	III.Lippes loop
D.Implants	IV.LNG-20

Choose the correct answer from the options given below:

(1) A-III, B-I, C-II, D-IV

(2) A-I, B-III, C-IV, D-II

(3) A-IV, B-I, C-II, D-III

(4) A-III, B-I, C-IV, D-II

Correct Answer: (4) A-III, B-I, C-IV, D-II

Solution:

- Non-medicated IUD is Lippes loop (III).
- Copper releasing IUD is Multiload 375 (I).
- Hormone releasing IUD is LNG-20 (IV).
- Implants contain Progestogens (II).

Quick Tip

IUDs (Intrauterine Devices) are either medicated or non-medicated and work by releasing copper or hormones to prevent pregnancy.

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180. Given below are two statements:

Statement I: In the nephron, the descending limb of the loop of Henle is impermeable to water and permeable to electrolytes.

Statement II: The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.

In the light of the above statements, choose the correct answer from the option given below:

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Correct Answer: (2)

Solution: Statement I is false: The descending limb of the loop of Henle is permeable to water and impermeable to electrolytes.

Statement II is also false: The proximal convoluted tubule is lined by cuboidal epithelium with a brush border, not simple columnar.

Quick Tip

The loop of Henle plays a critical role in the concentration of urine and the proximal convoluted tubule aids in reabsorption.

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181. The following diagram showing restriction sites in E. coli cloning vector pBR322. Find the role of 'X' and 'Y' genes:

(1) The gene 'X' is responsible for resistance to antibiotics and 'Y' for protein involved in the replication of Plasmid.

(2) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

(3) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.

(4) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.

Correct Answer: (2)

Solution: Gene 'X' in the plasmid pBR322 is responsible for controlling the copy number of the plasmid, while Gene 'Y' is involved in the replication process.

Quick Tip

pBR322 is a commonly used plasmid vector in genetic engineering that contains antibiotic resistance genes and replication control mechanisms.

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182. Match List I with List II:

List I	List II
A.Axoneme	I.Centriole
B.Cartwheel pattern	II.Cilia and flagella
C.Crista	III.Chromosome
D.Satellite	IV.Mitochondria

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-II, D-I

(2) A-IV, B-II, C-III, D-I

(3) A-II, B-IV, C-I, D-III

(4) A-II, B-I, C-IV, D-III

Correct Answer: (4)

Solution:

- Axoneme is associated with cilia and flagella (II).
- Cartwheel pattern is found in centrioles (I).
- Crista is a feature of mitochondria (IV).
- Satellite is associated with chromosomes (III).

Quick Tip

The structure and function of cell components like mitochondria, centrioles, and cilia are crucial for cellular processes.

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183. Match List I with List II:

List I	List II
A.Pterophyllum	I.Hag fish
B.Myxine	II.Saw fish
C.Pristis	III.Angel fish
D.Exocoetus	IV.Flying fish

Choose the correct answer from the options given below:

(1) A-II, B-I, C-III, D-IV

(2) A-III, B-I, C-II, D-IV

(3) A-IV, B-I, C-II, D-III

(4) A-III, B-II, C-I, D-IV

Correct Answer: (2)

Solution:

Pterophyllum is the Angel fish (III). Myxine is the Hag fish (I). Pristis is the Saw fish (II). Exocoetus is the Flying fish (IV).

Quick Tip

Fish species vary widely, and each has unique adaptations like flight or deep-sea living.

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184. Match List I with List II:

List I	List II
A.Fibrous joints	I.Adjacent vertebrae, limited movement
B.Cartilaginous joints	II.Humerus and Pectoral girdle, rotational movement
C.Hinge joints	III.Skull, don't allow any movement
D.Ball and socket joints	IV.Knee, help in locomotion

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-I, B-III, C-II, D-IV

(3) A-II, B-III, C-I, D-IV

(4) A-III, B-I, C-IV, D-II

Correct Answer: (4)

Solution:

- Fibrous joints are immovable like those in the skull (III).
- Cartilaginous joints are slightly movable, such as between adjacent vertebrae (I).
- Hinge joints allow movement like in the knee (IV).
- Ball and socket joints allow rotational movement like in the humerus and pectoral girdle (II).

