

ZOOLOGY

SECTION-A

151. In gene therapy of Adenosine Deaminase (ADA) deficiency, the patient requires periodic infusion of genetically engineered lymphocytes because :

- (1) Gene isolated from marrow cells producing ADA is introduced into cells at embryonic stages
- (2) Lymphocytes from patient's blood are grown in culture, outside the body.
- (3) Genetically engineered lymphocytes are not immortal cells.
- (4) Retroviral vector is introduced into these lymphocytes.

Answer (3)

Sol. Option (3) is the correct answer as genetically engineered lymphocytes are not immortal cells and die after some time.

Option (2) is not the correct answer as the lymphocytes from patient's blood are grown in culture, outside the body but it is not the correct reason.

In option (1), if the gene isolated from bone marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.

152. *In-situ* conservation refers to:

- (1) Conserve only high-risk species
- (2) Conserve only endangered species
- (3) Conserve only extinct species
- (4) Protect and conserve the whole ecosystem

Answer (4)

Sol. When we conserve and protect the whole ecosystem, its biodiversity at all levels is protected. This is *in-situ* or on site conservation strategy.

153. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A):

Osteoporosis is characterised by decreased bone mass and increased chance of fractures.

Reason (R):

Common cause of osteoporosis is increased levels of estrogen.

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

- (1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**
- (2) **(A)** is correct but **(R)** is not correct
- (3) **(A)** is not correct but **(R)** is correct
- (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

Answer (2)

Sol. Option (2) is the correct answer as osteoporosis is due to decreased levels of oestrogen.

Osteoporosis is an age-related disorder characterised by decreased bone mass hence, the chances of fractures increase.

154. Which of the following is a correct match for disease and its symptoms?

- (1) Tetany – High Ca^{2+} level causing rapid spasms.
- (2) Myasthenia gravis – Genetic disorder resulting in weakening and paralysis of skeletal muscle
- (3) Muscular dystrophy – An auto immune disorder causing progressive degeneration of skeletal muscle
- (4) Arthritis – Inflamed joints

Answer (4)

Sol. Option (4) is the correct answer because Arthritis is inflammation of joints.

Option (2) is incorrect because myasthenia gravis is an immune disorder affecting neuro-muscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

Option (3) is incorrect because muscular dystrophy is progressive degeneration of skeletal muscle mostly due to genetic disorder.

Option (1) is incorrect because tetany is rapid spasms in muscle due to low Ca^{++} in body fluid.

155. In the taxonomic categories which hierarchical arrangement in ascending order is **correct** in case of animals?

- (1) Kingdom, Class, Phylum, Family, Order, Genus, Species
- (2) Kingdom, Order, Class, Phylum, Family, Genus, Species
- (3) Kingdom, Order, Phylum, Class, Family, Genus, Species
- (4) Kingdom, Phylum, Class, Order, Family, Genus, Species

Answer (4*)

Sol. None of the options are matching with the language of the question

The correct ascending order of taxonomic categories in case of animals is
species → genus → family → order → class → phylum → kingdom

156. Regarding Meiosis, which of the statements is **incorrect**?

- (1) DNA replication occurs in S phase of Meiosis-II
- (2) Pairing of homologous chromosomes and recombination occurs in Meiosis-I
- (3) Four haploid cells are formed at the end of Meiosis-II
- (4) There are two stages in Meiosis, Meiosis-I and II

Answer (1)

Sol. Meiosis involves two sequential cycles of nuclear and cell division called meiosis-I and meiosis-II but only single cycle of DNA replication.

The stage between two meiotic divisions is called interkinesis and is generally short lived and involves no DNA replication.

157. If the length of a DNA molecule is 1.1 metres, what will be the approximate number of base pairs?

- (1) 6.6×10^9 bp
- (2) 3.3×10^6 bp
- (3) 6.6×10^6 bp
- (4) 3.3×10^9 bp

Answer (4)

Sol. Number of base pairs × distance between 2 consecutive base pairs = Length of DNA molecule

$$x \cdot 0.34 \times 10^{-9} \text{ m} = 1.1 \text{ m}$$

$$x = \frac{1.1}{0.3 \times 10^{-9}}$$

$$= 3.6 \times 10^9$$

$$\approx 3.3 \times 10^9 \text{ bp}$$

158. Given below are two statements :

Statement I :

The coagulum is formed of network of threads called thrombins.

Statement II :

Spleen is the graveyard of erythrocytes.

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

Answer (3)

Sol. Option (3) is the correct answer because coagulum or clot is formed mainly of a network of threads called fibrins. Hence, Statement I is incorrect.

