NEET UG 2024 T5 Zoology Question Paper With Solutions

(Section-A)

151. Match List I with List II

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

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

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

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

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

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

Solution:

Step 1: Pleurobrachia belongs to Ctenophora (comb jellies). (Matching A $\rightarrow$ II)

Step 2: Radula is a rasping organ found in Mollusca for feeding. (Matching B $\rightarrow$ I)

Step 3: Stomachord is a structure found in Hemichordates. (Matching C $\rightarrow$ IV)

Step 4: Air bladder is found in Osteichthyes (bony fish) and helps in buoyancy. (Matching D $\rightarrow$ III)

Thus, the correct answer is option (4), as the correct matches are A-II, B-I, C-IV, D-III.

Quick Tip

Pleurobrachia belongs to Ctenophora, radula is a feeding organ in Mollusca, stomachord is found in Hemichordata, and air bladder helps in buoyancy in bony fishes.

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152. 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

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

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

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

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

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

Solution:

Step 1: Non-medicated IUDs include Lippes loop. (Matching A $\rightarrow$ III)

Step 2: Copper-releasing IUDs include Multiload 375. (Matching B $\rightarrow$ I)

Step 3: Hormone-releasing IUDs include LNG-20. (Matching C $\rightarrow$ IV)

Step 4: Implants release progestogens, acting as long-term contraceptives. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (2), as the correct matches are A-III, B-I, C-IV, D-II.

Quick Tip

Non-medicated IUDs include Lippes loop, Copper IUDs include Multiload 375, hormone-releasing IUDs include LNG-20, and implants release progestogens.

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153. Match List I with List II

List I		List II	
A.	α-1 antitrypsin	I.	Cotton bollworm
B.	Cry IAb	II.	ADA deficiency
C.	Cry IAc	III.	Emphysema
D.	Enzyme replacement therapy	IV.	Corn borer

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

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

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

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

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

Solution:

Step 1: α-1 antitrypsin is used in the treatment of emphysema. (Matching A $\rightarrow$ III)

Step 2: Cry IAb is a Bt toxin that is effective against corn borers. (Matching B $\rightarrow$ IV)

Step 3: Cry IAc is another Bt toxin, specifically targeting cotton bollworm. (Matching C $\rightarrow$ I)

Step 4: Enzyme replacement therapy is used for ADA deficiency, a genetic disorder affecting the immune system. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (1), as the correct matches are A-III, B-IV, C-I, D-II.

Quick Tip

α-1 antitrypsin treats emphysema, Cry IAb targets corn borers, Cry IAc affects cotton bollworms, and enzyme replacement therapy helps in ADA deficiency.

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154. 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

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

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

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

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

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

Solution:

Step 1: Common cold is caused by Rhinoviruses. (Matching A $\rightarrow$ III)

Step 2: Haemozoin is a malarial pigment produced by *Plasmodium* during its life cycle. (Matching B $\rightarrow$ I)

Step 3: Widal test is a diagnostic test for Typhoid, caused by *Salmonella typhi*. (Matching C $\rightarrow$ II)

Step 4: Allergies are triggered by allergens such as dust mites. (Matching D $\rightarrow$ IV)

Thus, the correct answer is option (1), as the correct matches are A-III, B-I, C-II, D-IV.

Quick Tip

Rhinoviruses cause the common cold, *Plasmodium* produces haemozoin, Widal test diagnoses typhoid, and dust mites trigger allergies.

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155. 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*

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

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

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

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

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

Solution:

Step 1: Cocaine is derived from *Erythroxylum coca*. (Matching A $\rightarrow$ III)

Step 2: Heroin is synthesized from morphine, which is obtained from *Papaver somniferum* (opium poppy). (Matching B $\rightarrow$ IV)

Step 3: Morphine is an effective sedative used in surgery. (Matching C $\rightarrow$ I)

Step 4: Marijuana is derived from *Cannabis sativa*. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (2), as the correct matches are A-III, B-IV, C-I, D-II.

Quick Tip

Cocaine is derived from *Erythroxylum coca*, heroin from *Papaver somniferum*, morphine is a sedative, and marijuana comes from *Cannabis sativa*.

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156. 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

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

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

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

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

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

Solution:

Step 1: Diakinesis is the final stage of prophase I, where chiasmata terminalization is completed. (Matching A $\rightarrow$ II)

Step 2: Pachytene is the stage where recombination nodules appear. (Matching B $\rightarrow$ IV)

Step 3: Zygotene is characterized by synaptonemal complex formation. (Matching C $\rightarrow$ I)

Step 4: Leptotene is the first stage where chromosomes appear as thin threads. (Matching D $\rightarrow$ III)

Thus, the correct answer is option (1), as the correct matches are A-II, B-IV, C-I, D-III.

Quick Tip

Prophase I stages: Leptotene (thin chromosomes), Zygotene (synaptonemal complex), Pachytene (crossing over), Diakinesis (chiasmata terminalization).

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157. 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.

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

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

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

Correct Answer: (1) Statement I is true but Statement II is false.

Solution:

Step 1: The hymen can be torn due to various non-sexual activities like sports, cycling, or physical exertion. Statement I is true.

Step 2: The belief that the hymen tears only during the first coitus is incorrect, as it may already be absent due to other factors. Statement II is false.

Thus, the correct answer is option (1), as Statement I is true but Statement II is false.