Quick Tip

Joints in the human body are classified based on their structure and the type of movement they allow.

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185. Given below are two statements:

Statement I: The presence or absence of hymen is not a reliable indicator of virginity.

Statement II: The hymen is torn during the first coitus only.

Choose the correct answer from the options given below:

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Correct Answer: (3) Statement I is true but Statement II is false

Solution: Statement I is true because hymen can naturally tear due to physical activities or exercise, not necessarily the first coitus. Statement II is false because the hymen may tear due to various reasons, not only during the first sexual intercourse.

Quick Tip

The hymen can tear due to activities like cycling, sports, or medical examination, not just during coitus.

Section B

186. Given below are two statements:

Statement I: Gause's competitive exclusion principle states that two closely related species competing for different resources cannot exist indefinitely.
Statement II: According to Gause's principle, during competition, the inferior will be eliminated. This may be true if resources are limiting.

Correct Answer: (4) Statement I is false but Statement II is true.

Solution: Statement I is false because Gause's competitive exclusion principle states that two species competing for the same limiting resource cannot coexist indefinitely, not necessarily for different resources.
Statement II is true as, according to Gause's principle, the inferior competitor is often eliminated when resources are limited.

Quick Tip

Gause's principle highlights that no two species can occupy the same niche for long if they are competing for the same resources.

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187. Match List I with List II related to digestive system of cockroach.

List I	List II
A. The structures used for storing of food	I. Gizzard
B. Ring of 6-8 blind tubules at junction of foregut and midgut.	II. Gastric Caeca
C. Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.	III. Malpighian tubules
D. The structures used for grinding the food.	IV. Crop

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-I, B-II, C-III, D-IV

(3) A-IV, B-III, C-II, D-I

(4) A-III, B-II, C-IV, D-I

Correct Answer: (1) A-IV, B-II, C-III, D-I

Solution: A. The structures used for storing of food: The crop is the part of the cockroach's digestive system responsible for storing food.

B. Ring of 6-8 blind tubules at junction of foregut and midgut: These are the gastric caeca, which help in digestion by secreting digestive enzymes.

C. Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut: These are the Malpighian tubules, responsible for excretion and osmoregulation.

D. The structures used for grinding the food: The gizzard grinds food, breaking down particles mechanically.

Quick Tip

In cockroaches, the crop stores food, the gastric caeca aids in digestion, the gizzard grinds food, and the Malpighian tubules are responsible for excretion and waste removal.

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188. The following are the statements about non-chordates:

A. Pharynx is perforated by gill slits.

B. Notochord is absent.

C. Central nervous system is dorsal.

D. Heart is dorsal if present.

E. Post anal tail is absent.

Correct Answer: (3) B, D E only

Solution: Statement A is incorrect because the pharynx is not perforated by gill slits in all non-chordates; it is characteristic of chordates.

Statement B is correct as non-chordates lack a notochord.

Statement C is incorrect because the central nervous system in non-chordates is typically ventral.

Statement D is correct as the heart, if present, is dorsal in non-chordates.

Statement E is correct as many non-chordates lack a post-anal tail.

Quick Tip

Non-chordates lack a notochord and the dorsal position of the heart, unlike chordates.

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189. Choose the correct statement given below regarding juxta medullary nephron.