RBCs are destroyed in the spleen so spleen is known as the graveyard of erythrocytes. Hence, Statement II is correct.

159. Given below are two statements :

Statement I : Mycoplasma can pass through less than 1 micron filter size.

Statement II : Mycoplasma are bacteria with cell wall.

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

Answer (2)

Sol. Mycoplasma are the smallest cells and are only 0.3 μm in length. So it can pass through less than 1 μm filter size.

Mycoplasma lack cell wall.

160. If '8' *Drosophila* in a laboratory population of '80' died during a week, the death rate in the population is _____ individuals per *Drosophila* per week.

- (1) 10
- (2) 1.0
- (3) zero
- (4) 0.1

Answer (4)

Sol. If 8 *Drosophila* in a laboratory population of 80 died during a week, the death rate in the population is

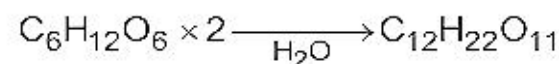
$$\frac{8}{80} = 0.1 \text{ individuals per } Drosophila \text{ per week.}$$

161. A dehydration reaction links two glucose molecules to product maltose. If the formula for glucose is $\text{C}_6\text{H}_{12}\text{O}_6$ then what is the formula for maltose?

- (1) $\text{C}_{12}\text{H}_{24}\text{O}_{12}$
- (2) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
- (3) $\text{C}_{12}\text{H}_{24}\text{O}_{11}$
- (4) $\text{C}_{12}\text{H}_{20}\text{O}_{10}$

Answer (2)

Sol. Option (2) is correct because maltose is a disaccharide formed by dehydration process *i.e.*, synthesis by elimination of one water molecule to form a glycosidic bond in between two glucose molecules. So, its molecular formula is.



162. Tegmina in cockroach, arises from

- (1) Mesothorax
- (2) Metathorax
- (3) Prothorax and Mesothorax
- (4) Prothorax

Answer (1)

Sol. Option (1) is the correct answer because tegmina or forewings (the first pair of wings) in cockroach arises from mesothorax.

Options (2), (3) and (4) are incorrect because no wing arises from prothorax and hindwings arise from metathorax.

163. Identify the microorganism which is responsible for the production of an immunosuppressive molecule cyclosporin A :

- (1) *Clostridium butylicum*
- (2) *Aspergillus niger*
- (3) *Streptococcus cerevisiae*
- (4) *Trichoderma polysporum*

Answer (4)

Sol. Bioactive molecule, cyclosporin A, that is used as an immunosuppressive agent in organ transplant patients, is produced by the fungus, *Trichoderma polysporum*.

164. Nitrogenous waste is excreted in the form of pellet or paste by :

- (1) *Salamandra*
- (2) *Hippocampus*
- (3) *Pavo*
- (4) *Ornithorhynchus*

Answer (3)

Sol. Option (3) is the correct answer because birds (*Pavo*) excrete nitrogenous wastes as uric acid in the form of pellet or paste with a minimum loss of water.

Option (1) and (2) are incorrect because many bony fishes (like *Hippocampus*) and aquatic amphibians (like *Salamandra*) are ammonotelic in nature.

Option (4) is incorrect because mammals (like *Ornithorhynchus*) mainly excrete urea and are called ureotelic animals.

165. Which of the following functions is **not** performed by secretions from salivary glands?

- (1) Digestion of complex carbohydrates
- (2) Lubrication of oral cavity
- (3) Digestion of disaccharides
- (4) Control bacterial population in mouth

Answer (3)

Sol. Option (3) is the correct answer because digestion of polysaccharides like starch occurs in mouth and digestion of disaccharides occurs in small intestine.

Option (2) is incorrect because saliva contains mucus which helps in the lubrication of oral cavity.

Option (4) is incorrect because saliva contains an antibacterial agent-lysozyme so that it controls bacterial population in mouth.

Option (1) is incorrect because digestion of complex carbohydrates are performed by secretions from salivary glands.

166. Breeding crops with higher levels of vitamins and minerals or higher proteins and healthier fats is called :

- (1) Bio-remediation (2) Bio-fortification
(3) Bio-accumulation (4) Bio-magnification

Answer (2)

Sol. Breeding crops with higher levels of vitamins and minerals, or higher protein and healthier fats is known as Biofortification.

Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.

Bioremediation is the phenomenon of using biological organism to handle pollution.

