

SECTION - A

151. Which of the following is not an objective of Biofortification in crops?

- (1) Improve resistance to diseases
- (2) Improve vitamin content
- (3) Improve micronutrient and mineral content
- (4) Improve protein content

Answer (1)

Sol. Biofortification improves vitamin content, protein content and micronutrient and mineral content.

It does not create resistance in plants against diseases.

152. Read the following statements

- (a) Metagenesis is observed in Helminths.
- (b) Echinoderms are triploblastic and coelomate animals.
- (c) Round worms have organ-system level of body organization.
- (d) Comb plates present in ctenophores help in digestion.
- (e) Water vascular system is characteristic of Echinoderms.

Choose the **correct** answer from the options given below.

- (1) (a), (b) and (c) are correct
- (2) (a), (d) and (e) are correct
- (3) (b), (c) and (e) are correct
- (4) (c), (d) and (e) are correct

Answer (3)

Sol. • Metagenesis (alternation of generation) is observed in members of phylum Coelenterata (Cnidaria).

- Echinoderms are triploblastic and coelomate animals as true coelom is observed in them.
- Roundworms (Aschelminths) have organ system level of organization.
- Comb plates present in ctenophores help in locomotion.
- Water vascular system is seen in echinoderms, which helps in locomotion, capture and transport of food and respiration.

153. Sphincter of oddi is present at:

- (1) Junction of hepato-pancreatic duct and duodenum
- (2) Gastro-oesophageal junction
- (3) Junction of jejunum and duodenum
- (4) Ileo-caecal junction

Answer (1)

Sol. • The bile duct and the pancreatic duct open together into the duodenum as the common hepato-pancreatic duct which is guarded by a sphincter called the sphincter of Oddi.

- Ileo-caecal valve is present at the junction of ileum and caecum to prevent the backflow of faecal matter into the ileum in humans.
- Gastro-oesophageal sphincter regulates the opening of oesophagus into stomach.

154. Which stage of meiotic prophase shows terminalisation of chiasmata as its distinctive feature?

- (1) Zygotene
- (2) Diakinesis
- (3) Pachytene
- (4) Leptotene

Answer (2)

Sol. • In meiosis I, chiasmata (X shaped structure) is formed in diplotene stage while it terminalise in diakinesis stage.

- Bivalents are formed in zygotene stage and crossing over takes place in pachytene stage.
- Compaction of chromosomal material occurs in leptotene stage.

155. The fruit fly has 8 chromosomes (2n) in each cell. During interphase of Mitosis if the number of chromosomes at G₁ phase is 8, what would be the number of chromosomes after S phase?

- (1) 16
- (2) 4
- (3) 32
- (4) 8

Answer (4)

Sol. In S phase there is duplication of DNA. So amount of DNA increases but not the chromosome number.

So, if the number of chromosomes at G₁ phase is 8 in fruit fly then the number of chromosomes will be same in S phase that is 8 only.

156. For effective treatment of the disease, early diagnosis and understanding its pathophysiology is very important. Which of the following molecular diagnostic techniques is very useful for early detection?

- (1) Southern Blotting Technique
- (2) ELISA Technique
- (3) Hybridization Technique
- (4) Western Blotting Technique

Answer (1/2*)

Sol. • ELISA can be used for early detection of an infection either by detecting the presence of pathogenic antigen or by detecting the antibodies synthesized against the pathogen.

- Option (1) Southern blotting is used to detect a specific DNA sequence in the given sample and can be detected prior to antibody formation. One can detect presence of pathogenic DNA/RNA.
- In hybridization technique a ssDNA/ssRNA tagged with a radioactive molecule (probe) is allowed to hybridize its complementary DNA in a clone of cells followed by detection using autoradiography. It is used to find a mutated gene.
- Western blotting technique is used to detect a specific protein molecule among a mixture of proteins.

157. With regard to insulin choose **correct** options.

- (a) C-peptide is not present in mature insulin.
- (b) The insulin produced by rDNA technology has C-peptide.
- (c) The pro-insulin has C-peptide
- (d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.

Choose the **correct** answer from the options given below

- (1) (b) and (c) only (2) (a), (c) and (d) only
- (3) (a) and (d) only (4) (b) and (d) only

Answer (2)

Sol. • Insulin is synthesized as a pro-hormone which contains A-chain, B-chain and an extra stretch called the C-peptide.

- C-peptide is not present in mature insulin called humulin.
- Chains A and B are connected by interchain disulphide bridges.

