NEET 2024 - Paper Code R3

Biology

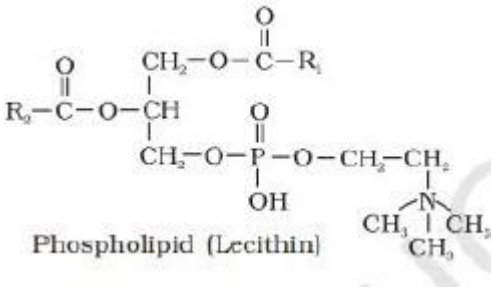
Question 101: A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and down stream end.
Options:
(a) Structural gene, Transposons, Operator gene
(b) Inductor, Repressor, Structural gene
(c) Promotor, Structural gene, Terminator
(d) Repressor, Operator gene, Structural gene
Answer: (c)
Solution: Transcription Unit consists of a promoter, structural gene and terminator. The promoter and terminator flank the structural gene in a transcription unit. The promoter is said to be located towards **5' -end (upstream)** of the structural gene (the reference is made with respect to the polarity of coding strand). The **terminator** is located **towards 3' -end (downstream)** of the coding strand and it usually defines the end of the process of transcription.

Question 102: Identify the set of correct statements:
A. The flowers of *Vallisneria* are colorful and produce nectar.
B. The flowers of waterlily are not pollinated by water.
C. In most of water pollinated species, the pollen grains are protected from wetting.
D. Pollen grains of some hydrophytes are long and ribbon like.
E. In sumo hydrophytes, the pollen grains are carried passively inside water.
Choose the correct answer from the options given below:
Options:
(a) A, B, C and D only
(b) A, C, D and E only
(c) B, C, D and E only
(d) C, D and E only
Answer: (c)
Solution: In Vallisneria, the female flower reach the surface of water by the long stalk and the male flowers or pollen grains are released on to the surface of water.
Both wind and water pollinated flowers are **not very colourful and do not produce nectar**.
In a majority of aquatic plants such as water hyacinth and **water lily**, the flowers emerge above the level of water and are **pollinated by insects or wind** as in most of the land plants.
In most of the **water-pollinated** species, pollen grains are protected from wetting by a **mucilaginous covering**.
Pollen grains in many such species are **long, ribbon like** and they are carried passively inside the water; some of them reach the stigma and achieve pollination.

Question 103: Lecithin, a small molecular weight organic compound found in living tissues, is an example of

Options:
(a) Phospholipids
(b) Glyceride

(c) Carbohydrates
(d) Amino acids
Answer: (a)
Solution: Some lipids have phosphorus and a phosphorylated organic compound in them. These are phospholipids. They are found in cell membrane. **Lecithin** is one example.



Question 104: These are regarded as major causes of biodiversity loss:
A. Over exploitation
B. Co-extinction
C. Mutation
D. Habitat loss and fragmentation
E. Migration
Choose the correct option:
Options:
(a) A, B, C and D only
(b) A, B and E only
(c) A, B and D only
(d) A, C and D only
Answer: (c)
Solution: Causes of biodiversity losses: The accelerated rates of species extinctions that the world is facing now are largely due to human activities. There are four major causes:

- **Habitat loss and fragmentation**
- **Over-exploitation**
- **Alien species invasions**
- **Co-extinctions**

Question 105: Match List I with List II.

List I	**List II**
A. *Clostridium butylicum*	I. Ethanol
B. *Saccharomyces cerevisiae*	II. Streptokinase
C. *Trichoderma polysporum*	III. Butyric acid
D. *Streptococcus sp.*	IV. Cyclosporin-A

Choose the correct answer from the options given below.
Options:
(a) A-II, B-IV, C-III, D-I
(b) A-III, B-I, C-IV, D-II
(c) A-IV, B-I, C-III, D-II
(d) A-III, B-I, C-II, D-IV
Answer: (b)
Solution: Clostridium butylicum (a bacterium) of **butyric acid**. Yeast (Saccharomyces cerevisiae) is used for commercial production of ethanol.

Another bioactive molecule, **cyclosporin A**, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus **Trichoderma polysporum**.
Streptokinase produced by the bacterium Streptococcus and modified by genetic engineering is used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack.

Question 106: Match list I with list II.

List I	**List II**
A. *Rhizopus*	I. Mushroom
B. *Ustilago*	II. Smut fungus
C. *Puccinia*	III. Bread mould
D. *Agaricus*	IV. Rust fungus

Choose the correct answer from the options given below.
Options:
(a) A-I, B-III, C-II, D-IV
(b) A-III, B-II, C-I, D-IV
(c) A-IV, B-III, C-II, D-I
(d) A-III, B-II, C-IV, D-I
Answer: (d)
Solution: Rhizopus (the **bread mould** mentioned earlier) and Albugo (the parasitic fungi on mustard).
Some common members are **Agaricus (mushroom), Ustilago (smut)** and **Puccinia (rust fungus).**

Question 107: The lactose present in the growth medium of bacteria is transported to the cell by the action of:
Options:
(a) Acetylase
(b) Permease
(c) Polymerase
(d) Beta-galactosidase
Answer: (b)
Solution: In the absence of a preferred carbon source such as glucose, if lactose is provided in the growth medium of the bacteria, **the lactose is transported into the cells through the action of permease**.

Question 108: List of endangered species was released by
Options:
(a) WWF
(b) FOAM
(c) IUCN
(d) GEAC
Answer: (c)
Solution: The **IUCN Red List** (2004) documents the extinction of 784 species (including 338 vertebrates, 359 invertebrates and 87 plants) in the last 500 years.
Established in 1964, The International Union for Conservation of Nature's Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global conservation status of animal, fungi and plant species.

Question 109: How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle

Options:

(a) 2 molecules of ATP and 2 molecules of NADPH
(b) 3 molecules of ATP and 3 molecules of NADPH
(c) 3 molecules of ATP and 2 molecules of NADPH
(d) 2 molecules of ATP and 3 molecules of NADPH

Answer: (c)

Solution: For every CO_2 molecule entering the Calvin cycle, **3 molecules of ATP and 2 of NADPH** are required.

Question 110: The equation of Verhulst-Pearl logistic growth is $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$,

From this equation, *K* indicates.

Options:

(a) Biotic potential
(b) Carrying capacity
(c) Population density
(d) Intrinsic rate of natural increase

Answer: (b)

Solution: A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity. A plot of N in relation to time (t) results in a sigmoid curve. This type of population growth is called Verhulst-Pearl Logistic Growth and is described by the following equation:

$$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$$

Where,
N = Population density at time t
r = Intrinsic rate of natural increase
K = Carrying Capacity

Question 111: Bulliform cells are responsible for

Options:

(a) Protecting the plant from salt stress.
(b) Increased photosynthesis in monocots.
(c) Providing large spaces for storage of sugars.
(d) Inward curling of leaves in monocots.

Answer: (d)

Solution: In grasses, certain adaxial epidermal cells along the veins modify themselves into large, empty, colourless cells. These are called bulliform cells. When the bulliform cells in the leaves have absorbed water and are turgid, the leaf surface is exposed. When they are flaccid due to water stress, they make the leaves curl inwards to minimise water loss Bulliform cells are therefore responsible for inward curling of leaves in the monocots.

Question 112: Which one of the following is not a criterion for classification of fungi?

Options:

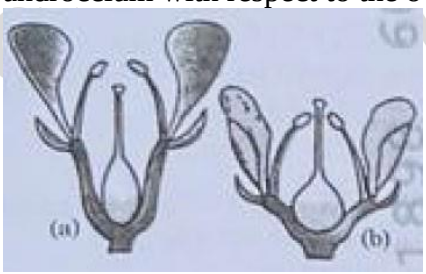
(a) Mode of nutrition
(b) Mode of spore formation
(c) Fruiting body

(d) Morphology of mycelium
Answer: (a)
Solution: The morphology of the mycelium, mode of spore formation and fruiting bodies form the basis for the division of the kingdom into various classes.
Mode of nutrition is not the criterion for classification of fungi.