167. Which of the following is not the function of conducting part of respiratory system?

- (1) Inhaled air is humidified
(2) Temperature of inhaled air is brought to body temperature
(3) Provides surface for diffusion of O₂ and CO₂
(4) It clears inhaled air from foreign particles

Answer (3)

Sol. Option (3) is correct because the part starting with the external nostrils upto the terminal bronchioles constitute the conducting part; whereas the alveoli and their ducts form the respiratory or exchange part of the respiratory system.

The conducting part transports the atmospheric air to the alveoli, clears it from foreign particles, humidifies and also bring the air to body temperature. Exchange part is the site of actual diffusion of O₂/CO₂ between blood and atmospheric air.

168. Natural selection where more individuals acquire specific character value other than the mean character value, leads to

- (1) Directional change (2) Disruptive change
(3) Random change (4) Stabilising change

Answer (1)

Sol. Option (1) is correct because in directional natural selection more individuals acquire value other than the mean character value.

Option (2) is incorrect because in disruptive change, more individuals acquire peripheral character value at both ends of the distribution curve.

Option (3) is incorrect because there is no random change in natural selection.

Option (4) is incorrect because natural selection leads to stabilisation when more individuals acquire mean character value.

169. Which of the following statements with respect to Endoplasmic Reticulum is incorrect?

- (1) SER is devoid of ribosomes
(2) In prokaryotes only RER are present
(3) SER are the sites for lipid synthesis

(4) RER has ribosomes attached to ER

Answer (2)

Sol. In prokaryotes, ER is absent be it RER or SER.

170. Given below are two statements:

Statement I:

Autoimmune disorder is a condition where body defense mechanism recognizes its own cells as foreign bodies.

Statement II:

Rheumatoid arthritis is a condition where body does not attack self cells.

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

Answer (2)

Sol. Option (2) is the correct answer as autoimmune disorder is a condition where body defense mechanism recognises its own cells as foreign bodies. Sometimes, due to genetic and other unknown reasons, the body attacks self- cells.

Rheumatoid arthritis is an example where body attacks self cells (synovial membrane).

So Statement I is correct but Statement II is incorrect.

171. Under normal physiological conditions in human being every 100 ml of oxygenated blood can deliver _____ ml of O₂ to the tissues.

- (1) 5 ml
- (2) 4 ml
- (3) 10 ml
- (4) 2 ml

Answer (1)

Sol. Option (1) is the correct answer because every 100 mL of oxygenated blood can deliver around 5 mL of O₂ to the tissues under normal physiological conditions.

Option (2), (3) and (4) are incorrect because every 100 mL of deoxygenated blood delivers approximately 4 mL of CO₂ to the alveoli.

172. In an *E. Coli* strain *i* gene gets mutated and its product can not bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome?

- (1) z, y, a genes will be transcribed
- (2) z, y, a genes will not be translated
- (3) RNA polymerase will bind the promoter region
- (4) Only z gene will get transcribed

Answer (2)

Sol. As the product of '*i*' gene binds with the operator region and blocks the transcription and translation of z, y and a genes.

It's product is prevented from binding to the operator by attaching it with the inducer. As the inducer can now no more capable of binding with the repressor, thus, in all the cases, operator always gets attached with the repressor thereby preventing the transcription and transmission of z, y and a.

Even in the presence of lactose, transcription and translation of z, y and a would not occur.

173. Which of the following is present between the adjacent bones of the vertebral column?

- (1) Cartilage
- (2) Areolar tissue
- (3) Smooth muscle
- (4) Intercalated discs

Answer (1)

Sol. Option (1) is the correct answer because cartilage forming the intervertebral disc is present between the adjacent bones of the vertebral column and it is a type of cartilaginous joint.

Option (2) is incorrect because areolar tissue present beneath the skin is a type of loose connective tissue.

Option (3) is incorrect because smooth muscles are present in the visceral organs.

Option (4) is incorrect because intercalated discs are characteristic feature of cardiac muscles present in heart.

174. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : All vertebrates are chordates but all chordates are not vertebrates.

Reason (R) : Notochord is replaced by vertebral column in the adult vertebrates.

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

- (1) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
- (2) (A) is correct but (R) is not correct
- (3) (A) is not correct but (R) is correct
- (4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

Answer (4)

Sol. Option (4) is the correct answer because all chordates are divided into three subphyla – Urochordata, Cephalochordata and Vertebrata. In subphylum Vertebrata, notochord is replaced by bony or cartilaginous vertebral column in adults. Therefore, all vertebrates are chordates but all chordates are not vertebrates.