158. Match List-I with List-II

List-I		List-II	
(a)	<i>Aspergillus niger</i>	(i)	Acetic Acid
(b)	<i>Acetobacter aceti</i>	(ii)	Lactic Acid
(c)	<i>Clostridium butylicum</i>	(iii)	Citric Acid
(d)	<i>Lactobacillus</i>	(iv)	Butyric Acid

Choose the **correct** answer from the options given below

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (i) | (ii) | (iii) | (iv) |
| (2) | (ii) | (iii) | (i) | (iv) |
| (3) | (iv) | (ii) | (i) | (iii) |
| (4) | (iii) | (i) | (iv) | (ii) |

Answer (4)

Sol. *Aspergillus niger* is involved in production of citric acid. *Acetobacter aceti* is involved in production of acetic acid. *Clostridium butylicum* is involved in production of butyric acid whereas *Lactobacillus* is involved in the production of lactic acid.

So a(iii), b(i), c(iv), d(ii) is correct matching.

159. Match List - I with List - II

List - I		List - II	
(a)	Metamerism	(I)	Coelenterata
(b)	Canal system	(ii)	Ctenophora
(c)	Comb plates	(iii)	Annelida
(d)	Cnidoblasts	(iv)	Porifera

Choose the correct answer from the options given below.

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|------|-------|
| (1) | (iii) | (iv) | (i) | (ii) |
| (2) | (iii) | (iv) | (ii) | (i) |
| (3) | (iv) | (i) | (ii) | (iii) |
| (4) | (iv) | (iii) | (i) | (ii) |

Answer (2)

Sol. Metamerism is commonly seen in the members of phylum Annelida where the body is externally and internally divided into segments with a serial repetition of atleast some organs.

Water canal system is present in the members of phylum Porifera.

The body of ctenophores bears 8 external rows of ciliated comb plates which help in locomotion.

Cnidoblasts or cnidocytes are characteristic feature of cnidarians (coelentrata).

160. If Adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it?

- (1) T : 20 ; G : 20 ; C : 30
- (2) T : 30 ; G : 20 ; C : 20
- (3) T : 20 ; G : 25 ; C : 25
- (4) T : 20 ; G : 30 ; C : 20

Answer (2)

Sol. According to Chargaff's rule, for a double stranded DNA,

$$[A] = [T],$$

$$\therefore [A] = 30\% \Rightarrow [T] = 30\%$$

$$\text{Since } [C] = [G]$$

$$\therefore 100 - [A + T]$$

$$= 100 - [30 + 30]$$

$$= 100 - 60 = 40\%$$

and C = G = 20% each

$$\therefore [A] = 30\%$$

$$[T] = 30\%$$

$$[G] = 20\%$$

$$[C] = 20\%$$

161. Select the favourable conditions required for the formation of oxyhaemoglobin at the alveoli.

- (1) Low pO_2 , high pCO_2 , more H^+ , higher temperature
- (2) High pO_2 , high pCO_2 , less H^+ , higher temperature
- (3) Low pO_2 , low pCO_2 , more H^+ , higher temperature
- (4) High pO_2 , low pCO_2 , less H^+ , lower temperature

Answer (4)

Sol. • The factors favourable for the formation of oxyhaemoglobin at the alveolar level are; high pO_2 , low pCO_2 , less H^+ concentration and lower temperature.

- The conditions favourable for the dissociation of oxygen from oxyhaemoglobin at the tissue level are; low pO_2 , high pCO_2 , high H^+ concentration and high temperature.

162. The organelles that are included in the endomembrane system are

- (1) Endoplasmic reticulum, Golgi complex, Lysosomes and Vacuoles
- (2) Golgi complex, Mitochondria, Ribosomes and Lysosomes
- (3) Golgi complex, Endoplasmic reticulum, Mitochondria and Lysosomes
- (4) Endoplasmic reticulum, Mitochondria, Ribosomes and Lysosomes

Answer (1)

Sol. • Endomembrane system consist of endoplasmic reticulum, Golgi complex, vacuoles and lysosomes.

- Mitochondria is semi-autonomous cell organelle.
- Ribosome is non-membranous cell organelle.

163. Match the following:

List-I		List-II	
(a)	<i>Physalia</i>	(i)	Pearl oyster
(b)	<i>Limulus</i>	(ii)	Portuguese Man of War
(c)	<i>Ancylostoma</i>	(iii)	Living fossil
(d)	<i>Pinctada</i>	(iv)	Hookworm

Choose the **correct** answer from the options given below.