Question 113: Tropical regions show greatest level of species richness because
A. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for specks diversification.
B. Tropical environments are more seasonal.
C. More solar energy is available in tropics
D. Constant environments promote niche specialization.
E. Tropical environments are constant and predictable.
Choose the correct answer from the options given below:
Options:
(a) A and B only
(b) A, B and E only
(c) A, B and D only
(d) A, C, D and E only
Answer: (d)
Solution: Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable.

Question 114: Which of the following is an example of actinomorphic flower?
Options:
(a) Cassia
(b) Pisum
(c) Sesbania
(d) Datura
Answer: (d)
Solution: When a flower can be divided into two equal radial halves in any radial plane passing through the centre, it is said to be actinomorphic, e.g., mustard, datura, chilli.

Question 115: Identify the type of flowers based on the position of calyx, corolla and androccium with respect to the ovary from the given figures (a) and (b)



Options:
(a) (a) Hypogynous; (b) Epigynous
(b) (a) Perigynous; (b) Epigynous
(c) (a) Perigynous; (b) Perigynous
(d) (a) Epigynous; (b)
Answer: (c)

Solution: If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level, it is called perigynous. The ovary here is said to be half inferior, e.g., plum, rose, peach.

Question 116: Match list I with list II.

List I	**List II**
A. Nucleolus	I. Site of formation of glycolipid
B. Centriole	II. Organisation like the cartwheel
C. Leucoplasts	III. Site for active ribosomal RNA synthesis
D. Golgi apparatus	IV. For storing nutrients

Choose the correct answer from the options given below.

Options:

(a) A-II, B-III, C-I, D-IV
(b) A-III, B-IV, C-II, D-I
(c) A-I, B-II, C-III, D-IV
(d) A-III, B-II, C-IV, D-I

Answer: (d)

Solution:

- nucleolus is a site for active ribosomal RNA synthesis.
- The centrioles in a centrosome lie perpendicular to each other in which each has an organisation like the cartwheel.
- The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients
- Golgi apparatus is the important site of formation of glycoproteins and glycolipids.

Question 117: What is the rate ore piece or DNA carrying only gene of interest which is transferred into an alien organism?

A. The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
B. It may get integrated into the genome of the recipient.
C. It may multiply and be inherited along with the host DNA.
D. The alien piece of DNA is not an integral part of chromosome.
E. It shows ability to replicate.

Choose the correct answer from the options given below:

Options:

(a) D and E only
(b) B and C only
(c) A and E only
(d) A and B only

Answer: (b)

Solution: It may get integrated into the genome of the recipient.
It may multiply and be inherited along with the host DNA.

Question 118: Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of

Options:

(a) 6 bp
(b) 4 bp
(c) 10 bp
(d) 8 bp

Answer: (a)

Solution: Recognition sequence of Hind II consists of 6 bp.

Question 119: The cofactor of the enzyme carboxypeptidase is
Options:
(a) Niacin
(b) Flavin
(c) Haem
(d) Zinc
Answer: (d)
Solution: Zinc is a cofactor for the proteolytic enzyme carboxypeptidase.

Question 120: Which of the following are required for the dark reaction of photosynthesis?
A. Light
B. Chlorophyll
C. CO_2
D. ATP
E. NADPH
Choose the correct answer from the options given below:
Options:
(a) B, C and D only
(b) C, D and E only
(c) D and E only
(d) A, B and C only
Answer: (b)
Solution: The dark phase or biosynthetic phase of photosynthesis does not directly depend on the presence of light but is dependent on the products of the light reaction, i.e., ATP and NADPH, besides CO_2 and H_2O.

Question 121: The type of conservation in which the threatened species are taken out from their natural habitat and placed in special setting when they can he protected and given special care is called
Options:
(a) Biodiversity conservation
(b) Semi-conservative method
(c) Sustainable development
(d) *in-situ* conservation
Answer: (a)
Solution: *Ex situ* Conservation – In this approach, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care.

Question 122: Match list I with list II.

List I	**List II**
A. Two or more alternative forms of a gene	I. Back cross
B. Cross of F_1 progeny with homozygous recessive parent	II. Ploidy
C. Cross of F_1 progeny with any of the parents	III. Allele
D. Number of chromosome sets in plant.	IV. Test cross

Choose the correct answer from the options given below.

Options:
(a) A-II, B-I, C-III, D-IV
(b) A-III, B-IV, C-I, D-II
(c) A-IV, B-III, C-II, D-I
(d) A-I, B-II, C-III, D-IV
Answer: (b)
Solution: Genes which code for a pair of contrasting traits are known as alleles, i.e., they are slightly different forms of the same gene.
In a typical test cross an organism (pea plants here) showing a dominant phenotype (and whose genotype is to be determined) is crossed with the recessive parent instead of self-crossing.
Cross of F_1 progeny with any of the parents is called Back Cross.
Ploidy is the number of sets of chromosomes in a cell or organism.

Question 123: Formation of interfascicular cambium from fully developed parenchyma cells is an example for
Options:
(a) Redifferentiation
(b) Dedifferentiation
(c) Maturation
(d) Differentiation
Answer: (b)
Solution: The living differentiated cells, that by now have lost the capacity to divide can regain the capacity of division under certain conditions. This phenomenon is termed as dedifferentiation. For example, formation of meristems – interfascicular cambium and cork cambium from fully differentiated parenchyma cells.

Question 124: Spindle fibres attach to kinetochores of chromosomes during
Options:
(a) Metaphase
(b) Anaphase
(c) Telophase
(d) Prophase
Answer: (a)
Solution: At metaphase stage, metaphase chromosome is made up of two sister chromatids, which are held together by the centromere. Small disc-shaped structures at the surface of the centromeres are called kinetochores. These structures serve as the sites of attachment of spindle fibres (formed by the spindle fibres) to the chromosomes that are moved into position at the centre of the cell.

Question 125: In a plant, black seed color (BB/bb) is dominant, over white seed color (bb). In order to find out the genotype of the black seed plant, which of the following genotype will you cross it?
Options:
(a) bb
(b) Bb
(c) BB/Bb
(d) BB
Answer: (a)

Solution: By simply looking at the phenotype of a dominant trait (BB/Bb), it is not possible to know the genotypic composition. That is, for example, whether a tall plant from F_1 or F_2 has BB or Bb composition, cannot be predicted. Therefore, to determine the genotype of a tall plant at F_2, Mendel crossed the tall plant from F_2 with a dwarf (bb) plant. This he called a test cross. In a typical test cross an organism (black seed color plants here) showing a dominant phenotype (and whose genotype is to be determined) is crossed with the recessive parent (bb) instead of self-crossing.

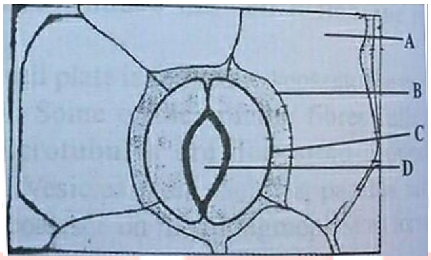
Question 126: A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotype/s is/are expected in the progeny ? (I) (2) (3).
Options:
(a) Red flowered as well as pink flowered plants
(b) Only pink flowered plants
(c) Red, Pink as well as white flowered plants
(d) Only red flowered plants
Answer: (a)
Solution: The inheritance of flower colour in the dog flower (snapdragon or Antirrhinum sp.) is a good example to understand incomplete dominance. In a cross between true-breeding red-flowered (RR) and true breeding white-flowered plants (rr), the F1 (Rr) was pink. When the F1 was self-pollinated the F2 resulted in the following ratio 1 (RR) Red: 2 (Rr) Pink: 1 (rr) White.
So in a cross between red and pink flowers, the phenotypes expected in the progeny will be 1 Red (RR): 1 Pink (Rr), only red and pink flowers will be obtained.