A. Juxta medullary nephrons are located in the columns of Bertini.

B. Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

C. Loop of Henle of juxta medullary nephron runs deep into medulla.

D. Juxta medullary nephrons outnumber the cortical nephrons.

Correct Answer: C

Solution: -A. Incorrect: Juxta medullary nephrons are located at the junction of the cortex and medulla, not in the columns of Bertini. -B. Incorrect: The renal corpuscle of juxta medullary nephrons is located in the outer cortex, not in the outer medulla. -C. Correct: The loop of Henle of juxta medullary nephrons extends deep into the medulla, which helps in concentrating the urine. -D. Incorrect: Juxta medullary nephrons are fewer in number compared to cortical nephrons.

Quick Tip

The juxta medullary nephrons are vital for water conservation as their deep loop of Henle helps in the concentration of urine.

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190. Given below are two statements:

Statement I: The cerebral hemispheres are connected by nerve tract known as corpus callosum.

Statement II: The brain stem consists of the medulla oblongata, pons and cerebrum.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Correct Answer: (3) Statement I is correct but Statement II is incorrect.

Solution: Statement I is correct because the cerebral hemispheres are indeed connected by the corpus callosum, which allows communication between the two hemispheres.

Statement II is incorrect because the brainstem consists of the medulla oblongata, pons, and midbrain, not the cerebrum.

Quick Tip

The corpus callosum is essential for the exchange of information between the two cerebral hemispheres.

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191. Given below are two statements:

Statement I: Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

Statement II: Both bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Correct Answer: (1) Both Statement I and Statement II are correct.

Solution: Statement I: Correct. Bone marrow is indeed the primary lymphoid organ responsible for the production of blood cells, including lymphocytes.
Statement II: Correct. The bone marrow produces T-lymphocytes, which mature in the thymus. Both organs provide the necessary environments for T-cell development.

Quick Tip

Bone marrow is the site of hematopoiesis (blood cell production), while the thymus is responsible for the maturation of T-lymphocytes, essential for the adaptive immune response.

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192. Regarding catalytic cycle of an enzyme action, select the correct sequential steps:

A. Substrate enzyme complex formation.
B. Free enzyme ready to bind with another substrate.
C. Release of products.
D. Chemical bonds of the substrate broken.
E. Substrate binding to active site.

Choose the correct answer from the options given below:

(1) E, A, D, C, B
(2) A, E, B, D, C
(3) B, A, C, D, E
(4) E, D, C, B, A

Correct Answer: (1) E, A, D, C, B

Solution: -E. The substrate binds to the active site of the enzyme, initiating the catalytic process.
-A. The enzyme-substrate complex is formed after the substrate binds to the active site.
-D. The enzyme catalyzes the breaking of chemical bonds in the substrate, facilitating the transition state.
-C. The product is released from the enzyme after the reaction.
-B. The enzyme is now free and ready to bind with a new substrate.

Quick Tip

The enzyme catalytic cycle involves the binding of substrate, conversion into products, and release. The enzyme is reused in subsequent cycles.

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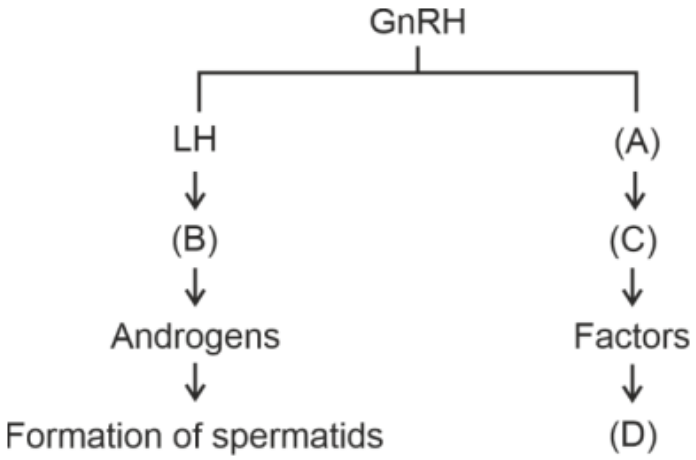
193. Identify the correct option (A), (B), (C), (D) with respect to spermatogenesis.