- | | (a) | (b) | (c) | (d) |
|-----|------|-------|-------|------|
| (1) | (iv) | (i) | (iii) | (ii) |
| (2) | (ii) | (iii) | (iv) | (i) |
| (3) | (i) | (iv) | (iii) | (ii) |
| (4) | (ii) | (iii) | (i) | (iv) |

Answer (2)

- Sol.** • Option (2) is correct because *Physalia* is commonly known as Portuguese man of war.
- *Limulus* is considered as a living fossil and commonly known as king crab.
 - *Ancylostoma* is a roundworm and commonly known as hookworm.
 - *Pinctada* is commonly known as pearl oyster, included in phylum Mollusca.

164. The partial pressures (in mm Hg) of oxygen (O_2) and carbon dioxide (CO_2) at alveoli (the site of diffusion) are:

- (1) $pO_2 = 40$ and $pCO_2 = 45$
- (2) $pO_2 = 95$ and $pCO_2 = 40$
- (3) $pO_2 = 159$ and $pCO_2 = 0.3$
- (4) $pO_2 = 104$ and $pCO_2 = 40$

Answer (4)

- Sol.** • Option (4) is correct because pO_2 in alveoli is 104 mm Hg and pCO_2 in alveoli is 40 mmHg.
- In atmosphere, pO_2 is 159 mm Hg and pCO_2 is 0.3 mm Hg.
 - In deoxygenated blood, pO_2 is 40 mmHg and pCO_2 is 45 mmHg.
 - In oxygenated blood, pO_2 is 95 mmHg and pCO_2 is 40 mmHg.

165. Match List-I with List-II.

List-I		List-II	
(a)	Vaults	(i)	Entry of sperm through Cervix is blocked
(b)	IUDs	(ii)	Removal of Vas deferens
(c)	Vasectomy	(iii)	Phagocytosis of sperms within the Uterus
(d)	Tubectomy	(iv)	Removal of fallopian tube

Choose the correct answer from the option given below

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (i) | (iii) | (ii) | (iv) |
| (2) | (ii) | (iv) | (iii) | (i) |
| (3) | (iii) | (i) | (iv) | (ii) |
| (4) | (iv) | (ii) | (i) | (iii) |

Answer (1)

- Sol.** • Diaphragms, cervical caps and vaults are barrier methods of contraception for female which works by blocking the entry of sperms through the cervix.
- IUDs increase phagocytosis of sperms within the uterus.
 - Vasectomy is a surgical method of contraception in males in which a small part of the vas deferens is removed or tied up through a small incision on the scrotum.
 - Tubectomy is a surgical method of contraception in females where a small part of the fallopian tube is removed or tied up through a small incision in the abdomen or through vagina.

166. During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first?

- (1) Extension
- (2) Denaturation
- (3) Ligation
- (4) Annealing

Answer (2)

- Sol.** • Option (2) is correct. High temperature about $94^\circ C$ is required for the process of denaturation which is the first step of PCR.
- Ligation of DNA fragments is performed with the help of an enzyme called DNA ligase.
 - Annealing is performed at $50^\circ-60^\circ C$ which is the second step that can get affected.
 - Addition of nucleotides to the primer, synthesizing a new DNA strand using only the template sequences with the help of enzyme DNA polymerase is called primer extension/polymerisation.

167. Identify the **incorrect** pair

- (1) Toxin – Abrin
- (2) Lectins – Concanavalin A
- (3) Drugs – Ricin
- (4) Alkaloids – Codeine

Answer (3)

- Sol.** • Option (3) is incorrect because ricin is a toxin obtained from *Ricinus* plant. Vinblastin and curcumin are drugs.
- Morphine and codeine are alkaloids.
 - Abrin is also a toxin obtained by plant *Abrus*.
 - Concanavalin A is a lectin.

168. Chronic auto immune disorder affecting neuro muscular junction leading to fatigue, weakening and paralysis of skeletal muscle is called as:

- (1) Muscular dystrophy (2) Myasthenia gravis
(3) Gout (4) Arthritis

Answer (2)

Sol. • Option (2) is correct because myasthenia gravis is a chronic auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

- Gout is caused due to deposition of uric acid crystals in joints leading to its inflammation.
- Inflammation of joints is commonly known as arthritis.
- Muscular dystrophy is a genetic disorder which results in progressive degeneration of skeletal muscle.