Question 127: Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of
Options:
(a) Feedback inhibition
(b) Competitive inhibition
(c) Enzyme activation
(d) Cofactor inhibition
Answer: (b)
Solution: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor. Due to its close structural similarity with the substrate, the inhibitor competes with the substrate for the substrate binding site of the enzyme. Consequently, the substrate cannot bind and as a result, the enzyme action declines, e.g., inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate in structure.

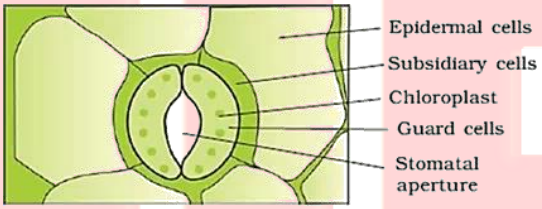
Question 128: Given below are two statements:
Statement I: Bt toxins are insect group specific and coded by a gene *cry* 1Ac.
Statement II: Bt toxin exists as inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect the inactive protoxin gets converted into active form due to acidic pH of the insect gut.
In the light of the above statements, choose the correct answer from the options given below:
Options:
(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are true

Answer: (b)
Solution: Specific Bt toxin genes were isolated from *Bacillus thuringiensis* and incorporated into the several crop plants such as cotton. The choice of genes depends upon the crop and the targeted pest, as most Bt toxins are insect-group specific. The toxin is coded by a gene cryIAc named cry
Bacillus thuringiensis forms protein crystals during a particular phase of their growth. These crystals contain a toxic insecticidal protein. Why does this toxin not kill the *Bacillus*? Actually, the Bt toxin protein exist as inactive protoxins but once an insect ingest the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilise the crystals.

Question 129: In the given figure, which component has thin outer walls and highly thickened inner walls?



Options:
(a) D
(b) A
(c) B
(d) C
Answer: (d)
Solution:

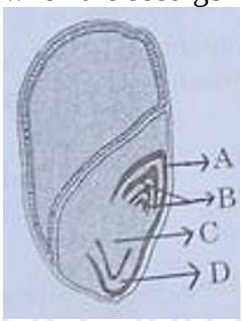


The outer walls of guard cells (away from the stomatal pore) are thin and the inner walls (towards the stomatal pore) are highly thickened.

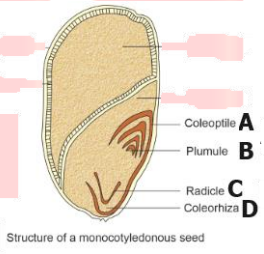
Question 130: Which one of the following can be explained on the basis of Mendal's law of Dominance?
A. Out of one pair of factors one is dominant and the other is recessive.
B. Alleles do not show any expression and both the character appear as such in F_2 generation.
C. Factors occur in pairs in normal diploid plants.
D. The discrete unit controlling a particular character is called factor.
E. The expression of only one of the parental characters is found in a monohybrid cross.
Choose the comet aver from the options given below:
Options:
(a) A, C, D and E only
(b) B, C, and D only
(c) A, B, C, D and E
(d) A, B and C only
Answer: (a)
Solution: Law of Dominance

(i) Characters are controlled by discrete units called factors.
(ii) Factors occur in pairs.
(iii) In a dissimilar pair of factors one member of the pair dominates (dominant) the other (recessive).
The law of dominance is used to explain the expression of only one of the parental characters in a monohybrid cross in the F_1 and the expression of both in the F_2. It also explains the proportion of 3:1 obtained at the F_2

Question 131: Identify the part seed from the given figure which is destined to form root when the seed germinates.



Options:
(a) B
(b) C
(c) D
(d) A
Answer: (b)
Solution:



The radicle (C) is destined to form root when the seed germinates

Question 132: Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin
Options:
(a) promotes abscission of mature leaves only
(b) does not affect mature monocotyledon plants
(c) can help in cell division in grasses, to produce growth
(d) promotes apical dominance
Answer: (b)
Solution: Auxins are widely used as herbicides. 2, 4-D, widely used to kill dicotyledonous weeds, does not affect mature monocotyledonous plants. It is used to prepare weed-free lawns by gardeners.

Question 133: Given below are two statements.
Statement 1: Chromosomes become gradually visible under light microscope during leptotene stage.

Statement 2: The beginning of diplotene stage is recognized by dissolution of synaptonemal complex.
In the light of the above statements, choose the correct answer from the options given below.
Options:
(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are true
Answer: (d)
Solution: During leptotene stage the chromosomes become gradually visible under the light microscope
The beginning of diplotene is recognised by the dissolution of the synaptonemal complex and the tendency of the recombined homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers.

Question 134: The capacity to generate a whole plant from any cell of the plant is called
Options:
(a) Micropropagation
(b) Differentiation
(c) Somatic hybridization
(d) Totipotency
Answer: (d)
Solution: It was learnt by scientists, during 1950s, that whole plants could be regenerated from explants, i.e., any part of a plant taken out and grown in a test tube, under sterile conditions in special nutrient media. This capacity to generate a whole plant from any cell/explant is called totipotency

Question 135: Given below are two statements.
Statement 1: Parenchyma is living but collenchyma is dead tissue
Statement 2: Gymnosperms lack xylem vessels but presence of xylem vessels is the characteristic of angiosperms.
In the light of the above statements, choose the correct answer from the options given below.
Options:
(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are true
Answer: (c)
Solution: Both Parenchyma and Collenchyma are living simple permanent tissue, while sclerenchyma is a dead tissue.
Phloem in Angiosperms is composed of sieve tube elements, companion cells. Gymnosperms have albuminous cells and sieve cells. They lack sieve tubes and companion cells.

Question 136: Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, thus, increasing the yield?
Options:
(a) Gibberellin
(b) Cytokinin
(c) Abscisic acid
(d) Auxin

Answer: (a)
Solution: Sugarcane stores carbohydrate as sugar in their stems. Spraying sugarcane crop with gibberellins increases the length of the stem, thus increasing the yield by as much as 20 tonnes per acre

Question 137: Given below are two statements.
Statement 1: in C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.
Statement 2: In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.
In the light of the above statements, choose the correct answer from the options given below.
Options:
(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are true
Answer: (b)
Solution: In C_3 plants some O_2 does bind to RuBisCO, and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecules of PGA binds with O_2 to form one molecule of phosphoglycerate and phosphoglycolate (2 Carbon) in a pathway called photorespiration.
In C_4 plants photorespiration does not occur. This is because they have a mechanism that increases the concentration of CO_2 at the enzyme site. This takes place when the C_4 acid from the mesophyll is broken down in the bundle sheath cells to release CO_2 – this results in increasing the intracellular concentration of CO_2. In turn, this ensures that the RuBisCO functions as a carboxylase minimising the oxygenase activity.

Question 138: Match list I with list II.