175. Given below are two statements:

Statement I :

The release of sperms into the seminiferous tubules is called spermiation.

Statement II :

Spermiogenesis is the process of formation of sperms from spermatogonia.

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

Answer (2)

Sol. Option (2) is the correct answer because Statement II is incorrect as the transformation of spermatids into spermatozoa (sperms) are called spermiogenesis. After this, sperm head becomes embedded in the Sertoli cells and are finally released from the seminiferous tubules by the process called spermiation. Hence, Statement I is a correct statement.

Spermatogenesis is the process of formation of sperms from spermatogonia.

176. Identify the asexual reproductive structure associated with *Penicillium* :

- (1) Conidia
- (2) Gemmules
- (3) Buds
- (4) Zoospores

Answer (1)

Sol. Conidia are the asexual reproductive structures produced in *Penicillium*.

Gemmules are produced in sponge

Buds are produced in *Hydra*

Zoospores are produced in *Chlamydomonas*

177. Which of the following statements are true for spermatogenesis but do not hold true for Oogenesis?

- (a) It results in the formation of haploid gametes
- (b) Differentiation of gamete occurs after the completion of meiosis
- (c) Meiosis occurs continuously in a mitotically dividing stem cell population
- (d) It is controlled by the Luteinising hormone (LH) and Follicle Stimulating Hormone (FSH) secreted by the anterior pituitary
- (e) It is initiated at puberty

Choose the most appropriate answer from the options given below:

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

Answer (3)

Sol. Option (3) is the correct answer.

- In both, spermatogenesis and oogenesis haploid gametes are formed. So (a) is true for both.
- The spermatids are transformed into spermatozoa (sperms) by the process called spermiogenesis. Hence, (b) is true for spermatogenesis only.
- Spermatogenesis and oogenesis both are controlled by LH and FSH secreted by the anterior pituitary. Hence (d) is true for both.
- Spermatogenesis is a continuous process that begins at puberty. So (e) is true for spermatogenesis. Oogenesis on the other hand begins during embryonic development of the female.

178. Given below are two statements:

Statement I:

Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence.

Statement II:

Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site.

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

Answer (4)

Sol. Option (4) is the correct answer because both the statements I and II are correct.

Each restriction endonuclease recognises a specific palindromic nucleotide sequences in the DNA. It will bind to the DNA and cut each of the two strands of double helix at specific points.

Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome site; but between the same two bases on the opposite strands. So both the statements I and II are correct.

179. Lippe's loop is a type of contraceptive used as:

- (1) Vault barrier
- (2) Non-Medicated IUD
- (3) Copper releasing IUD
- (4) Cervical barrier

Answer (2)

Sol. Option (2) is the correct answer because the intrauterine device (IUD) presently available as the non-medicated IUDs, is Lippe's loop.

Option (3) is incorrect as copper releasing IUDs are CuT, Cu7 and multiload 375.

Option (1) and (4) are incorrect as diaphragms, cervical caps and vaults are included in barrier method of contraception.

180. Detritivores breakdown detritus into smaller particles. This process is called:

- (1) Fragmentation
- (2) Humification
- (3) Decomposition
- (4) Catabolism

Answer (1)

Sol. Detritivores (eg. earthworm) break down detritus into smaller particles. This process is called fragmentation.

181. Which of the following is **not** a connective tissue?

- (1) Adipose tissue
- (2) Cartilage
- (3) Neuroglia
- (4) Blood

Answer (3)

Sol. Option (3) is the correct answer as neuroglia are a part of nervous tissue.

- Neuroglia are the supportive cells of nervous tissue. They make up more than half the volume of neural tissue. Neurons, the unit of neural system are excitable cells.
- Cartilage and blood are specialised type of connective tissues.
- Adipose tissue is a type of loose connective tissue.

182. In which of the following animals, digestive tract has additional chambers like crop and gizzard?

- (1) *Bufo*, *Balaenoptera*, *Bangarus*
- (2) *Catla*, *Columba*, *Crocodilus*
- (3) *Pavo*, *Psittacula*, *Corvus*
- (4) *Corvus*, *Columba*, *Chameleon*

Answer (3)

Sol. Option (3) is the correct answer because two additional chambers like crop and gizzard in alimentary canal are present in birds.

Pavo (Peacock), *Psittacula* (Parrot), *Corvus* (Crow) and *Columba* (Pigeon) are birds.

Option (1), (2) and (4) are incorrect because *Catla* is a bony fish, *Crocodylus*, *Chameleleon* and *Bangarus* are reptiles, *Bufo* is an amphibian and *Balaenoptera* is an aquatic mammal.