169. Which enzyme is responsible for the conversion of inactive fibrinogens to fibrins?

- (1) Renin (2) Epinephrine
(3) Thrombokinase (4) Thrombin

Answer (4)

Sol. During coagulation of blood, an enzyme complex thrombokinase helps in the conversion of prothrombin (present in plasma) into thrombin.

Thrombin further helps in the conversion of inactive fibrinogens into fibrins which form network of threads.

Renin is secreted by JG cells in response to fall in glomerular blood flow, which converts angiotensinogen in blood to angiotensin-I

Epinephrine or adrenaline is secreted by adrenal medulla in response to stress of any kind and during emergency.

170. The centriole undergoes duplication during:

- (1) Prophase (2) Metaphase
(3) G₂ phase (4) S-phase

Answer (4)

Sol. During S phase of cell cycle replication of DNA takes place. In animal cells during S phase, centriole duplicates in the cytoplasm.

In G₂ phase there is duplication of mitochondria, chloroplast and Golgi bodies. Tubulin protein is also synthesized during this phase.

During prophase, condensation of chromatin starts.

During metaphase, chromosomes get aligned at equator to form metaphasic plate.

171. Which one of the following organisms bears hollow and pneumatic long bones?

- (1) *Hemidactylus* (2) *Macropus*
(3) *Ornithorhynchus* (4) *Neophron*

Answer (4)

Sol. • Hollow and pneumatic long bones are present in animals that belong to class Aves e.g., *Neophron* (vulture).

- *Ornithorhynchus* (Platypus) and *Macropus* (Kangaroo) belong to class Mammalia.
- *Hemidactylus* (Wall lizard) is a member of class Reptilia.

172. Receptors for sperm binding in mammals are present on :

- (1) Vitelline membrane (2) Perivitelline space
(3) Zona pellucida (4) Corona radiata

Answer (3)

Sol. • Option (3) is correct because zona pellucida has receptors for sperm binding (ZP3 receptors) in mammals.

- Corona radiata is a layer of radially arranged cells of membrana granulosa.
- Perivitelline space is present in between vitelline membrane and zona pellucida.

173. A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is:

- (1) Okazaki sequences
(2) Palindromic Nucleotide sequences
(3) Poly(A) tail sequences
(4) Degenerate primer sequence

Answer (2)

Sol. • Each restriction endonuclease recognizes a specific palindromic nucleotide sequence in the DNA. Once it finds its specific recognition sequence it binds to DNA and cuts each of the two strands of DNA.

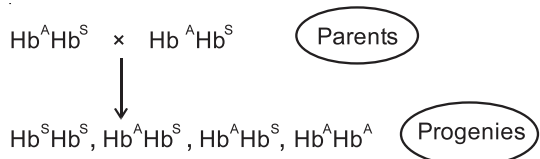
- During post transcriptional modification in eukaryotes, poly(A) tail (200–300 adenylate residues) are added at 3' end of hnRNA.
- During DNA replication Okazaki fragments are synthesized discontinuously and joined by DNA ligase.
- A PCR primer sequence is termed degenerate if some of its positions have several possible bases.

174. In a cross between a male and female, both heterozygous for sickle cell anaemia gene, what percentage of the progeny will be diseased?

- (1) 75% (2) 25%
(3) 100% (4) 50%

Answer (2)

Sol. According to given question;



Total number of affected progenies = 1

∴ Percentage of diseased/affected progenies

$$= \frac{1}{4} \times 100 = 25\%$$

175. Which is the "Only enzyme" that has "Capability" to catalyse Initiation, Elongation and Termination in the process of transcription in prokaryotes?

- (1) DNA dependent RNA polymerase
(2) DNA Ligase
(3) DNase
(4) DNA dependent DNA polymerase

Answer (1)

Sol. In prokaryotes, the DNA dependent RNA polymerase is a holoenzyme that is made of polypeptides ($\alpha_2\beta\beta'\omega$) σ . It is responsible for initiation, elongation and termination during transcription.

DNase degrades DNA.

DNA dependent DNA polymerase is involved in replication of DNA.

DNA ligase joins the discontinuously synthesised fragments of DNA.

176. Succus entericus is referred to as:

- (1) Intestinal juice (2) Gastric juice
(3) Chyme (4) Pancreatic juice

Answer (1)

Sol. • Option (1) is correct because succus entericus is referred to as intestinal juice.