Quick Tip

The hymen is not a definitive indicator of virginity, as it can be torn due to various physical activities unrelated to sexual intercourse.

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

3' TACATGGCAAATATCCATTCA 5'

(1) 5' AUGUACCGUUUUAUAGGAAUAG 3'

(2) 5' ATGTACCGTTTATAGGTAAGT 3'

(3) 5’ AUGUACCGUUUUAUAGGAAGU 3’

(4) 5’ AUGUAAAGUUUAUGGAUAGU 3’

Correct Answer: (3) 5’ AUGUACCGUUUUAUAGGAAGU 3’.

Solution:

Step 1: DNA-dependent RNA polymerase synthesizes mRNA complementary to the DNA template.

Step 2: The given template strand (3’→5’ direction) results in an mRNA strand in the 5’→3’ direction.

Thus, the correct answer is option (3), as the correct mRNA sequence is 5’ AUGUACCGUUUUAUAGGAAGU 3’.

Quick Tip

DNA-dependent RNA polymerase synthesizes mRNA complementary to the template strand, replacing thymine (T) with uracil (U).

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159. Match List I with List II

	List I		List II
A.	Expiratory capacity	I.	Expiratory reserve volume + Tidal volume + Inspiratory reserve 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

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

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

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

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

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

Solution:

Step 1: Expiratory capacity (A) is the sum of tidal volume + expiratory reserve volume. (Matching A $\rightarrow$ II)

Step 2: Functional residual capacity (B) is the sum of expiratory reserve volume + residual volume. (Matching B $\rightarrow$ IV)

Step 3: Vital capacity (C) is the sum of tidal volume + inspiratory reserve volume + expiratory reserve volume. (Matching C $\rightarrow$ I)

Step 4: Inspiratory capacity (D) is the sum of tidal volume + inspiratory reserve volume. (Matching D $\rightarrow$ III)

Thus, the correct answer is option (3), as the correct matches are A-II, B-IV, C-I, D-III.

Quick Tip

Expiratory capacity = TV + ERV, Functional residual capacity = ERV + RV, Vital capacity = TV + IRV + ERV, Inspiratory capacity = TV + IRV.

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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) B, C E only

(2) C, D E only

(3) A, B D only

(4) A, B E only

Correct Answer: (4) A, B E only.

Solution:

Step 1: Autoimmune disorders occur when the immune system attacks its own body tissues.

Step 2: - Myasthenia gravis (A): Autoimmune attack on neuromuscular junctions. -

Rheumatoid arthritis (B): Autoimmune inflammation of joints. - SLE (E): A systemic autoimmune disease affecting multiple organs. - Gout (C) is due to uric acid crystal accumulation (not autoimmune). - Muscular dystrophy (D) is a genetic disorder, not autoimmune.

Thus, the correct answer is option (4), as A, B, and E are autoimmune disorders.

Quick Tip

Autoimmune diseases include Myasthenia gravis, Rheumatoid arthritis, and Systemic Lupus Erythematosus (SLE), but not gout or muscular dystrophy.

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161. Consider the following statements:

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

Choose the correct answer from the options given below:

(1) C only

(2) D only

(3) B only

(4) A only

Correct Answer: (4) A only.

Solution:

Step 1: Annelids (e.g., earthworms) have a true coelom, which is mesodermally derived. Statement A is correct.

Step 2: Poriferans (sponges) lack body cavities altogether, making Statement B incorrect.

Step 3: Aschelminthes (Nematodes) are pseudocoelomates, not acoelomates, making Statement C incorrect.

Step 4: Platyhelminthes (Flatworms) are acoelomates, not pseudocoelomates, making Statement D incorrect.

Thus, the correct answer is option (4), as only Statement A is correct.

Quick Tip

Annelids have a true coelom, Poriferans lack body cavities, Aschelminthes are pseudo-coelomates, and Platyhelminthes are acoelomates.

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162. Given below are two statements:

Statement I: In the nephron, the descending limb of 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.

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

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

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

Correct Answer: (4) Both Statement I and Statement II are false.

Solution:

Step 1: The descending limb of the loop of Henle is permeable to water but impermeable to electrolytes. Thus, Statement I is false.

Step 2: The proximal convoluted tubule (PCT) is lined by simple cuboidal brush border epithelium, not columnar epithelium. Thus, Statement II is false.

Thus, the correct answer is option (4), as both Statement I and Statement II are false.

Quick Tip

The descending limb of the loop of Henle is water-permeable, while the proximal convoluted tubule has simple cuboidal brush border epithelium for increased absorption.

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163. 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

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

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

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

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

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

Solution:

Step 1: *Pterophyllum* is commonly known as the Angel fish. (Matching A $\rightarrow$ III)

Step 2: *Myxine* is commonly known as the Hag fish, which is a jawless fish. (Matching B $\rightarrow$ I)

Step 3: *Pristis* is known as the Saw fish, characterized by its elongated snout with teeth. (Matching C $\rightarrow$ II)

Step 4: *Exocoetus* is called the Flying fish, as it can glide over water surfaces. (Matching D $\rightarrow$ IV)

Thus, the correct answer is option (4), as the correct matches are A-III, B-I, C-II, D-IV.

Quick Tip

Pterophyllum (Angel fish), *Myxine* (Hag fish - jawless), *Pristis* (Saw fish), and *Exocoetus* (Flying fish) are well-known aquatic species.