183. Given below are two statements :

Statement I :

Fatty acids and glycerols cannot be absorbed into the blood.

Statement II :

Specialized lymphatic capillaries called lacteals carry chylomicrons into lymphatic vessels and ultimately into the blood.

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

Answer (4)

Sol. Option (4) is the correct answer because both the statements I and II are correct as fatty acids and glycerol being insoluble in water, cannot be absorbed into the blood. They are first incorporated into small droplets called micelles which move into the intestinal mucosa. They are re-formed into very small protein coated fat globules called chylomicrons which are transported into the lymph vessels (lacteals) in the villi. These lymph vessels ultimately release the absorbed substances into the blood stream.

184. Select the **incorrect** statement with reference to mitosis:

- (1) Spindle fibres attach to centromere of chromosomes
- (2) Chromosomes decondense at telophase
- (3) Splitting of centromere occurs at anaphase
- (4) All the chromosomes lie at the equator at metaphase

Answer (1)

Sol. Spindle fibres attach to the kinetochores of chromosomes.

Kinetochores are the disc shaped structures present on sides of primary constriction or centromere of chromosomes.

185. At which stage of life the oogenesis process is initiated?

- (1) Embryonic development stage
- (2) Birth
- (3) Adult
- (4) Puberty

Answer (1)

Sol. Option (1) is the correct answer as oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each foetal ovary.

No more oogonia are formed and added after birth in a human female.

At puberty only 60,000 to 80,000 primary follicles are left in each ovary, rest degenerate during the phase from birth to puberty.

SECTION-B

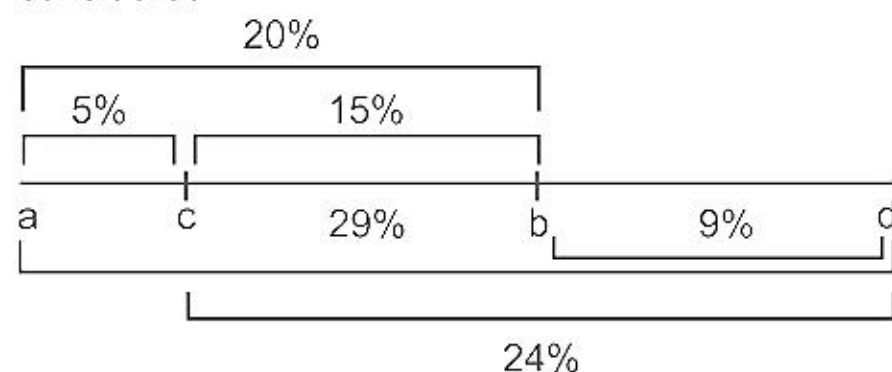
186. The recombination frequency between the genes a & c is 5%, b & c is 15%, b & d is 9%, a & b is 20%, c & d is 24% and a & d is 29%. What will be the sequence of these genes on a linear chromosome?

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

Answer (3)

Sol. 1% recombination frequency = 1 centi Morgan

To place the genes on a linear chromosome, decreasing order of recombination frequency will be considered.



187. Which one of the following statements is **correct**?

- (1) The tricuspid and the bicuspid valves open due to the pressure exerted by the simultaneous contraction of the atria
- (2) Blood moves freely from atrium to the ventricle during joint diastole.
- (3) Increased ventricular pressure causes closing of the semilunar valves.
- (4) The atrio-ventricular node (AVN) generates an action potential to stimulate atrial contraction

Answer (2)

Sol. Option (2) is the correct answer because during joint diastole, blood moves freely from atrium to ventricle as atrioventricular valve remain open during joint diastole.

Option (3) is incorrect because decrease in ventricular pressure, during ventricular diastole closes semilunar valves to produce 'dub' heart sound.

Option (4) is incorrect because SA node generates action potential to stimulate atrial contraction.

Option (1) is incorrect because bicuspid and tricuspid valves open due to pressure exerted by blood present in atria and decrease in pressure in ventricles during ventricular diastole.

188. Given below are two statements:

Statements I :

In a scrubber the exhaust from the thermal plant is passed through the electric wires to charge the dust particles.

Statement II :

Particulate matter (PM 2.5) cannot be removed by scrubber but can be removed by an electrostatic precipitator.

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

Answer (3)

Sol. Scrubber is used by the industries which produce SO_2 as a by product.

The limestone present in slurry of scrubber remove SO_2 from the exhaust.

Electrostatic precipitator is the most effective device to remove 99% of particulate matter, 'even PM 2.5' present in the exhaust.