- Chyme is name given to acidic food present in stomach.
- Exocrine secretion of pancreatic acini is called pancreatic juice.
- Secretion of gastric glands present in stomach is called gastric juice.

177. Which one of the following is an example of Hormone releasing IUD?

- (1) LNG 20 (2) Cu 7
(3) Multiload 375 (4) CuT

Answer (1)

Sol. • LNG-20 is a hormone releasing IUD which makes the uterus unsuitable for implantation and the cervix hostile to sperms.

- Multiload 375, CuT and Cu7 are copper releasing IUDs which suppress sperm motility and the fertilizing capacity of sperms.

178. Venereal diseases can spread through :

- (a) Using sterile needles
(b) Transfusion of blood from infected person
(c) Infected mother to foetus
(d) Kissing
(e) Inheritance

Choose the **correct** answer from the option given below

- (1) (b), (c) and (d) only (2) (b) and (c) only
(3) (a) and (c) only (4) (a), (b) and (c) only

Answer (2)

Sol. • Venereal diseases or sexually transmitted diseases or infections are transmitted by sharing of infected needles, surgical instruments with infected person, transfusion of blood or from an infected mother to foetus.

- Venereal diseases are not transmitted through kissing or inheritance.

179. Dobson units are used to measure thickness of:

- (1) Stratosphere (2) Ozone
(3) Troposphere (4) CFCs

Answer (2)

Sol. The thickness of the ozone in a column of air from the ground to the top of atmosphere is measured in term of Dobson unit (1 DU = 1ppb).

The lowermost layer of atmosphere is called troposphere.

CFCs are ozone depleting substances. Ozone found in upper part of atmosphere (the stratosphere) is called good ozone.

180. Persons with 'AB' blood group are called as "Universal recipients". This is due to :

- (1) Absence of antigens A and B in plasma
- (2) Presence of antibodies, anti-A and anti-B, on RBCs
- (3) Absence of antibodies, anti-A and anti-B, in plasma
- (4) Absence of antigens A and B on the surface of RBCs

Answer (3)

Sol. Option (3) is correct because persons with 'AB' blood group contain antigens 'A' and 'B' but lack antibodies anti-A and anti-B in plasma. So, persons with 'AB' blood group can accept blood from persons with AB as well as the other groups of blood due to lack of antibodies in their blood. Therefore, such persons are called "Universal recipients".

181. Which of the following RNAs is not required for the synthesis of protein?

- (1) tRNA
- (2) rRNA
- (3) siRNA
- (4) mRNA

Answer (3)

Sol. siRNA are small interfering RNA also called silencing RNA. It is a class of double-stranded RNA, non-coding RNA molecules.

mRNA is messenger RNA that carries genetic information provided by DNA.

tRNA carries amino acids to the mRNA during translation.

rRNA is structural RNA that forms ribosomes which are involved in translation.

182. Which of the following statements wrongly represents the nature of smooth muscle?

- (1) They are involuntary muscles
- (2) Communication among the cells is performed by intercalated discs
- (3) These muscles are present in the wall of blood vessels
- (4) These muscle have no striations

Answer (2)

Sol. • Option (2) is incorrect because intercalated discs are found only in cardiac muscle tissue.

- Smooth muscle fibres are non-striated and involuntary in nature and are present in the wall of blood vessels, uterus, gall bladder, alimentary canal etc.

183. Which of the following characteristics is **incorrect** with respect to cockroach?

- (1) Hypopharynx lies within the cavity enclosed by the mouth parts
- (2) In females, 7th-9th sterna together form a genital pouch
- (3) 10th abdominal segment in both sexes, bears a pair of anal cerci
- (4) A ring of gastric caeca is present at the junction of midgut and hind gut

Answer (4)

Sol. • Option (4) is incorrect because a ring of gastric caecae is present at the junction of foregut and midgut. At the junction of midgut and hindgut, malpighian tubules are present.

- Hypopharynx lies within the cavity enclosed by mouthparts.
- In female cockroach, the 7th sternum is boat shaped and together with the 8th and 9th sterna forms a genital pouch.
- 10th abdominal segment in both sexes, bears a pair of anal cerci and 9th sternum only in male cockroach, bears a pair of chitinous anal style.

184. Which one of the following belongs to the family Muscidae?

- (1) Grasshopper
- (2) Cockroach
- (3) House fly
- (4) Fire fly

Answer (3)

Sol. • Option (3) is correct because housefly belongs to the family Muscidae, class Insecta and phylum Arthropoda.