(1) FSH, Leydig cells, Sertoli cells, spermiogenesis.

(2) ICSH, Interstitial cells, Leydig cells, spermiogenesis.

(3) FSH, Sertoli cells, Leydig cells, spermatogenesis.

(4) ICSH, Leydig cells, Sertoli cells, spermatogenesis.

Correct Answer: (1) FSH, Leydig cells, Sertoli cells, spermiogenesis.

Solution: FSH (Follicle Stimulating Hormone) stimulates Sertoli cells, which support the process of spermatogenesis.

Leydig cells secrete testosterone, which is essential for spermatogenesis.

Spermiogenesis refers to the maturation of spermatids into sperm.

Quick Tip

Spermatogenesis involves the transformation of spermatogonia into mature sperm cells through a series of stages, including spermiogenesis.

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194. Match List I with List II:

List I	List II
A. Mesozoic Era	I. Lower invertebrates
B. Proterozoic Era	II. Fish & Amphibia
C. Cenozoic Era	III. Birds & Reptiles
D. Paleozoic Era	IV. Mammals

Choose the correct answer from the options given below:

(1) A-II, B-I, C-III, D-IV

(2) A-III, B-I, C-II, D-IV

(3) A-I, B-II, C-IV, D-III

(4) A-III, B-I, C-IV, D-II

Correct Answer: (4) A-III, B-I, C-IV, D-II

Solution: A. Mesozoic Era: Known as the age of reptiles and birds, including dinosaurs.

B. Proterozoic Era: Dominated by lower invertebrates.

C. Cenozoic Era: Age of mammals, characterized by their rise.

D. Paleozoic Era: Dominated by fish and amphibians.

Quick Tip

The Mesozoic era is known for dinosaurs, the Cenozoic era for mammals, and the Paleozoic era for early vertebrates like fish and amphibians.

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195. Match List I with List II:

List I	List II
A. Unicellular glandular epithelium	I. Salivary glands
B. Compound epithelium	II. Pancreas
C. Multicellular glandular epithelium	III. Goblet cells of alimentary canal
D. Endocrine glandular epithelium	IV. Moist surface of buccal cavity

Choose the correct answer from the options given below:

(1) A-II, B-I, C-III, D-IV

(2) A-IV, B-III, C-I, D-II

(3) A-III, B-IV, C-I, D-II

(4) A-II, B-I, C-IV, D-III

Correct Answer: (3) A-III, B-IV, C-I, D-II

Solution: A. Unicellular glandular epithelium: Goblet cells in the alimentary canal secrete mucus.

B. Compound epithelium: Found on the moist surface of the buccal cavity.

C. Multicellular glandular epithelium: Includes salivary glands which secrete saliva.

D. Endocrine glandular epithelium: Found in the pancreas, involved in hormone secretion.

Quick Tip

Glandular epithelium includes unicellular (e.g., goblet cells), multicellular (e.g., salivary glands), and endocrine glands that secrete hormones (e.g., pancreas).

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196. Match List I with List II:

List I	List II
A. RNA polymerase III	I. snRNPs
B. Termination of transcription	II. Promotor
C. Splicing of Exons	III. Rho factor
D. TATA box	IV. SnRNAs, tRNA

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-I, D-III

(2) A-III, B-II, C-IV, D-I

(3) A-III, B-IV, C-I, D-II

(4) A-IV, B-III, C-I, D-II

Correct Answer: (4) A-IV, B-III, C-I, D-II

Solution: - **A. RNA polymerase III**: It synthesizes tRNA and small RNAs such as snRNAs. - **B. Termination of transcription**: Rho factor is involved in terminating transcription in prokaryotes. - **C. Splicing of Exons**: snRNPs (small nuclear ribonucleoproteins) are involved in splicing introns and exons in eukaryotic mRNA processing. - **D. TATA box**: The TATA box is a promoter region that plays a role in the initiation of transcription in eukaryotes.