List I	**List II**
A. GLUT-4	I. Hormone
B. Insulin	II. Enzyme
C. Trypsin	III. Intercellular ground substance
D. Collagen	IV. Enables glucose transport into cells

Choose the correct answer from the options given below.
Options:
(a) A-I, B-II, C-III, D-IV
(b) A-II, B-III, C-IV, D-I
(c) A-III, B-IV, C-I, D-II
(d) A-IV, B-I, C-II, D-III
Answer: (d)
Solution:

TABLE 9.5 Some Proteins and their Functions

Protein	Functions
Collagen	Intercellular ground substance
Trypsin	Enzyme
Insulin	Hormone
Antibody	Fights infectious agents
Receptor	Sensory reception (smell, taste, hormone, etc.)
GLUT-4	Enables glucose transport into cells

Question 139: Read the following statements and choose the set of correct statements:
In the members of Phacophyceae,
A. Asexual reproduction occurs usually by biflagellate zoospores.
B. Sexual reproduction is in oogamous method only.
C. Stored food is in the form of carbohydrates which is either mannitol or laminarin.
D. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.
E. Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.
Choose the correct answer from the options given below:
Options:
(a) B, C, D and E only
(b) A, C, D and E only
(c) A, B, C and E only
(d) A, B, C and D only
Answer: (b)
Solution: A. Asexual reproduction in most Phaeophyceae (brown algae) is by biflagellate zoospores that are pear-shaped and have two unequal laterally attached flagella.
B. Sexual reproduction may be isogamous, anisogamous or oogamous.
C. Food is stored as complex carbohydrates, which may be in the form of laminarin or mannitol
D. The members of phaeophyceae possess chlorophyll a, c, carotenoids and xanthophylls.
E. The vegetative cells have a cellulosic wall usually covered on the outside by a gelatinous coating of algin

Question 140: Which of the following statements is correct regarding the process of replication in *E.coli* ?
Options:
(a) The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5′ → 3′.
(b) The DNA dependent DNA polymerase catalyses polymerization in 5′ → 3′ as well as 3′ → 5′ direction.
(c) The DNA dependent DNA polymerase catalyses polymerization in 5′ → 3′ direction.
(d) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3′ → 5′.
Answer: (c)
Solution: In living cells, such as E. coli, the process of replication requires a set of catalysts (enzymes). The main enzyme is referred to as DNA-dependent DNA polymerase, since it uses a DNA template to catalyse the polymerisation of deoxynucleotides.
The DNA-dependent DNA polymerases catalyse polymerisation only in one direction, that is 5' → 3'.

Question 141: Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.
Options:
(a) Succinic acid → Malic acid
(b) Succinyl-CaA → Succinic acid
(c) Isocitrate → α-ketoglutaric acid
(d) Malic acid → Oxaloacetic acid

Answer: (b)
Solution: Succinyl-CoA is oxidised to OAA

Question 142: Match List I with List II.

List I	**List II**
A. Robert May	I. Species-Area relationship
B. Alexander von Humboldt	II. Long term ecosystem experiment using out door plots
C. Paul Ehrlich	III. Global species diversity at about 7 million
D. David Tilman	IV. Rivet popper hypothesis

Choose the correct answer from the options given below.
Options:
(a) A-III, B-I, C-IV, D-II
(b) A-I, B-III, C-II, D-IV
(c) A-III, B-IV, C-II, D-I
(d) A-II, B-III, C-I, D-IV
Answer: (a)
Solution:

Robert May	Global species diversity at about 7 million
Alexander von Humboldt	Species-Area relationship
Paul Ehrlich	Rivet popper hypothesis
David Tilman	Long term ecosystem experiment using out door plots

Question 143: Identify the correct description about given figure.

Options:
(a) Water pollinated flowers showing stamens with mucilaginous covering.
(b) Cleistogamous flowers showing Endogamy.
(c) Compact inflorescence showing complete autogamy
(d) Wind pollinated plant inflorescence showing flowers with well exposed stamens.
Answer: (d)
Solution: Wind pollinated flower inflorescense showing flowers with well exposed stamens.

Question 144: In an ecosystem if the Net primary Productivity (NPP) of first trophic level is $100x\left(kcalm^{-2}\right)yr^{-1}$, what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem?
Options:
(a) $x\left(kcalm^{-2}\right)yr^{-1}$
(b) $10x\left(kcalm^{-2}\right)yr^{-1}$

(c) $\frac{100x}{3x}\left(kcalm^{-2}\right)yr^{-1}$

(d)$\left(\frac{x}{10}\left(kcalm^{-2}\right)yr^{-1}\right)$

Answer: (b)

Solution: NPP at first trophic level would be the GPP for second trophic level. NPP at second trophic level would be GPP for third trophic level. Therefore. 100x (kcal/m^2/yr) would be GPP at second trophic level and 100x × 10% (kcal/m^2/yr) i.e., 10x (kcal/m^2/yr) energy would be GPP at third trophic level.

Question 145: Match List I with List II.

List I	**List II**
A. Rose	I. Twisted aestivation
B. Pea	II. Perigynous flower
C. Cotton	III. Drupe
D. Mango	IV. Marginal placentation

Choose the correct answer from the options given below.

Options:

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

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

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

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

Answer: (d)

Solution:

Rose	Perigynous flower
Pea	Marginal placentation
Cotton	Twisted aestivation
Mango	Drupe

Question 146: Match List I with List II.

List I (Types of Stamens)	**List II (Example)**
A. Monoadelphous	I. Citrus
B. Diadelphous	II. Pea
C. Polyadelphous	III. Lily
D. Epiphyllous	IV. China-rose

Choose the correct answer from the options given below.

Options:

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

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

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

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

Answer: (d)

Solution:

A. Monoadelphous	China-rose
B. Diadelphous	Pea
C. Polyadelphous	Citrus
D. Epiphyllous	Lily

Question 147: Which of the following are fused in somatic hybridization involving two varieties of plants?

Options:

(a) Somatic embryos
(b) Protoplasts
(c) Pollens
(d) Callus

Answer: (b)

Solution: Isolated protoplasts from two different varieties of plants – each having a desirable character – can be fused to get hybrid protoplasts, which can be further grown to form a new plant. These hybrids are called somatic hybrids while the process is called somatic hybridisation.

Question 148: Match List I with List II.

List I	List II
A. Frederick Griffith	I. Genetic code
B. Francois Jacob & Jacque Monod	II. Semi-conservative mode of DNA replication
C. Har Gobind Khorana	III. Transformation
D. Meselson & Stahl.	IV. *Lac* operon

Choose the correct answer from the options given below.

Options:

(a) A-III, B-IV, C-I, D-II
(b) A-II, B-III, C-IV, D-I
(c) A-IV, B-I, C-II, D-III
(d) A-III, B-II, C-I, D-IV

Answer: (a)

Solution: In 1928, Frederick Griffith, in a series of experiments with Streptococcus pneumoniae (bacterium responsible for pneumonia), witnessed a miraculous transformation in the bacteria.

The elucidation of the lac operon was also a result of a close association between a geneticist, Francois Jacob and a biochemist, Jacque Monod.

Har Gobind Khorana - genetic code

DNA replicates semiconservatively - Matthew Meselson and Franklin Stahl.

Question 149: The DNA present in chloroplast is

Options:

(a) Circular, double, stranded
(b) Linear, single stranded
(c) Circular, single stranded
(d) Linear, double stranded

Answer: (a)

Solution: The stroma of the chloroplast contains small, double stranded circular DNA molecules.

Question 150: Match List I with List II.

List I	List II
A. Citric acid cycle	I. Cytoplasm
B. Glycolysis	II. Mitochondrial matrix

C. Electron transport system	III. Intermembrane space of mitochondria
D. Proton gradient	IV. Inner mitochondrial membrane

Choose the correct answer from the options given below.

Options:

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

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

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

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

Answer: (a)

Solution:

Citric acid cycle	Mitochondrial matrix
Glycolysis	Cytoplasm
Electron transport system	Inner mitochondrial membrane
Proton gradient	Intermembrane space of mitochondria

Question 151: Which of the following is not a natural/traditional contraceptive method?