189. Match **List-I** with **List-II**

	List-I		List-II
(a)	Bronchioles	(i)	Dense Regular Connective Tissue
(b)	Goblet Cell	(ii)	Loose Connective Tissue
(c)	Tendons	(iii)	Glandular Tissue
(d)	Adipose Tissue	(iv)	Ciliated Epithelium

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

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

Answer (4)

Sol. Option (4) is the correct answer because

Ciliated epithelium is mainly present in the inner surface of hollow organs like bronchioles and fallopian tubes. The function is to move particles or mucus in a specific direction over the epithelium.

Some of the columnar or cuboidal cells get specialised for secretion and are called glandular epithelium. Goblet cells are unicellular glands.

Tendons are dense regular connective tissues. They attach skeletal muscles to bones.

Adipose tissue is a type of loose connective tissue located mainly beneath the skin. The cells of this tissue are specialised to store fats.

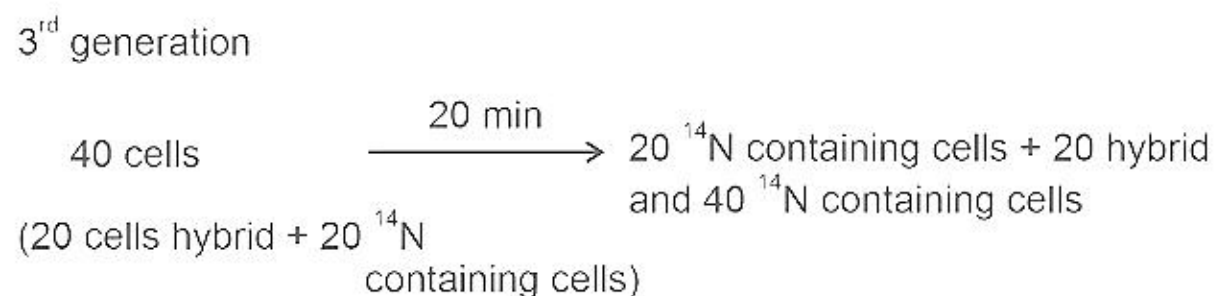
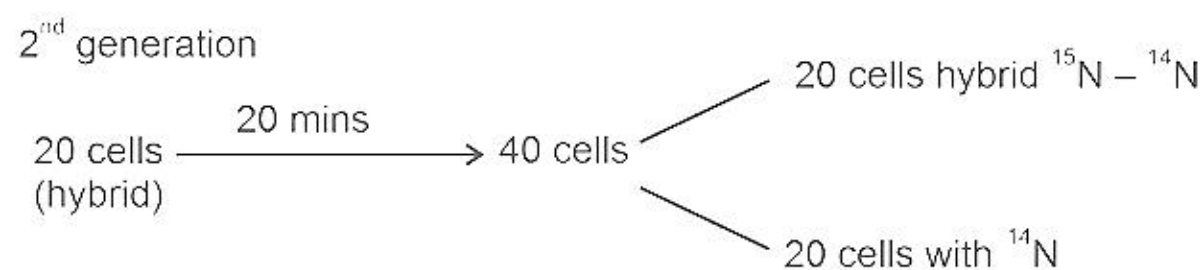
190. Ten *E.coli* cells with ^{15}N - dsDNA are incubated in medium containing ^{14}N nucleotide. After 60 minutes, how many *E.coli* cells will have DNA totally free from ^{15}N ?

- (1) 40 cells
 (2) 60 cells
 (3) 80 cells
 (4) 20 cells

Answer (2)

Sol. From 10 parent *E.coli* cells





Therefore, after 60 minutes, 60 *E.coli* cells will have DNA totally free from ^{15}N .

191. Select the **incorrect** statement regarding synapses :

- (1) Electrical current can flow directly from one neuron into the other across the electrical synapse.
- (2) Chemical synapses use neurotransmitters
- (3) Impulse transmission across a chemical synapse is always faster than that across an electrical synapse.
- (4) The membranes of presynaptic and postsynaptic neurons are in close proximity in an electrical synapse.

Answer (3)

Sol. Option (3) is the correct answer as impulse transmission across an electrical synapse is always faster than that across a chemical synapse.

- \rightarrow Chemical synapses use chemicals for transmission which are known as neurotransmitters.
- \rightarrow The membranes of presynaptic and postsynaptic neurons are in close proximity in an electrical synapse.
- \rightarrow In an electrical synapse, the transmission of the impulse occurs in the form of an electrical current from one neuron to the next neuron.