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

(1) Progesterone

(2) Glucagon

(3) Cortisol

(4) Testosterone

Correct Answer: (2) Glucagon.

Solution:

Step 1: Steroid hormones are derived from cholesterol and include sex hormones and adrenal cortex hormones.

Step 2: - Progesterone (option 1) is a steroid hormone involved in pregnancy. - Cortisol (option 3) is a steroid hormone secreted by the adrenal cortex. - Testosterone (option 4) is a steroid hormone responsible for male secondary sexual characteristics. - Glucagon (option 2) is a peptide hormone, not a steroid. It is secreted by the pancreas and regulates blood glucose levels.

Thus, the correct answer is option (2), as Glucagon is a peptide hormone, not a steroid hormone.

Quick Tip

Steroid hormones are derived from cholesterol (e.g., testosterone, cortisol, progesterone), while peptide hormones (e.g., glucagon, insulin) are made of amino acids.

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165. 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

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

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

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

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

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

Solution:

Step 1: Lipase breaks down lipids by hydrolyzing ester bonds. (Matching A $\rightarrow$ II)

Step 2: Nuclease hydrolyzes nucleic acids by breaking phosphodiester bonds in DNA/RNA. (Matching B $\rightarrow$ IV)

Step 3: Protease digests proteins by hydrolyzing peptide bonds between amino acids. (Matching C $\rightarrow$ I)

Step 4: Amylase breaks down polysaccharides (starch) by hydrolyzing glycosidic bonds. (Matching D $\rightarrow$ III)

Thus, the correct answer is option (1), as the correct matches are A-II, B-IV, C-I, D-III.

Quick Tip

Lipase hydrolyzes ester bonds in fats, nucleases break phosphodiester bonds in DNA/RNA, proteases cleave peptide bonds in proteins, and amylase breaks glycosidic bonds in carbohydrates.

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166. Match List I with List II

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

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

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

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

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

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

Solution:

Step 1: Down's syndrome is caused by trisomy of the 21^{st} chromosome. (Matching A $\rightarrow$ III)

Step 2: α-Thalassemia is associated with mutations in the 16^{th} chromosome. (Matching B $\rightarrow$ IV)

Step 3: β-Thalassemia is caused by mutations in the 11^{th} chromosome. (Matching C $\rightarrow$ I)

Step 4: Klinefelter's syndrome occurs due to the presence of an extra 'X' chromosome (XXY). (Matching D $\rightarrow$ II)

Thus, the correct answer is option (1), as the correct matches are A-III, B-IV, C-I, D-II.

Quick Tip

Down's syndrome is due to trisomy 21, α-Thalassemia is linked to chromosome 16, β-Thalassemia to chromosome 11, and Klinefelter's syndrome to the 'X' chromosome.

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

(1) Tumor inducing plasmid

(2) Temperature independent plasmid

(3) Tumour inhibiting plasmid

(4) Tumor independent plasmid

Correct Answer: (1) Tumor inducing plasmid.

Solution:

Step 1: The Ti plasmid is a tumor-inducing plasmid found in *Agrobacterium tumefaciens*, a plant pathogen.

Step 2: It is responsible for causing crown gall disease in dicot plants.

Step 3: The T-DNA (transfer DNA) segment of the Ti plasmid integrates into the host genome, leading to uncontrolled cell division.

Thus, the correct answer is option (1), as the Ti plasmid stands for Tumor Inducing plasmid.

Quick Tip

The Ti plasmid of *Agrobacterium tumefaciens* is widely used in plant genetic engineering due to its ability to transfer genes into plants.

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168. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Breast-feeding during the 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 newborn baby.

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

(1) A is correct but R is not correct

(2) A is not correct but R is correct

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

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

Correct Answer: (3) Both A and R are correct and R is the correct explanation of A.

Solution:

Step 1: Breastfeeding is recommended as it provides essential nutrients and immunity to the infant. Assertion A is correct.

Step 2: Colostrum, the first milk produced after birth, is rich in maternal antibodies (IgA, IgG, IgM), which help develop immunity in the newborn. Reason R is correct.

Step 3: Since colostrum provides antibodies essential for infant immunity, it directly supports the reason given in Assertion A.

Thus, the correct answer is option (3), as both A and R are correct, and R is the correct explanation of A.

Quick Tip

Colostrum is rich in maternal antibodies and helps develop passive immunity in newborns, making breastfeeding highly beneficial.

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

(1) Infundibulum

(2) Ampulla

(3) Uterine fundus

(4) Isthmus

Correct Answer: (3) Uterine fundus.

Solution:

Step 1: The Fallopian tube consists of four parts: - Infundibulum (1): Funnel-shaped structure with fimbriae. - Ampulla (2): The widest and longest part, where fertilization occurs. - Isthmus (4): A narrow region connecting to the uterus.

Step 2: The Uterine fundus (3) is the uppermost part of the uterus, not the Fallopian tube. Thus, the correct answer is option (3), as the uterine fundus is not part of the Fallopian tube.

Quick Tip

The Fallopian tube consists of Infundibulum, Ampulla, Isthmus, and the Uterine part, but not the Uterine fundus.

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

(1) 8^{th} and 9^{th} segment

(2) 11^{th} segment

(3) 9^{th} segment

(4) 10^{th} segment

Correct Answer: (4) 10^{th} segment.

Solution:

Step 1: Cockroaches possess anal cerci, which are jointed filamentous structures that function as sensory organs.