Options:

(a) Periodic abstinence

(b) Lactational amenorrhea

(c) Vaults

(d) Coitus interruptus

Answer: (c)

Solution: Natural methods work on the principle of avoiding chances of ovum and sperms meeting. Periodic abstinence is one such method in which the couples avoid or abstain from coitus from day 10 to 17 of the menstrual cycle when ovulation could be expected. As chances of fertilisation are very high during this period, it is called the fertile period. Therefore, by abstaining from coitus during this period, conception could be prevented. Withdrawal or coitus interruptus is another method in which the male partner withdraws his penis from the vagina just before ejaculation so as to avoid insemination. Lactational amenorrhea (absence of menstruation) method is based on the fact that ovulation and therefore the cycle do not occur during the period of intense lactation following parturition

Question 152: Match List I with List II:

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

Choose the correct answer from the options given below:

Options:

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

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

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

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

Answer: (b)

Solution: (b) A III, B I, C II, D IV

Common Cold - Rhino virus

Haemozoin - Plasmodium

Widal - Typhoid

Allergy - Dust mites

Question 153: Which or the following statements is incorrect?
Options:
(a) Most commonly used bio-reactors are of stirring type.
(b) Bio-reactors are used to produce small scale bacterial cultures.
(c) Bio-reactors have an agitator system, an oxygen delivery system and foam control system.
(d) A bio-reactor provides optimal growth conditions for achieving the desired product.
Answer: (b)
Solution: After having cloned the gene of interest and having optimised the conditions to induce the expression of the target protein, one has to consider producing it on a large scale. Small volume cultures cannot yield appreciable quantities of products. To produce in large quantities, the development of bioreactors, where large volumes (100-1000 litres) of culture can be processed, was required

Question 154: 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
Options:
(a) A, B and E only
(b) B, C and E only
(c) C, D and E only
(d) A, B and D only
Answer: (a)
Solution: Sometimes, due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called auto-immune disease. Rheumatoid arthritis, Myasthenia gravis, Systemic lupus Erythematosus which affects many people in our society are auto-immune disease

Question 155: 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

Choose the correct answer from the options given below:
Options:
(a) A-II, B-III, C-IV, D-I
(b) A-III, B-IV, C-I, D-II
(c) A-IV, B-I, C-II, D-III
(d) A-I, B-II, C-III, D-IV
Answer: (b)
Solution: (b) A III, B IV, C I, D II
Down Syndrome - 21st chromosome
Alpha Thalassemia - 16th Chromosome
Beta Thalassemia - 11th Chromosome
Klienfelters - X Chromosome

Question 156: Match List I with List II:

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

Choose the correct answer from the options given below:

Options:

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

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

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

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

Answer: (c)

Solution: Another effective and popular method is the use of Intra Uterine Devices (IUDs). These devices are inserted by doctors or expert nurses in the uterus through vagina. These Intra Uterine Devices are presently available as the non-medicated IUDs (e.g., Lippes loop), copper releasing IUDs (CuT, Cu7, Multiload 375) and the hormone releasing IUDs (Progestasert, LNG-20)

Progestogens alone or in combination with estrogen can also be used by females as injections or implants under the skin

Question 157: Match List I with List II:

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

Choose the correct answer from the options given below:

Options:

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

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

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

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

Answer: (a)

Solution: (a) A-II, B-I, C-IV, D-III

Pleurobrachia - Ctenophora

Radula - Mollusca

Stomochord - hemichordata

Air bladder - Osteichthyes

Question 158: Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

Options:

(a) High pO_2 and lesser H^+ concentration
(b) Low pCO_2 and high H^+ concentration
(c) Low pCO_2 and high temperature
(d) High pO_2 and high pCO_2
Answer: (a)
Solution: Binding of oxygen with haemoglobin is primarily related to partial pressure of O_2. Partial pressure of CO_2, hydrogen ion concentration and temperature are the other factors which can interfere with this binding. A sigmoid curve is obtained when percentage saturation of haemoglobin with O_2 is plotted against the pO_2. This curve is called the Oxygen dissociation curve (Figure 17.5) and is highly useful in studying the effect of factors like pCO_2, H^+ concentration, etc., on binding of O_2 with haemoglobin. In the alveoli, where there is high pO_2, low pCO_2, lesser H^+ concentration and lower temperature, the factors are all favourable for the formation of oxyhaemoglobin, whereas in the tissues, where low pO_2, high pCO_2, high H^+ concentration and higher temperature exist, the conditions are favourable for dissociation of oxygen from the oxyhaemoglobin. This clearly indicates that O_2 gets bound to haemoglobin in the lung surface and gets dissociated at the tissues.

Question 159: Match List I with List II:

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

Choose the correct answer from the options given below:
Options:
(a) A-I, B-III, C-II, D-IV
(b) A-II, B-I, C-III, D-IV
(c) A-III, B-IV, C-I, D-II
(d) A-IV, B-III, C-I, D-II
Answer: (c)
Solution: (c) A-III, B-IV, C-I, D-II

Question 160: Match List I with List II:

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

Choose the correct answer from the options given below:
Options:
(a) A-I, B-II, C-IV, D-III
(b) A-II, B-IV, C-I, D-III
(c) A-IV, B-III, C-II, D-I
(d) A-IV, B-II, C-III, D-I
Answer: (b)
Solution: (b) A-II, B-IV, C-I, D-III
Diakinesis - Completion of terminalisation
Pachytene - Appearance of recombination nodule
Zygotene - Synaptonemal complex forms

Leptotene - Chromosomes look like thin threads

Question 161: 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	III. Skull, don't allow any movement
D. Ball and socket joints	IV. Knee, help in locomotion

Choose the correct answer from the options given below:

Options:

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

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

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

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

Answer: (c)

Solution: Fibrous joints do not allow any movement. This type of 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. In cartilaginous joints, the bones involved are joined together with the help of cartilages. The joint between the adjacent vertebrae in the vertebral column is of this pattern and it permits limited movements. Synovial joints are characterised by the presence of a fluid filled synovial cavity between the articulating surfaces of the two bones. Such an arrangement allows considerable movement. These joints help in locomotion and many other movements. Ball and socket joint (between humerus and pectoral girdle), hinge joint (knee joint), pivot joint (between atlas and axis), gliding joint (between the carpals) and saddle joint (between carpal and metacarpal of thumb) are some examples.

Question 162: Which of the following is not a steroid hormone?

Options:

(a) Testosterone

(b) Progesterone

(c) Glucagon

(d) Cortisol

Answer: (c)

Solution: Glucagon is a peptide hormone secreted from the alpha cells of the pancreatic islets of Langerhans

Question 163: In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on:

Options:

(a) 10^{th} segment

(b) 8^{th} and 9^{th} se

(c) 11^{th} segment

(d) 5^{th} segment

Answer: (a)

Solution: Males bear a pair of short, threadlike anal styles which are absent in females. In both sexes, the 10^{th} segment bears a pair of jointed filamentous structures called anal cerci

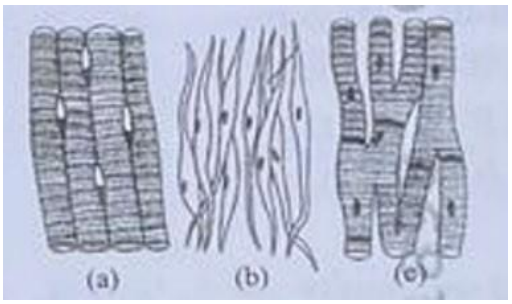
Question 164: Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : FSH acts upon ovarian follicles in female and Leydig cells in male.
Reason R : Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human being.
In the light of the above statements, choose the correct answer from the options given below :
Options:
(a) Both A and R true but R is NOT the correct explanation of A.
(b) A is true but R is false
(c) A is false but R is true
(d) Both A and R are true and R is the correct explanation of A.
Answer: (c)
Solution: LH acts on the Leydig cells in males to produce Androgens (Not FSH)

Question 165: 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

Choose the correct answer from the options given below:
Options:
(a) A-III, B-II, C-IV, D-I
(b) A-II, B-I, C-IV, D-III
(c) A-I, B-III, C-II, D-IV
(d) A-II, B-IV, C-I, D-III
Answer: (d)
Solution: Inspiratory Capacity (IC): Total volume of air a person can inspire after a normal expiration. This includes tidal volume and inspiratory reserve volume (TV+IRV).
Expiratory Capacity (EC): Total volume of air a person can expire after a normal inspiration. This includes tidal volume and expiratory reserve volume (TV+ERV).
Functional Residual Capacity (FRC): Volume of air that will remain in the lungs after a normal expiration. This includes ERV+RV.
Vital Capacity (VC): The maximum volume of air a person can breathe in after a forced expiration. This includes ERV, TV and IRV or the maximum volume of air a person can breathe out after a forced inspiration.