- Fire flies are placed in family Lampyridae of class insecta.
- Grasshopper is also an insect placed in family Acrididae.
- Cockroach is also an insect placed in family Blattidae.

185. Erythropoietin hormone which stimulates R.B.C. formation is produced by:

- (1) The cells of rostral adenohypophysis
- (2) The cells of bone marrow
- (3) Juxtaglomerular cells of the kidney
- (4) Alpha cells of pancreas

Answer (3)

Sol. • Option (3) is correct because Juxtaglomerular cells of kidney secrete erythropoietin hormone which stimulates RBC formation.

- Alpha cells of pancreas produce hormone glucagon.
- The cells of rostral adenohypophysis synthesizes hormones of anterior lobe of pituitary.
- The cells of bone marrow are responsible for formation of formed elements.

SECTION - B

186. Match List-I with List-II

List - I		List - II	
(a)	Filariasis	(i)	<i>Haemophilus influenzae</i>
(b)	Amoebiasis	(ii)	<i>Trichophyton</i>
(c)	Pneumonia	(iii)	<i>Wuchereria bancrofti</i>
(d)	Ringworm	(iv)	<i>Entamoeba histolytica</i>

Choose the **correct** answer from the options given below

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (iii) | (iv) | (i) | (ii) |
| (2) | (i) | (ii) | (iv) | (iii) |
| (3) | (ii) | (iii) | (i) | (iv) |
| (4) | (iv) | (i) | (iii) | (ii) |

Answer (1)

Sol. The correct option is (1).

- Filariasis is the disease caused by *Wuchereria bancrofti*, filarial worm.
- Amoebiasis/Amoebic dysentery is caused by a protozoan parasite *Entamoeba histolytica* in the large intestine of human.

- Pneumonia is caused by bacteria like *Streptococcus pneumoniae* and *Haemophilus influenzae*.
- Ringworm is caused by fungi belonging to genera *Microsporum*, *Trichophyton* and *Epidermophyton*.

187. Following are the statements about prostomium of earthworm.

- (a) It serves as a covering for mouth.
- (b) It helps to open cracks in the soil into which it can crawl.
- (c) It is one of the sensory structures.
- (d) It is the first body segment.

Choose the **correct** answer from the options given below.

- (1) (a), (b) and (d) are correct
- (2) (a), (b), (c) and (d) are correct
- (3) (b) and (c) are correct
- (4) (a), (b) and (c) are correct

Answer (4)

Sol. • The anterior end of the earthworm has mouth which has covering called prostomium.

- Prostomium acts as a wedge to force open cracks in the soil.
- Prostomium has receptors, so it is sensory in function.
- The first body segment of earthworm is the peristomium

188. Match List - I with List - II

List - I		List - II	
(a)	Adaptive radiation	(i)	Selection of resistant varieties due to excessive use of herbicides and pesticides
(b)	Convergent evolution	(ii)	Bones of forelimbs in Man and Whale
(c)	Divergent evolution	(iii)	Wings of Butterfly and Bird
(d)	Evolution by anthropogenic action	(iv)	Darwin Finches

Choose the **correct** answer from the options given below.

- | | | | | |
|-----|------------|------------|------------|------------|
| | (a) | (b) | (c) | (d) |
| (1) | (iii) | (ii) | (i) | (iv) |
| (2) | (ii) | (i) | (iv) | (iii) |
| (3) | (i) | (iv) | (iii) | (ii) |
| (4) | (iv) | (iii) | (ii) | (i) |

Answer (4)

Sol. The correct option is (4)

- Adaptive radiation is the process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography, for example : Darwin's finches.
- Analogous organs which are not anatomically similar structures though they perform similar functions, are a result of convergent evolution, for example: Wings of butterfly and of birds.
- Homologous organs which are anatomically similar structures but perform different functions according to their needs, are a result of divergent evolution, for example : Bones of forelimbs in man and whale.
- Evolution by anthropogenic action means evolution due to human interference, for example: Antibiotic resistant microbes, herbicides resistant varieties and pesticide resistant varieties.

189. Following are the statements with reference to 'lipids'.

- Lipids having only single bonds are called unsaturated fatty acids
- Lecithin is a phospholipid.
- Trihydroxy propane is glycerol.
- Palmitic acid has 20 carbon atoms including carboxyl carbon.
- Arachidonic acid has 16 carbon atoms.