Step 2: These cerci are present in both male and female cockroaches on the 10^{th} abdominal segment.

Step 3: They help in detecting vibrations and movements in the surrounding environment.

Thus, the correct answer is option (4), as anal cerci are present on the 10^{th} segment of the cockroach.

Quick Tip

Anal cerci in cockroaches are located on the 10^{th} abdominal segment and serve as sensory organs for detecting movement and vibrations.

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

(1) Gene migration

(2) Constant gene pool

(3) Genetic recombination

(4) Genetic drift

Correct Answer: (2) Constant gene pool.

Solution:

Step 1: The Hardy-Weinberg equilibrium states that allele frequencies remain constant in a population under stable conditions.

Step 2: Gene migration, genetic recombination, and genetic drift cause changes in allele frequencies, disturbing equilibrium.

Step 3: A constant gene pool means no changes in allele frequencies, keeping the population in equilibrium.

Thus, the correct answer is option (2), as a constant gene pool maintains Hardy-Weinberg equilibrium.

Quick Tip

Hardy-Weinberg equilibrium remains stable if the gene pool is constant, meaning no evolutionary forces act on the population.

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172. Match List I with List II

List I		List II	
A.	Pons	I.	Provides 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

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

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

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

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

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

Solution:

Step 1: Pons acts as a bridge connecting different brain regions. (Matching A $\rightarrow$ III)

Step 2: Hypothalamus contains neurosecretory cells, playing a key role in hormonal regulation. (Matching B $\rightarrow$ IV)

Step 3: Medulla oblongata controls respiration and gastric secretions. (Matching C $\rightarrow$ II)

Step 4: Cerebellum regulates posture, balance, and coordination. (Matching D $\rightarrow$ I)

Thus, the correct answer is option (4), as the correct matches are A-III, B-IV, C-II, D-I.

Quick Tip

The cerebellum controls balance, the medulla regulates involuntary functions, the hypothalamus has neurosecretory cells, and the pons connects brain regions.

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173. The flippers of Penguins and Dolphins are an example of:

(1) Convergent evolution

(2) Divergent evolution

(3) Adaptive radiation

(4) Natural selection

Correct Answer: (1) Convergent evolution.

Solution:

Step 1: Convergent evolution occurs when unrelated organisms evolve similar traits due to similar environmental pressures.

Step 2: Penguins (birds) and Dolphins (mammals) belong to different groups but have flippers adapted for swimming, an example of convergent evolution.

Step 3: Divergent evolution leads to different traits in related species, adaptive radiation involves diversification from a common ancestor, and natural selection drives evolution but does not always lead to convergence.

Thus, the correct answer is option (1), as flippers in Penguins and Dolphins evolved due to convergent evolution.

Quick Tip

Convergent evolution leads to similar structures in unrelated species due to similar environmental pressures, as seen in Penguins and Dolphins.

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

A. AV bundle

B. Purkinje fibres

C. AV node

D. Bundle branches

E. SA node

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

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

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

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

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

Correct Answer: (3) E-C-A-D-B.

Solution:

Step 1: The conduction pathway of the heart follows this sequence: - SA node initiates the impulse. (E) - AV node delays the impulse slightly. (C) - AV bundle (Bundle of His) carries the signal to the ventricles. (A) - Bundle branches transmit impulses through the ventricles. (D) - Purkinje fibers distribute the impulse, leading to contraction. (B)
Thus, the correct answer is option (3), as the correct sequence is E-C-A-D-B.

Quick Tip

The conduction pathway of the heart: SA node $\rightarrow$ AV node $\rightarrow$ AV bundle $\rightarrow$ Bundle branches $\rightarrow$ Purkinje fibers.

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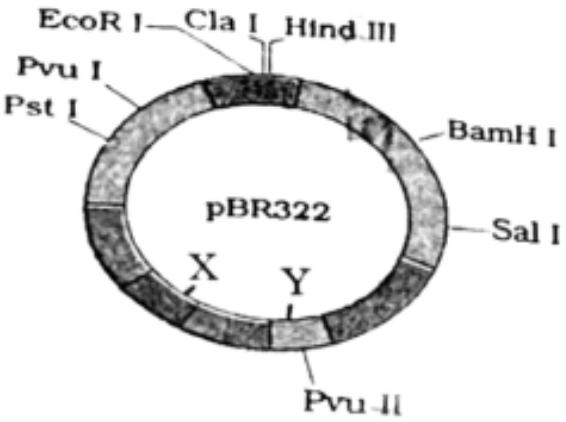
175. The following diagram shows restriction sites in E. coli cloning vector pBR322. Find the role of 'X' and 'Y' genes:



(1) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.
(2) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.
(3) The gene 'X' is responsible for resistance to antibiotics and 'Y' for protein involved in the replication of Plasmid.
(4) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

Correct Answer: (1) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

Solution:

The vector pBR322 contains the **X** and **Y** genes.

- **Gene X** regulates the copy number of the plasmid DNA.

- **Gene Y** encodes a protein involved in the replication of the plasmid. This ensures that the plasmid can replicate inside the host cell.

Thus, the correct answer is **(1) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.**

Quick Tip

In plasmid vectors like pBR322, genes involved in replication control the number of copies of the plasmid within the host cell.

---

176. Given below are two statements: One is labelled as Assertion A and the other as Reason R:

Assertion A: FSH acts upon ovarian follicles in females and Leydig cells in males.