Question 166: Three types of muscles are given as a, b and c. Identify the correct matching pair along with their location in human body.



Name of muscle/location

Options:

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

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

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

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

Answer: (a)

Solution: Skeletal muscle tissue is closely attached to skeletal bones. In a typical muscle such as the biceps, striated (striped) skeletal muscle fibres are bundled together in a parallel fashion

The smooth muscle fibres taper at both ends (fusiform) and do not show striations. Cell junctions hold them together and they are bundled together in a connective tissue sheath. The wall of internal organs such as the blood vessels, stomach and intestine contains this type of muscle tissue.

Cardiac muscle tissue is a contractile tissue present only in the heart.

Cell junctions fuse the plasma membranes of cardiac muscle cells and make them stick together. Communication junctions (intercalated discs) at some fusion points allow the cells to contract as a unit, i.e., when one cell receives a signal to contract, its neighbours are also stimulated to contract.

Question 167: Match List I with List II:

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

Choose the correct answer from the options given below:

Options:

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

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

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

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

Answer: (b)

Solution: Lipases are fat digesting enzymes and hence break ester bonds present between fatty acid and glycerol.

Nucleases are nucleic acid digesting enzymes which break phosphoester and phosphodiester bonds.

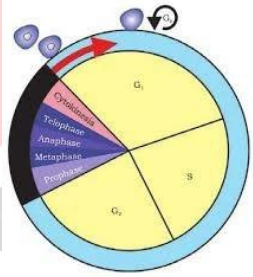
Protease are protein digesting enzymes which break peptide bonds between amino acids.

Amylase are carbohydrate digesting enzymes which break down the glycosidic bond present between sugars.

Question 168: The flippers of the Penguins and Dolphins are the example of the

Options:
(a) Natural selection
(b) Convergent evolution
(c) Divergent evolution
(d) Adaptive radiation
Answer: (b)
Solution: Wings of butterfly and of birds look alike. They are not anatomically similar structures though they perform similar functions. Hence, analogous structures are a result of convergent evolution - different structures evolving for the same function and hence having similarity. Other examples of analogy are the eye of the octopus and of mammals or the flippers of Penguins and Dolphins.
One can say that it is the similar habitat that has resulted in selection of similar adaptive features in different groups of organisms but toward the same function:
Sweet potato (root modification) and potato (stem modification) is another example for analogy.

Question 169: 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:
Options:
(a) E-B-D-A-C
(b) B-D-E-A-C
(c) E-C-A-D-B
(d) C-E-D-A-B
Answer: (c)
Solution:



Question 170: Which of the following factors will not affect the Hardy-Weinberg equilibrium?
Options:
(a) Genetic drift
(b) Gene migration
(c) Constant gene pool
(d) Genetic recombination
Answer: (c)
Solution: Five factors are known to affect Hardy-Weinberg equilibrium. These are gene migration or gene flow, genetic drift, mutation, genetic recombination and natural selection.

Question 171: 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.
In the light of the above statements, choose the correct answer from the options given below:
Options:
(a) Both statement I and statement II are false
(b) Statement I is true but statement II is false
(c) Statement I is false but statement II is true
(d) Both statement I and statement II are true
Answer: (b)
Solution: The opening of the vagina is often covered partially by a membrane called hymen. The hymen is often torn during the first coitus (intercourse). However, it can also be broken by a sudden fall or jolt, insertion of a vaginal tampon, active participation in some sports like horseback riding, cycling, etc. In some women the hymen persists even after coitus. In fact, the presence or absence of hymen is not a reliable indicator of virginity or sexual experience.

Question 172: Match List I with List II:

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

Choose the correct answer from the options given below:
Options:
(a) A-IV, B-III, C-I, D-II
(b) A-III, B-I, C-IV, D-II
(c) A-II, B-IV, C-III, D-I
(d) A-I, B-III, C-II, D-IV
Answer: (a)
Solution: Typhoid is caused by Salmonella typhi and Salmonella paratyphi which are bacterium Leishmaniasis is caused by Leishmania which is a protozoan Many fungi belonging to the genera Microsporum, Trichophyton and Epidermophyton are responsible for ringworms
Filariasis is caused by the filarial nematode which is Wuchereria.

Question 173: 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:
Options:
(a) B-A-D-C
(b) C-B-D-A
(c) A-D-C-B
(d) D-A-C-B
Answer: (c)
Solution: Some of the bones among the bones discovered were different. This creature was called the first human-like being the hominid and was called Homo habilis.

The brain capacities were between 650-800cc. They probably did not eat meat. Fossils discovered in Java in 1891 revealed the next stage, i.e., Homo erectus about 1.5 mya. Homo erectus had a large brain around 900cc. 2022-Homo erectus probably ate meat. The Neanderthal man with a brain size of 1400cc lived in near east and central Asia between 1,00,000-40,000 years back. They used hides to protect their body and buried their dead. Homo sapiens arose in Africa and moved across continents and developed into distinct races.

Question 174: Which of the following is not a component of Fallopian tube?
Options:
(a) Isthmus
(b) Infundibulum
(c) Ampulla
(d) Uterine fundus
Answer: (d)
Solution: The oviducts (fallopian tubes), uterus and vagina constitute the female accessory ducts. Each fallopian tube is about 10-12 cm long and extends from the periphery of each ovary to the uterus (Figure 3.3b), the part closer to the ovary is the funnel-shaped infundibulum. The edges of the infundibulum possess finger-like projections called fimbriae, which help in collection of the ovum after ovulation. The infundibulum leads to a wider part of the oviduct called ampulla. The last part of the oviduct, isthmus has a narrow lumen and it joins the uterus.

Question 175: Consider the following statement:
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:
Options:
(a) A only
(b) C only
(c) D only
(d) B only
Answer: (a)
Solution: Poriferans are Acoelomates
Aschelminthes are Pseudocoelomate
Platyhelminthes are Acoelomates

Question 176: Match List I with List II:

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

Choose the correct answer from the options given below:
Options:
(a) A-IV, B-II, C-III, D-I
(b) A-II, B-IV, C-I, D-III
(c) A-II, B-I, C-IV, D-III
(d) A-IV, B-III, C-II, D-I

Answer: (c)
Solution:

Axoneme	Cilia and flagella
Cartwheel pattern	Centriole
Crista	Mitochondria
Satellite	Chromosome

Question 177: Match List I with List II:

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

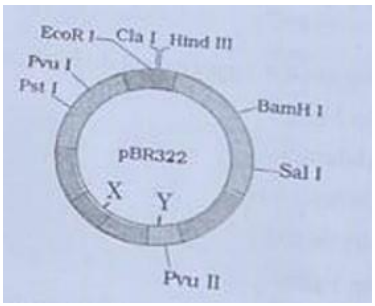
Choose the correct answer from the options given below:
Options:
(a) A-III, B-I, C-II, D-IV
(b) A-IV, B-I, C-II, D-III
(c) A-III, B-II, C-I, D-IV
(d) A-II, B-I, C-III, D-IV
Answer: (a)
Solution: *Pterophyllum* - Angel fish
Myxine - Hag fish
Pristis - saw fish
Exocoetus - Flying fish