Choose the **correct** answer from the options given below.

- (c) and (d) only
- (b) and (c) only
- (b) and (e) only
- (a) and (b) only

Answer (2)

Sol. • The correct option is (2) because lipids having only single bonds are called saturated fatty acids and lipids having one or more C = C double bonds are called unsaturated fatty acids.

- Palmitic acid has 16 carbon atoms including carboxyl carbon.
- Arachidonic acid has 20 carbon atoms including the carboxyl carbon.
- Lecithin is a phospholipid found in cell membrane.
- Glycerol has 3 carbons, each bearing a hydroxyl (-OH) group.

190. **Assertion (A):** A person goes to high altitude and experiences 'altitude sickness' with symptoms like breathing difficulty and heart palpitations.

Reason (R): Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.

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

- Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (A) is true but (R) is false
- (A) is false but (R) is true
- Both (A) and (R) are true and (R) is the correct explanation of (A)

Answer (4)

Sol. Altitude sickness can be experienced at high altitude where body does not get enough oxygen due to low atmospheric pressure and causes nausea, fatigue and heart palpitations.

Hence correct option is (4) as [R] is correct explanation of [A].

191. Match List-I with List - II

List - I		List - II	
(a)	Allen's Rule	(i)	Kangaroo rat
(b)	Physiological adaptation	(ii)	Desert lizard
(c)	Behavioural adaptation	(iii)	Marine fish at depth
(d)	Biochemical adaptation	(iv)	Polar seal

Choose the **correct** answer from the options given below.

- | | | | | |
|-----|------------|------------|------------|------------|
| | (a) | (b) | (c) | (d) |
| (1) | (iv) | (i) | (iii) | (ii) |
| (2) | (iv) | (i) | (ii) | (iii) |
| (3) | (iv) | (iii) | (ii) | (i) |
| (4) | (iv) | (ii) | (iii) | (i) |

Answer (2)

- Sol.**
- Polar seal generally has shorter ears and limbs (extremities) to minimise heat loss. This is with reference to Allen's rule.
 - Kangaroo rat exhibits physiological adaptation.
 - Desert lizard shows behavioural adaptation. They lack the physiological ability to cope-up with extreme temperature but manage the body temperature by behavioural means.
 - Marine fishes at depth are adapted biochemically to survive in great depths in ocean.

192. Which one of the following statements about Histones is **wrong**?

- (1) The pH of histones is slightly acidic
- (2) Histones are rich in amino acids - Lysine and Arginine
- (3) Histones carry positive charge in the side chain
- (4) Histones are organized to form a unit of 8 molecules

Answer (1)

- Sol.**
- Histones are rich in basic amino acids residue lysine and arginine with charged side chain.
 - There are five types of histone proteins *i.e.*, H₁, H₂A, H₂B, H₃ and H₄. Four of them occur in pairs to produce a unit of 8 molecules (histone octamer)
 - The pH of histones is basic.

193. **Statement I:** The codon 'AUG' codes for methionine and phenylalanine.

Statement II: 'AAA' and 'AAG' both codons code for the amino acid lysine.

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

- (1) Both **Statement I** and **Statement II** are false
- (2) **Statement I** is correct but **Statement II** is false
- (3) **Statement I** is incorrect but **Statement II** is true
- (4) Both **Statement I** and **Statement II** are true

Answer (3)

- Sol.**
- AUG has dual functions, it codes for methionine. It also acts as initiator codon.
 - AUG does not code for phenylalanine.
 - Statement II is true.

194. Match List-I with List-II

List -I		List -II	
(a)	Scapula	(i)	Cartilaginous joints
(b)	Cranium	(ii)	Flat bone
(c)	Sternum	(iii)	Fibrous joints
(d)	Vertebral column	(iv)	Triangular flat bone

Choose the correct answer from the options given below

- | | | | | |
|-----|------------|------------|------------|------------|
| | (a) | (b) | (c) | (d) |
| (1) | (ii) | (iii) | (iv) | (i) |
| (2) | (iv) | (ii) | (iii) | (i) |
| (3) | (iv) | (iii) | (ii) | (i) |
| (4) | (i) | (iii) | (ii) | (iv) |

Answer (3)

Sol. The correct option is (3).

- Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs.
- Fibrous joint is shown by the flat skull bones which fuse end-to-end with the help of dense fibrous connective tissues in the form of sutures, to form the cranium.
- Sternum is a flat bone on the ventral midline of thorax.
- Cartilaginous joints between the adjacent vertebrae in the vertebral column permits limited movements.