Reason R: Growing ovarian follicles secrete estrogen in females, while interstitial cells secrete androgens in males.

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

(1) A is true but R is false

(2) A is false but R is true

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

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

Correct Answer: (2) A is false but R is true.

Solution:

Step 1: FSH (Follicle Stimulating Hormone) acts on Sertoli cells, not Leydig cells, in males. It regulates spermatogenesis. Thus, Assertion A is false.

Step 2: Leydig cells in males produce androgens (testosterone). In females, growing ovarian follicles secrete estrogen. Thus, Reason R is correct.

Thus, the correct answer is option (2), as Assertion A is incorrect, but Reason R is correct.

Quick Tip

FSH acts on Sertoli cells (not Leydig cells), while growing ovarian follicles secrete estrogen, and Leydig cells secrete testosterone.

---

177. Which of the following statements is incorrect?

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

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

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

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

Correct Answer: (1) Bio-reactors are used to produce small scale bacterial cultures.

Solution:

Step 1: Bio-reactors are used for large-scale production of biological products, not small-scale. Statement (1) is incorrect.

Step 2: They contain an agitator system, oxygen delivery system, and foam control system to maintain optimal growth conditions. Statements (2), (3), and (4) are correct.

Thus, the correct answer is option (1), as bio-reactors are used for large-scale production, not small-scale.

Quick Tip

Bio-reactors are used for large-scale production of enzymes, antibiotics, and recombinant proteins, not small-scale bacterial cultures.

---

178. 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

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

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

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

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

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

Solution:

Step 1: Axoneme is the structural core of cilia and flagella, consisting of microtubules. (Matching A $\rightarrow$ II)

Step 2: Cartwheel pattern is a feature of centrioles, seen in their early formation stage. (Matching B $\rightarrow$ I)

Step 3: Crista are the folds of the inner mitochondrial membrane, increasing the surface area for ATP production. (Matching C $\rightarrow$ IV)

Step 4: Satellite DNA refers to repetitive DNA sequences found in chromosomes. (Matching D $\rightarrow$ III)

Thus, the correct answer is option (2), as the correct matches are A-II, B-I, C-IV, D-III.

Quick Tip

Axoneme forms the core of cilia and flagella, cartwheel pattern is found in centrioles, cristae are folds of mitochondria, and satellite DNA is a part of chromosomes.

---

179. 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

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

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

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

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

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

Solution:

Step 1: Fibrous joints (A) are immovable and found in the skull (Matching A $\rightarrow$ III).

Step 2: Cartilaginous joints (B) provide limited movement and are found in the vertebral column (Matching B $\rightarrow$ I).

Step 3: Hinge joints (C) allow movement in one plane and are found in the knee (Matching C $\rightarrow$ IV).

Step 4: Ball and socket joints (D) allow rotational movement and are found in the humerus and pectoral girdle (Matching D $\rightarrow$ II).

Thus, the correct answer is option (2), as the correct matches are A-III, B-I, C-IV, D-II.

Quick Tip

Fibrous joints (skull - no movement), Cartilaginous joints (vertebral column - limited movement), Hinge joints (knee - unidirectional), Ball and socket joints (shoulder - rotational).

---

180. 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) C-B-D-A

(2) A-D-C-B

(3) D-A-C-B

(4) B-A-D-C

Correct Answer: (2) A-D-C-B.

Solution:

Step 1: The correct sequence of human evolution is: - *Homo habilis* (earliest tool users) $\rightarrow$ *Homo erectus* (upright walkers) $\rightarrow$ - *Homo neanderthalensis* (Neanderthals) $\rightarrow$ *Homo sapiens* (modern humans).

Step 2: *Homo habilis* was the earliest species, followed by *Homo erectus*, then *Homo neanderthalensis*, and finally *Homo sapiens*.

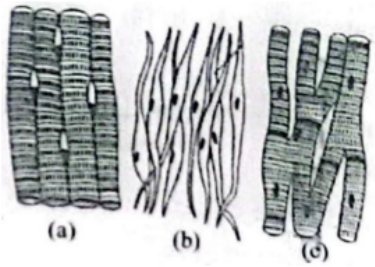
Thus, the correct answer is option (2), as A-D-C-B represents the correct evolutionary order.

Quick Tip

The sequence of human evolution follows: *Homo habilis* $\rightarrow$ *Homo erectus* $\rightarrow$ *Homo neanderthalensis* $\rightarrow$ *Homo sapiens*.

---

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



Name of muscle/location

(1) (a) Skeletal – Biceps (b) Involuntary – Intestine (c) Smooth – Heart

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

(3) (a) Smooth – Toes (b) Skeletal – Legs (c) Cardiac – Heart

(4) (a) Skeletal – Triceps (b) Smooth – Stomach (c) Cardiac – Heart

Correct Answer: (4) (a) Skeletal – Triceps (b) Smooth – Stomach (c) Cardiac – Heart.

Solution:

Step 1: The three major types of muscles in the human body are: - Skeletal muscle (voluntary and striated, found in biceps, triceps, etc.). - Smooth muscle (involuntary, non-striated, found in internal organs like the stomach and intestines). - Cardiac muscle (striated, involuntary, found in the heart).

Step 2: - Image (a) represents skeletal muscle, found in triceps. - Image (b) represents smooth muscle, found in stomach. - Image (c) represents cardiac muscle, found in heart. Thus, the correct answer is option (4), as (a) Skeletal – Triceps, (b) Smooth – Stomach, (c) Cardiac – Heart.