Quick Tip

RNA polymerase III is responsible for the synthesis of small RNAs such as tRNA, while the TATA box in the promoter region is essential for the initiation of transcription in eukaryotes.

197.As per ABO blood grouping system, the blood group of father is B+, mother is A+ and child is O+. Their respective genotype can be

A. $I^Bi/I^Ai/ii$

B. $I^BI^B/I^AI^A/ii$

C. $I^AI^B/iI^A/I^Bi$

D. $I^Ai/I^Bi/I^Ai$

Choose the most appropriate answer from the options given below : (1) A only

(2) B only

(3) C and B only

(4) D and E only

Correct Answer: (1) A only

Solution: The father with blood group B+ could have a genotype IBi or IBIB, while the mother with blood group A+ could have IAi or IAIA.

The child with blood group O+ must inherit an i allele from both parents, making the father's genotype IBi and the mother's genotype IAi.

Quick Tip

In the ABO blood group system, O blood type is recessive, and both parents must carry the i allele to produce a child with blood group O.

198.Given below are two statements:

Statement I: Mitochondria and chloroplasts are both double membrane-bound organelles.

Statement II: The inner membrane of mitochondria is relatively less permeable, as compared to the chloroplast membrane.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Correct Answer: (3) Statement I is correct but Statement II is incorrect.

Solution:

Statement I: Correct. Both mitochondria and chloroplasts are double membrane-bound organelles.

Statement II: Incorrect. The inner membrane of mitochondria is more impermeable compared to the outer membrane, but chloroplast membranes also have selective permeability, so this statement is not entirely correct.

Quick Tip

Mitochondria and chloroplasts have double membranes. The inner membrane of mitochondria is highly impermeable to ions, whereas chloroplast membranes vary in permeability to facilitate photosynthesis.

199.Given below are two statements:

Statement I: Mitochondria and chloroplasts are both double membrane-bound organelles.

Statement II: The inner membrane of mitochondria is relatively less permeable, as compared to the chloroplast membrane.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Correct Answer: (3) Statement I is correct but Statement II is incorrect.

Solution:

Statement I: Correct. Both mitochondria and chloroplasts are double membrane-bound organelles.

Statement II: Incorrect. The inner membrane of mitochondria is more impermeable compared to the outer membrane, but chloroplast membranes also have selective permeability, so this statement is not entirely correct.

Quick Tip

Mitochondria and chloroplasts have double membranes. The inner membrane of mitochondria is highly impermeable to ions, whereas chloroplast membranes vary in permeability to facilitate photosynthesis.

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200. Match List I with List II:

List I	List II
A. Exophthalmic goiter	I. Excess secretion of cortisol, moon face & hyperglycemia.
B. Acromegaly	II. Hypo-secretion of thyroid hormone and stunted growth.
C. Cushing's syndrome	III. Hyper secretion of thyroid hormone & protruding eyeballs.
D. Cretinism	IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

(1) A-I, B-III, C-II, D-IV

(2) A-IV, B-II, C-I, D-III

(3) A-III, B-IV, C-II, D-I

(4) A-III, B-IV, C-I, D-II

Correct Answer: (4) A-III, B-IV, C-I, D-II

Solution: -A. Exophthalmic goiter: Caused by hypersecretion of thyroid hormone, resulting in protruding eyeballs.

-B. Acromegaly: Resulting from excessive secretion of growth hormone, causing abnormal growth.

-C. Cushing's syndrome: Caused by excess secretion of cortisol, leading to symptoms like moon face and hyperglycemia.

-D. Cretinism: Due to hypo-secretion of thyroid hormone, leading to stunted growth and developmental issues.

Quick Tip

Exophthalmic goiter, acromegaly, Cushing's syndrome, and cretinism are conditions caused by abnormal hormone secretion, each with distinct symptoms related to the over- or under-production of thyroid or growth hormones.