195. Which of the following secretes the hormone, relaxin, during the later phase of pregnancy?

- (1) Corpus luteum (2) Foetus
(3) Uterus (4) Graafian follicle

Answer (1)

Sol. The hormone relaxin is produced in the later phase of pregnancy. It is produced by the ovary.

- Graafian follicle is not formed when the woman is pregnant.
- Uterus and foetus do not produce relaxin.
- Relaxin is produced by the corpus luteum present in the ovary. Ruptured Graafian follicle is called corpus luteum, which has endocrine function.

196. Identify the types of cell junctions that help to stop the leakage of the substances across a tissue and facilitation of communication with neighbouring cells via rapid transfer of ions and molecules.

- (1) Tight junctions and Gap junctions, respectively
(2) Adhering junctions and Tight junctions, respectively.
(3) Adhering junctions and Gap junctions, respectively
(4) Gap junctions and Adhering junctions, respectively

Answer (1)

Sol. Three types of junctions are found in tissues

- Tight junctions stop leakage of substances from leaking across a tissue.
- Adhering junctions cement and keep neighbouring cells together.
- Gap junctions or communication junctions facilitate communication between cells by connecting the cytoplasm of adjoining cells.

197. Which of these is not an important component of initiation of parturition in humans ?

- (1) Synthesis of prostaglandins
(2) Release of Oxytocin
(3) Release of Prolactin
(4) Increase in estrogen and progesterone ratio

Answer (3)

Sol. • At the end of gestation, the completely developed foetus is expelled out. This process is called parturition.

- Parturition is controlled by a complex neuroendocrine mechanism.
- Estrogen and progesterone ratio increases as estrogen levels rise significantly.
- Prostaglandins, which stimulate uterine contractions are also produced that act on myometrium.
- Oxytocin, the main hormone, also called as birth hormone is released by maternal pituitary, which brings about strong uterine contractions.
- Prolactin is a lactation hormone that has no role in initiation of parturition.

198. Which of the following is **not** a step in Multiple Ovulation Embryo Transfer Technology (MOET)?

- (1) Cow yields about 6-8 eggs at a time
(2) Cow is fertilized by artificial insemination
(3) Fertilized eggs are transferred to surrogate mothers at 8-32 cell stage
(4) Cow is administered hormone having LH like activity for super ovulation

Answer (4)

Sol. Multiple Ovulation Embryo Transfer Technology is used for herd improvement in short time.

- Cows are administered hormones, with FSH-like activity for superovulation.
- 8-32 celled embryos are transferred to surrogate mothers.
- 6-8 eggs are produced per cycle.
- Cows can be fertilised by artificial insemination.

199. During muscular contraction which of the following events occur?

- (a) 'H' zone disappears
(b) 'A' band widens
(c) 'I' band reduces in width
(d) Myosine hydrolyzes ATP, releasing the ADP and Pi.
(e) Z-lines attached to actins are pulled inwards.

Choose the **correct** answer from the options given below:

- (1) (a), (b), (c), (d) only (2) (b), (c), (d), (e) only
(3) (b), (d), (e), (a) only (4) (a), (c), (d), (e) only

Answer (4)

Sol. The correct option is (4) because the length of A-band is retained. During muscle contraction, the following events occur:

- (1) The globular head of myosin acts as ATPase and hydrolyses ATP molecule and eventually leads to the formation of cross bridge.
- (2) This pulls the actin filament towards the centre of 'A-band'.
- (3) The Z-line attached to these actins are also pulled inwards thereby causing a shortening of the sarcomere.
- (4) The thin myofilaments move past the thick myofilaments due to which the H-zone narrows. This reduces the length of I-band but retains the length of A-band.
- (5) The myosin then releases ADP+Pi, and goes back to its relaxed state.

200. The Adenosine deaminase deficiency results into

- (1) Parkinson's disease
- (2) Digestive disorder
- (3) Addison's disease
- (4) Dysfunction of Immune system

Answer (4)

Sol. Adenosine deaminase (ADA) enzyme is crucial for the immune system to function. Hence, its deficiency results in the dysfunction of immune system.

- Hyposecretion of hormones of the adrenal cortex causes Addison's disease.
- Parkinson's disease is a long-term degenerative disorder of the central nervous system.
- Disorders which affect GIT & associated glands are called digestive disorders.