Question 178: Match List I with List II:

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

Choose the correct answer from the options given below:
Options:
(a) A-III, B-IV, C-II, D-I
(b) A-I, B-III, C-II, D-IV
(c) A-II, B-I, C-III, D-IV
(d) A-II, B-III, C-I, D-IV
Answer: (a)
Solution: Pons - connects different regions
Hypothalamus - Neurosecretory cells
Medulla - Respiration and gastric secretion
Cerebellum - Regulates Posture and balance

Question 179: The following diagram showing restriction sites in *E coli* cloning vector pBR322. Find the role of 'X' and 'Y' genes:



Options:

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

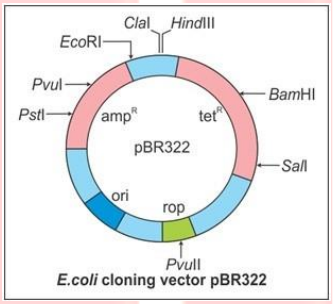
(b) The gene 'X' is for protein involved in replication of plasmid and 'Y' for resistance to antibiotics.

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

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

Answer: (a)

Solution: Gene X is responsible for controlling the copy number and Y for replication of Plasmid



Question 180: 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.

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

Options:

(a) Both statement I and statement II are false

(b) Statement I is true but statement II is false

(c) Statement I is false but statement II is true

(d) Both statement I and statement II are true

Answer: (a)

Solution: The descending limb of loop of Henle is permeable to water but almost impermeable to electrolytes

PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

Question 181: Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

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

Reason R: Colostrum Contains several antibodies absolutely essential to develop resistance for the new-born baby.
In the light of the above statements, choose the most appropriate answer from the options given below:
Options:
(a) Both A and R are correct, but R is NOT the correct explanation of A.
(b) A is correct but R is not correct.
(c) A is not correct but R is correct.
(d) Both A and R are correct, and R is the correct explanation of A.
Answer: (d)
Solution: The mammary glands of the female undergo differentiation during pregnancy and starts producing milk towards the end of pregnancy by the process called lactation. This helps the mother in feeding the newborn. The milk produced during the initial few days of lactation is called colostrum which contains several antibodies absolutely essential to develop resistance for the new-born babies. Breast-feeding during the initial period of infant growth is recommended by doctors for bringing up a healthy baby.

Question 182: 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
Options:
(a) A-E-C-B-D
(b) B-D-E-C-A
(c) E-A-D-B-C
(d) E-C-A-D-B
Answer: (d)
Solution: A specialised cardiac musculature called the nodal tissue is also distributed in the heart. A patch of this tissue is present in the right upper corner of the right atrium called the sino-atrial node (SAN). Another mass of this tissue is seen in the lower left corner of the right atrium close to the atrio-ventricular septum called the atrio-ventricular node (AVN). A bundle of nodal fibres, atrioventricular bundle (AV bundle) continues from the AVN which passes through the atrio-ventricular septa to emerge on the top of the interventricular septum and immediately divides into a right and left bundle. These branches give rise to minute fibres throughout the ventricular musculature of the respective sides and are called purkinje fibres. These fibres alongwith right and left bundles are known as bundle of His. The nodal musculature has the ability to generate action potentials without any external stimuli, i.e., it is autoexcitable.

Question 183: Which one is the correct product of DNA dependent RNA polymerase to the given template?
3'TACATGGCAAATATCCATTCA5'
Options:
(a) 5'AUGUAAAGUUUAUAGGUAAGU3'
(b) 5'AUGUAVVGUUUAUAGGGAAGU3'
(c) 5'ATGTACCCTTTATAGGTAAGT3'

(d) 5'AUGUAVVGUUUAUAGGUAAGU3'
Answer: (d)
Solution: The correct answer is Unidirectional 5 to 3. The two strands have opposite polarity and the DNA-dependent RNA polymerase also catalyze the polymerization in only one direction, that is, 5 to 3, The strand that has the polarity 3 to 5 acts as a template, and it is also referred to as a template strand. It makes mRNA strand that has U in place of A Therefore, solution is d.

Question 184: Match List I with List II.

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

Choose the correct answer from the options given below.
Options:
(a) A-III, B-I, C-II, D-IV
(b) A-III, B-IV, C-I, D-II
(c) A-II, B-IV, C-I, D-III
(d) A-II, B-I, C-IV, D-III
Answer: (b)
Solution:
• Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema.
• the proteins encoded by the genes cryIAc and cryIIAb control the cotton bollworms, that of cryIAb controls corn borer
• In some children ADA deficiency can be cured by bone marrow transplantation; in others it can be treated by enzyme replacement therapy, in which functional ADA is given to the patient by injection.

Question 185: The "Ti plasmid" of *Agrobacterium tumefaciens* stands for
Options:
(a) Tumor independent plasmid
(b) Tumor inducing plasmid
(c) Temperature independent plasmid
(d) Tumour inhibiting plasmid
Answer: (b)
Solution: A better understanding of the art of delivering genes by pathogens in their eukaryotic hosts has generated knowledge to transform these tools of pathogens into useful vectors for delivering genes of interest to humans. The tumor inducing (Ti) plasmid of Agrobacterium tumifaciens has now been modified into a cloning vector which is no more pathogenic to the plants but is still able to use the mechanisms to deliver genes of our interest into a variety of plants.

Question 186: 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.

Choose the correct answer from the options given below.

Options:

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

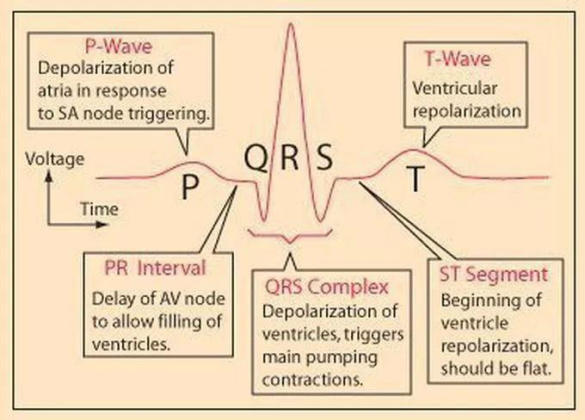
(b) A-II, B-III, C-I, D-IV

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

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

Answer: (a)

Solution:



Question 187: 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 :

Options:

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

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

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

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

Answer: (c)

Solution: Gause's Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually. This may be true if resources are limiting, but not otherwise.

Question 188: Given below are two statements :

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

Statement II : Inner membrane of Mitochondria is relatively less permeable, as compared to chloroplast.

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

Options:

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

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

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

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

Answer: (b)

Solution: Like mitochondria, the chloroplasts are also double membrane bound. Of the two, the inner chloroplast membrane is relatively less permeable.

Question 189: Choose the correct statement given helots regarding juxta medullary nephron.
Options:
(a) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.
(b) Loop of Henle of juxta medullary nephron runs deep into medulla.
(c) Juxta medullary nephrons outnumber the cortical nephrons.
(d) Juxta medullary nephrons are located in the columns of Bertini.
Answer: (b)
Solution: • In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla. Such nephrons are called cortical nephrons. In some of the nephrons, the loop of Henle is very long and runs deep into the medulla. These nephrons are called juxta medullary nephrons.
• The Malpighian corpuscle, PCT and DCT of the nephron are situated in the cortical region of the kidney whereas the loop of Henle dips into the medulla. In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla. Such nephrons are called cortical nephrons.