Quick Tip

Skeletal muscles are voluntary and striated, smooth muscles are involuntary and non-striated, and cardiac muscles are striated but involuntary.

---

182. 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) B-D-E-A-C

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

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

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

Correct Answer: (2) E-C-A-D-B.

Solution:

Step 1: The correct sequence of cell cycle stages is: - G1 phase (E): Cell growth occurs. - S phase (C): DNA replication happens. - G2 phase (A): Preparation for mitosis. - Karyokinesis

(D): Nuclear division occurs. - Cytokinesis (B): Cytoplasm divides, forming two daughter cells.

Thus, the correct answer is option (2), as the correct order is E-C-A-D-B.

Quick Tip

The cell cycle follows the order: G1 $\rightarrow$ S $\rightarrow$ G2 $\rightarrow$ M (Karyokinesis + Cytokinesis).

---

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

(1) Lactational amenorrhea

(2) Vaults

(3) Coitus interruptus

(4) Periodic abstinence

Correct Answer: (2) Vaults.

Solution:

Step 1: Natural contraceptive methods involve preventing pregnancy without external devices or hormones.

Step 2: Lactational amenorrhea, coitus interruptus, and periodic abstinence are natural contraceptive methods.

Step 3: Vaults are barrier contraceptives (diaphragms), which physically prevent sperm entry, making them a non-natural method.

Thus, the correct answer is option (2), as vaults are not a natural contraceptive method.

Quick Tip

Natural contraceptive methods rely on behavioral practices, while vaults (diaphragms) are physical barriers used for contraception.

---

184. 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

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

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

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

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

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

Solution:

Step 1: Typhoid is caused by the bacterium *Salmonella typhi*. (Matching A $\rightarrow$ IV)

Step 2: Leishmaniasis is caused by the protozoan parasite *Leishmania donovani*. (Matching B $\rightarrow$ III)

Step 3: Ringworm is a fungal infection caused by *Trichophyton*, *Microsporum*, or *Epidermophyton*. (Matching C $\rightarrow$ I)

Step 4: Filariasis is caused by nematode worms such as *Wuchereria bancrofti*. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (4), as the correct matches are A-IV, B-III, C-I, D-II.

Quick Tip

Typhoid is caused by bacteria, Leishmaniasis by protozoa, ringworm by fungi, and filariasis by nematodes.

---

185. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

(1) Low pCO_2 and High H^+ concentration

(2) Low pCO_2 and High temperature

(3) High pO_2 and High pCO_2

(4) High pO_2 and Lesser H^+ concentration

Correct Answer: (4) High pO_2 and Lesser H^+ concentration.

Solution:

Step 1: Oxyhaemoglobin (HbO_2) formation occurs in the alveoli, where oxygen binds to hemoglobin.

Step 2: High pO_2 (partial pressure of oxygen) favors oxygen binding to hemoglobin.

Step 3: Low pCO_2 and lesser H^+ concentration create an alkaline environment, promoting HbO_2 formation.

Step 4: High pCO_2 and high H^+ concentration (acidic environment) promote oxygen release (Bohr effect), making options (1) and (3) incorrect.

Thus, the correct answer is option (4), as high pO_2 and low H^+ concentration favor oxyhaemoglobin formation.

Quick Tip

In alveoli, high pO_2 and lower H^+ concentration favor oxyhaemoglobin formation, while high pCO_2 promotes oxygen release.

---

186. 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 microenvironments 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) Statement I is correct but Statement II is incorrect.

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

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

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

Correct Answer: (3) Both Statement I and Statement II are correct.

Solution:

Step 1: Bone marrow is indeed the primary site for the production of all blood cells, including lymphocytes. (Statement I is correct)

Step 2: Both bone marrow and thymus play crucial roles in the development and maturation of T-lymphocytes. (Statement II is correct)

Thus, the correct answer is option (3), as both Statement I and Statement II are correct.

Quick Tip

Bone marrow produces all blood cells, including lymphocytes. The thymus plays a key role in the maturation of T-lymphocytes.

---

187. Match List I with List II

List I		**List II**	
A.	P wave	I.	Heart muscles are electrically silent.
B.	QRS complex	II.	Depolarisation of ventricles.
C.	T wave	III.	Depolarisation of atria.
D.	T-P gap	IV.	Repolarisation of ventricles.

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

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

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

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

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

Solution:

Step 1: P wave represents depolarisation of atria. (Matching A $\rightarrow$ III)

Step 2: QRS complex represents depolarisation of ventricles. (Matching B $\rightarrow$ II)

Step 3: T wave represents repolarisation of ventricles. (Matching C $\rightarrow$ IV)

Step 4: T-P gap indicates electrical silence in heart muscles. (Matching D $\rightarrow$ I)

Thus, the correct answer is option (4), as the correct matches are A-III, B-II, C-IV, D-I.

Quick Tip

P wave (atrial depolarisation), QRS complex (ventricular depolarisation), T wave (ventricular repolarisation), T-P gap (electrical silence).

---

188. Given below are two statements:

Statement I: The cerebral hemispheres are connected by a 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) Statement I is correct but Statement II is incorrect.

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

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

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

Correct Answer: (1) Statement I is correct but Statement II is incorrect.