192. Which of the following are **not** the effects of Parathyroid hormone?

- (a) Stimulates the process of bone resorption
- (b) Decreases Ca^{2+} level in blood
- (c) Reabsorption of Ca^{2+} by renal tubules
- (d) Decreases the absorption of Ca^{2+} from digested food
- (e) Increases metabolism of carbohydrates

Choose the **most appropriate** answer from the options given below:

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

Answer (1)

Sol. Option (1) is the correct answer because parathyroid hormone is a hypercalcemic hormone *i.e.*, it increases the blood calcium levels. It also increases the absorption of calcium from digested food. Glucocorticoids regulate the carbohydrate metabolism.

Option (2) is not the answer because parathyroid hormone stimulates the process of bone resorption.

Option (3) and (4) are not the answers because reabsorption of Ca^{2+} by renal tubules is a function of PTH.

193. Which of the following statements **is not** true?
- (1) Sweet potato and potato is an example of analogy
 - (2) Homology indicates common ancestry
 - (3) Flippers of penguins and dolphins are a pair of homologous organs
 - (4) Analogous structures are a result of convergent evolution

Answer (3)

Sol. Option (3) is the correct answer because flippers of penguins and dolphins are analogous organs as they help in swimming but do not have the same structure.

Option (1), (2) and (4) are true statements and hence cannot be the correct answer.

Homologous organs have the same structure but have different functions according to the needs of the organisms. Hence, homology indicates common ancestry.

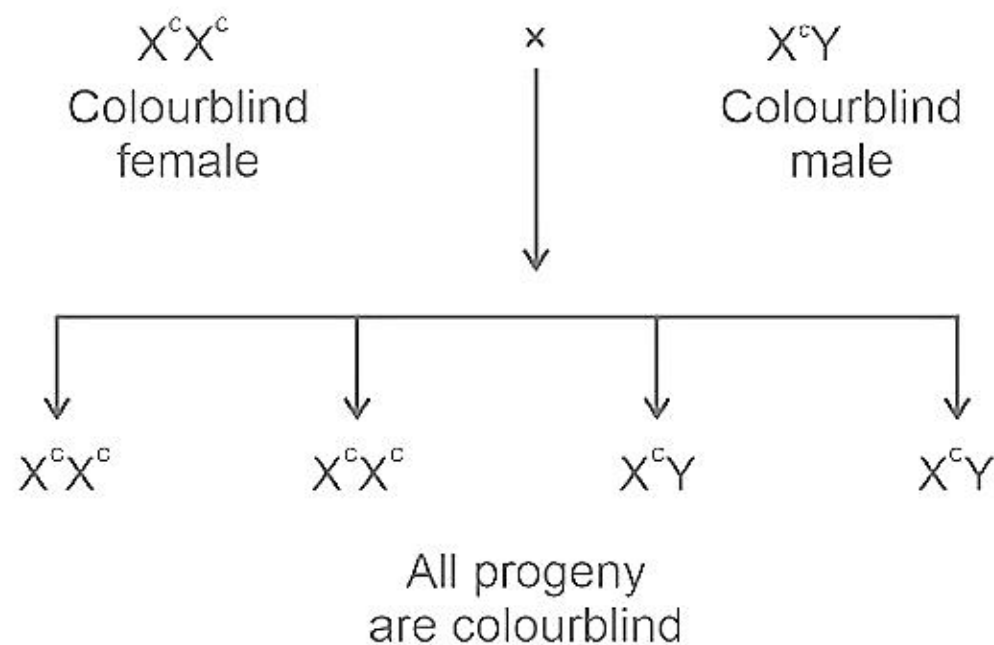
Analogous structures have developed for the same function but do not show a similarity in structure. Hence, they are a result of convergent evolution.

Sweet potato is a root modification for food storage whereas potato is an underground stem modification for storage. Hence they are analogous.

194. If a colour blind female marries a man whose mother was also colour blind, what are the chances of her progeny having colour blindness?
- (1) 50%
 - (2) 75%
 - (3) 100%
 - (4) 25%

Answer (3)

Sol. If mother of man is colourblind, then man will also be colourblind as colour blindness is a X-linked recessive trait and shows criss-cross inheritance.



195. Which of the following is a **correct** statement?
- (1) Bacteria are exclusively heterotrophic organisms.
 - (2) Slime moulds are saprophytic organisms classified under Kingdom Monera.
 - (3) Mycoplasma have DNA, ribosome and cell wall.
 - (4) Cyanobacteria are a group of autotrophic organisms classified under kingdom Monera.