Solution:

Step 1: The corpus callosum is a bundle of nerve fibers that connects the left and right cerebral hemispheres, making Statement I correct.

Step 2: The brainstem consists of the medulla oblongata, pons, and midbrain (not cerebrum), making Statement II incorrect.

Thus, the correct answer is option (1), as Statement I is correct, but Statement II is incorrect.

Quick Tip

The brainstem includes the medulla oblongata, pons, and midbrain but not the cerebrum. The corpus callosum connects the cerebral hemispheres.

---

189. 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

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

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

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

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

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

Solution:

Step 1: Unicellular glandular epithelium (A) consists of goblet cells in the alimentary canal. (Matching A $\rightarrow$ III)

Step 2: Compound epithelium (B) lines moist surfaces like the buccal cavity. (Matching B $\rightarrow$ IV)

Step 3: Multicellular glandular epithelium (C) includes salivary glands. (Matching C $\rightarrow$ I)

Step 4: Endocrine glandular epithelium (D) includes the pancreas. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (1), as the correct matches are A-III, B-IV, C-I, D-II.

Quick Tip

Unicellular epithelium (goblet cells), compound epithelium (moist surfaces), multicellular epithelium (salivary glands), endocrine epithelium (pancreas).

---

190. 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

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

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

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

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

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

Solution:

Step 1: Crop (A) is the structure used for storing food in cockroaches. (Matching A $\rightarrow$ IV)

Step 2: Gastric Caeca (B) are the 6-8 blind tubules at the junction of foregut and midgut. (Matching B $\rightarrow$ II)

Step 3: Malpighian tubules (C) are the yellow-colored filaments found at the junction of midgut and hindgut. (Matching C $\rightarrow$ III)

Step 4: Gizzard (D) is used for grinding food. (Matching D $\rightarrow$ I)

Thus, the correct answer is option (3), as the correct matches are A-IV, B-II, C-III, D-I.

Quick Tip

The cockroach digestive system has the crop (storage), gastric caeca (digestion), malpighian tubules (excretion), and gizzard (grinding food).

---

191. 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

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

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

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

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

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

Solution:

Step 1: Mesozoic Era is known as the "Age of Reptiles and Birds". (Matching A $\rightarrow$ III)

Step 2: Proterozoic Era had the first lower invertebrates. (Matching B $\rightarrow$ I)

Step 3: Cenozoic Era is known as the "Age of Mammals". (Matching C $\rightarrow$ IV)

Step 4: Paleozoic Era was the period of early Fish and Amphibia. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (2), as the correct matches are A-III, B-I, C-IV, D-II.

Quick Tip

Mesozoic Era (Reptiles & Birds), Proterozoic Era (Lower invertebrates), Cenozoic Era (Mammals), Paleozoic Era (Fish & Amphibians).

---

192. 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 compared to the chloroplast.

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

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

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

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

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

Correct Answer: (1) Statement I is correct but Statement II is incorrect.

Solution:

Step 1: Both mitochondria and chloroplasts have double membranes. (Statement I is correct)

Step 2: The inner membrane of mitochondria is highly folded but more permeable than the chloroplast. (Statement II is incorrect)

Thus, the correct answer is option (1).

Quick Tip

P wave (atrial depolarisation), QRS complex (ventricular depolarisation), T wave (ventricular repolarisation), T-P gap (electrical silence).

---

193. As per the ABO blood grouping system, the blood group of the father is B^+, mother is A^+, and child is O^-. Their respective genotypes can be:

Options:

A. I^Bi/I^Bi

B. I^BI^A/I^Ai

C. I^AI^B/I^Bi

D. I^Ai/I^Bi

E. $ii/I^Bi/I^AI^B$

Choose the most appropriate answer from the options given below:

(1) C B only

(2) D E only

(3) A D only

(4) B only

Correct Answer: (3) A D only.

Solution:

Step 1: Blood type inheritance follows the Mendelian principles of codominance. The possible genotypes are: - Blood group A: I^AI^A or I^Ai - Blood group B: I^BI^B or I^Bi - Blood group O: ii

Step 2: Since the child has O^- blood, they must have received the ii genotype (one i from each parent).

Step 3: - The father's genotype must be I^Bi or I^BI^B. - The mother's genotype must be I^Ai or I^AI^A. - The only correct parental genotype pair that produces an O^- child is A (I^Bi/I^Bi) D (I^Ai/I^Bi).

Thus, the correct answer is option (3), as A D represent the correct possible genotypes.

Quick Tip

For a child with O blood type, both parents must contribute an "i" allele (i.e., they must be heterozygous A or B).

---

194. 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.

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

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

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

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

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

Solution:

Step 1: Exophthalmic goiter is due to hyperthyroidism, leading to protruding eyeballs. (Matching A $\rightarrow$ III)

Step 2: Acromegaly occurs due to excess secretion of growth hormone. (Matching B $\rightarrow$ IV)

Step 3: Cushing's syndrome is due to excess cortisol secretion, leading to moon face and hyperglycemia. (Matching C $\rightarrow$ I)

Step 4: Cretinism results from thyroid hormone deficiency, leading to stunted growth. (Matching D $\rightarrow$ II)

Thus, the correct answer is option (2), as the correct matches are A-III, B-IV, C-I, D-II.

Quick Tip

Exophthalmic goiter (hyperthyroidism), Acromegaly (excess GH), Cushing's syndrome (excess cortisol), and Cretinism (thyroid hormone deficiency).

---

195. 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

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

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

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

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

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

Solution:

Step 1: RNA polymerase III (A) synthesizes SnRNAs and tRNA. (Matching A $\rightarrow$ IV)

Step 2: Termination of transcription (B) is regulated by the Rho factor. (Matching B $\rightarrow$ II)

Step 3: Splicing of Exons (C) is associated with snRNPs. (Matching C $\rightarrow$ I)

Step 4: The TATA box (D) is a promotor region that facilitates transcription. (Matching D $\rightarrow$ III)

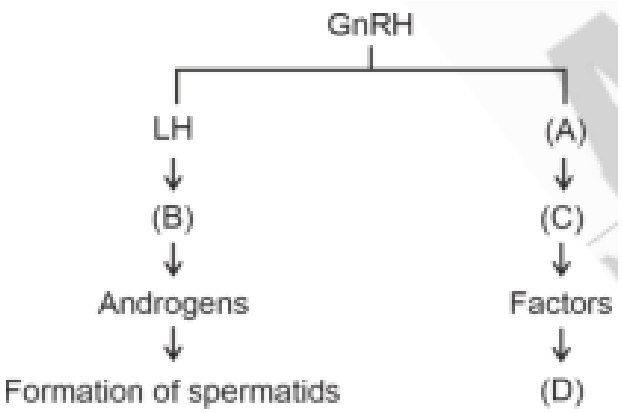
Thus, the correct answer is option (2), as the correct matches are A-IV, B-II, C-I, D-III.

Quick Tip

RNA polymerase III produces tRNA and snRNAs. The TATA box is a core promoter for transcription initiation.

---

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



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

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

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

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

Correct Answer: (3) FSH, Leydig cells, Sertoli cells, spermiogenesis.

Solution:

Step 1: FSH (Follicle-stimulating hormone) stimulates Sertoli cells, which support spermatogenesis.

Step 2: LH (Luteinizing hormone) stimulates Leydig cells, which secrete androgens (testosterone) necessary for spermiogenesis.

Thus, the correct answer is option (3), as FSH stimulates Sertoli cells and Leydig cells support spermiogenesis.

Quick Tip

FSH acts on Sertoli cells (spermatogenesis), and LH acts on Leydig cells (spermiogenesis).

---

197. 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.

Choose the most appropriate answer from the options given below:

(1) B, D & E only

(2) B, C & D only

(3) A & C only

(4) A, B & D only

Correct Answer: (1) B, D & E only.

Solution:

Step 1: Non-chordates lack notochord (B), post-anal tail (E), and have a dorsal heart (D).

Step 2: Chordates have pharyngeal gill slits (A) and a dorsal CNS (C), so these statements do not apply to non-chordates.

Step 3: Since non-chordates lack notochord, post-anal tail, and have a dorsal heart, the correct answer is B, D, and E only.

Thus, the correct answer is option (1), as B, D, and E are true for non-chordates.

Quick Tip

Non-chordates lack a notochord and post-anal tail, while their heart (if present) is dorsal. Chordates have pharyngeal gill slits and a dorsal CNS.

---

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

(1) Loop of Henle of juxta medullary nephron runs deep into medulla.

(2) Juxta medullary nephrons outnumber the cortical nephrons.

(3) Juxta medullary nephrons are located in the columns of Bertini.

(4) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

Correct Answer: (1) Loop of Henle of juxta medullary nephron runs deep into medulla.

Solution:

Step 1: Juxta medullary nephrons have a longer loop of Henle that extends deep into the renal medulla, aiding in concentration of urine. (Matching Option 1)

Step 2: Cortical nephrons are more numerous than juxta medullary nephrons.

Thus, the correct answer is option (1), as the loop of Henle in juxta medullary nephron extends deep into medulla.

Quick Tip

Juxta medullary nephrons play a critical role in water reabsorption and urine concentration due to their long loop of Henle.

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199. 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.

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

(1) Statement I is true but Statement II is false.

(2) Statement I is false but Statement II is true.

(3) Both Statement I and Statement II are true.

(4) Both Statement I and Statement II are false.

Correct Answer: (2) Statement I is false but Statement II is true.

Solution:

Step 1: Gause's competitive exclusion principle does not state that species with different resources cannot coexist indefinitely. It specifically states that closely related species competing for the same resources cannot coexist indefinitely. (Statement I is false)

Step 2: Statement II is true because, in cases of competition with limited resources, the inferior species is eliminated.

Thus, the correct answer is option (2), as Statement I is false, but Statement II is true.

Quick Tip

Competitive exclusion occurs when two species competing for the same resources cannot coexist, and the inferior species is eliminated.

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200. 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) B, A, C, D, E

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

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

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

Correct Answer: (3) E, A, B, C, D.

Solution:

Step 1: The enzyme action begins with substrate binding to the active site (E).

Step 2: This leads to substrate-enzyme complex formation (A).

Step 3: The enzyme is then ready to bind with another substrate (B).

Step 4: The chemical bonds of the substrate are broken (D) as the reaction progresses.

Step 5: Finally, the products are released (C).

Thus, the correct answer is option (3), as the correct sequence is E, A, B, C, D.

Quick Tip

The enzyme catalytic cycle follows: Substrate binding $\rightarrow$ Substrate-enzyme complex $\rightarrow$ Enzyme ready for next substrate $\rightarrow$ Substrate broken $\rightarrow$ Product released.