Answer (4)

Sol. Slime moulds are classified under kingdom Protista.

Mycoplasma lack cell wall.

Bacteria can be autotrophic as well as heterotrophic.

196. Match **List-I** with **List-II**

	List-I (Biological Molecules)		List-II (Biological functions)
(a)	Glycogen	(i)	Hormone
(b)	Globulin	(ii)	Biocatalyst
(c)	Steroids	(iii)	Antibody
(d)	Thrombin	(iv)	Storage product

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

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

Answer (3)

Sol. Option (3) is the correct answer as glycogen is a polysaccharide and is a storage product in animals.

- Globulins form antibodies which are also known as immunoglobulins.
- Steroids form hormones like testosterone.
- Thrombin is a biocatalyst which converts soluble fibrinogen to insoluble fibrin.

197. Which of the following is **not** a desirable feature of a cloning vector?

- (1) Presence of a marker gene
 (2) Presence of single restriction enzyme site
 (3) Presence of two or more recognition sites
 (4) Presence of origin of replication

Answer (3)

Sol. Option (3) is the correct answer. Cloning vectors are the carriers of the desired gene in the host cell. The features desirable in a cloning vector are:-

- Presence of origin of replication
- Presence of marker genes
- Presence of very few, preferably single recognition site for the commonly used restriction enzymes

198. Match **List-I** with **List-II** with respect to methods of Contraception and their respective actions.

	List-I		List-II
(a)	Diaphragms	(i)	Inhibit ovulation and Implantation
(b)	Contraceptive Pills	(ii)	Increase phagocytosis of sperm within Uterus
(c)	Intra Uterine Devices	(iii)	Absence of Menstrual cycle and ovulation following parturition
(d)	Lactational Amenorrhea	(iv)	They cover the cervix blocking the entry of sperms

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

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

Answer (1)

Sol. Option (1) is the correct answer because

- Diaphragms are barrier methods of contraception. They cover the cervix and block the entry of sperms.
- Contraceptive pills are preparations containing either progestogens alone or combination of progestogen and oestrogen. They inhibit ovulation and implantation as well as alter the quality of cervical mucus to prevent entry of sperms.
- Intra uterine devices increase the phagocytosis of sperms within the uterus.
- Lactational amenorrhoea is a natural method of contraception and it is based on the fact that the ovulation and therefore menstrual cycle do not occur during the period of intense lactation following parturition.

199. Statements related to human Insulin are given below.

Which statement(s) is/are **correct** about genetically engineered Insulin?

- (a) Pro-hormone insulin contain extra stretch of C-peptide
- (b) A-peptide and B-peptide chains of insulin were produced separately in *E.coli*, extracted and combined by creating disulphide bond between them.
- (c) Insulin used for treating Diabetes was extracted from Cattles and Pigs.
- (d) Pro-hormone Insulin needs to be processed for converting into a mature and functional hormone.
- (e) Some patients develop allergic reactions to the foreign insulin.

Choose **the most appropriate** answer from the options given below:

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

Answer (1)

Sol. Option (1) is the correct answer as genetically engineered insulin has A-peptide and B-peptide chains of insulin which are produced separately in *E.coli*, then they are extracted and combined by creating disulphide bond between them.

Statement (a) is incorrect as genetically engineered insulin does not have an extra stretch of C-peptide.

Statement (c) is incorrect as insulin obtained from cattles and pigs is not genetically engineered insulin.

Statement (d) is incorrect because conversion of pro-insulin to insulin is not required during production of insulin by genetic engineering as A-peptide and B-peptide chains are produced separately.

Statement (e) is incorrect as allergic reactions to insulin are mostly seen when the insulin is obtained from animals.

200. Select the **incorrect** statement with respect to acquired immunity.

- (1) Anamnestic response is elicited on subsequent encounters with the same pathogen.
- (2) Anamnestic response is due to memory of first encounter.
- (3) Acquired immunity is non-specific type of defense present at the time of birth.
- (4) Primary response is produced when our body encounters a pathogen for the first time.

Answer (3)

Sol. Option (3) is the correct answer as acquired immunity is a specific type of defence which is not present at the time of birth.

Option (1), (2) and (4) are true statements and hence cannot be the answer.

Anamnestic response or secondary immune response is a highly intensified response due to memory of first encounter.

When our body encounters a pathogen for the first time then the body elicits the primary immune response.

When there is a subsequent encounter with the same pathogen, secondary or anamnestic immune response is elicited.