Question 190: 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 eye balls.
D. Cretinism	IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below.
Options:
(a) A-IV, B-II, C-I, D-III
(b) A-III, B-IV, C-II, D-I
(c) A-III, B-IV, C-I, D-II
(d) A-I, B-III, C-II, D-IV
Answer: (c)
Solution:
● Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.

● Excess secretion of growth hormone in adults especially in middle age can result in severe disfigurement (especially of the face) called Acromegaly, which may lead to serious complications, and premature death if unchecked.
● Cushing's syndrome: Cushing's syndrome is a disorder caused due to the body's long-term exposure to an excess level of the hormone cortisol.
● Exophthalmic goitre, also known as Graves disease, is an autoimmune disease. It is a disease related to the thyroid gland and it is caused due to hyperthyroidism. Thyroid glands generally become enlarged and secrete high levels of thyroid hormones. A combination of genetic and environmental factors are responsible for the disease.
● Exophthalmic goitre is characterised by over-secretion of thyroid hormones, protruded eyeballs, weight loss and an increase in Basal Metabolic Rate (BMR).

Question 191: Match List I with List II.

List I	List II

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

Choose the correct answer from the options given below.

Options:

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

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

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

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

Answer: (b)

Solution:

Some of the columnar or cuboidal cells get specialised for secretion and are called glandular epithelium. They are mainly of two types: unicellular, consisting of isolated glandular cells (goblet cells of the alimentary canal), and multicellular, consisting of cluster of cells (salivary gland). On the basis of the mode of pouring of their secretions, glands are divided into two categories namely exocrine and endocrine glands. Exocrine glands secrete mucus, saliva, earwax, oil, milk, digestive enzymes and other cell products. These products are released through ducts or tubes. In contrast, endocrine glands do not have ducts. Their products called hormones are secreted directly into the fluid bathing the gland. Compound epithelium is made of more than one layer (multi-layered) of cells and thus has a limited role in secretion and absorption. Their main function is to provide protection against chemical and mechanical stresses. They cover the dry surface of the skin, the moist surface of buccal cavity, pharynx, inner lining of ducts of salivary glands and of pancreatic ducts.

Question 192: Match List I with List II.

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

Choose the correct answer from the options given below.

Options:

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

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

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

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

Answer: (c)

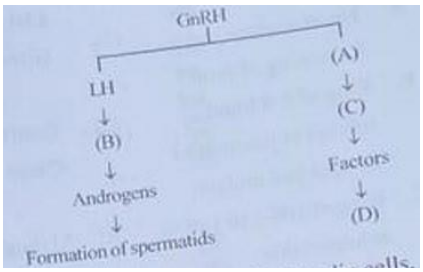
Solution:

• the RNA polymerase III is responsible for transcription of tRNA, 5srRNA, and snRNAs (small nuclear RNAs)

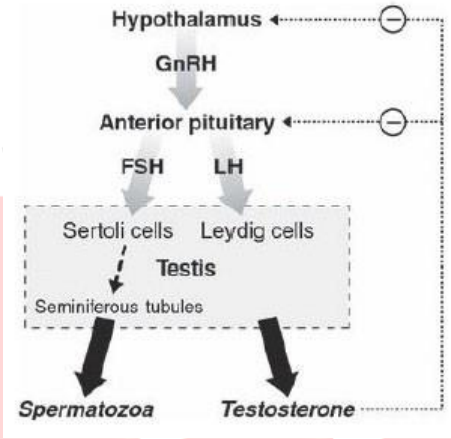
• The RNA polymerase is only capable of catalysing the process of elongation. It associates transiently with initiation-factor (σ) and termination-factor (ρ) to initiate and terminate the transcription, respectively. Association with these factors alter the specificity of the RNA polymerase to either initiate or termina

• promoter lies upstream of and slightly overlaps with the transcriptional start site (+1). It contains a TATA box, which has a sequence (on the coding strand) of 5'-TATAAA-3'.

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



Options:
(a) ICSH, Interstitial cells, Leydig cells, spermatogenesis
(b) FSH, Sertoli cells, Leydig cells, spermatogenesis
(c) ICSH, Leydig cells, Sertoli cells, spermatogenesis
(d) FSH, Leydig cells, Sertoli cells, spermatogenesis
Answer: (d)
Solution:



Question 194: 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 :
Options:
(a) A, E, B, D, C
(b) B, A, C, D, E
(c) E, D, C, B, A
(d) E, A, D, C, B
Answer: (d)
Solution: The catalytic cycle of an enzyme action can be described in the following steps:
1. First, the substrate binds to the active site of the enzyme, fitting into the active site.
2. The binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate.
3. The active site of the enzyme, now in close proximity of the substrate breaks the chemical bonds of the substrate and the new enzyme- product complex is formed.
4. The enzyme releases the products of the reaction and the free enzyme is ready to bind to another molecule of the substrate and run through the catalytic cycle once again.

Question 195: 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 :
Options:
(a) A, B & D only
(b) B, D & E only
(c) B, C & D only
(d) A & C only
Answer: (b)
Solution:
Non-Chordates
Notochord is absent.
Central nervous system is ventral, solid and double.
Gill slits are absent.
Heart is dorsal (if present).
Post-anal tail is absent.

Question 196: Match List I with List II.

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

Choose the correct answer from the options given below.
Options:
(a) A-I, B-II, C-III, D-IV
(b) A-IV, B-III, C-II, D-I
(c) A-III, B-II, C-IV, D-I
(d) A-IV, B-II, C-III, D-I
Answer: (d)
Solution:
- a sac like structure called **crop** used for **storing of food**.
- A ring of **6-8 blind tubules** called **hepatic or gastric caeca** is present at the junction of foregut and midgut, which secrete digestive juice.
- **Gizzard** helps in **grinding the food particles**.
- At the junction of midgut and hindgut is present another ring of **100-150 yellow coloured** thin filamentous **Malpighian tubules**.

Question 197: Given below are two statements :
Statement I : The cerebral hemispheres are connected by nerve tract known as corpus callosum.
Statement II : The brain stem consists of the medulla oblongata, pons and cerebrum.
In the light of the above statements, choose the most appropriate answer from the options given below :
Options:

(a) Both Statement I and Statement II are incorrect.
(b) Statement I is Correct but Statement II is incorrect.
(c) Statement I is incorrect but Statement II is correct.
(d) Both Statement I and Statement II are correct.
Answer: (b)
Solution: Cerebrum forms the major part of the human brain. A deep cleft divides the cerebrum longitudinally into two halves, which are termed as the left and right cerebral hemispheres. The **hemispheres are connected by a tract of nerve fibres called corpus callosum.**
Three major regions make up the brainstem; **midbrain, pons and medulla oblongata.**

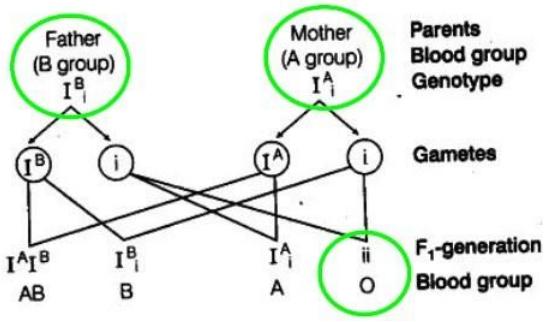
Question 198: Match List I with List II.

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

Choose the correct answer from the options given below.
Options:
(a) A-III, B-I, C-II, D-IV
(b) A-I, B-II, C-IV, D-III
(c) A-III, B-I, C-IV, D-II
(d) A-II, B-I, C-III, D-IV
Answer: (c)
Solution:

Mesozoic era	Birds and reptiles
Proterozoic era	Lower invertebrates
Cenozoic	Mammals
Palaeozoic	Fish and amphibia

Question 199: As per ABO blood grouping system, the blood group of father is B^+, mother is A^+ and child is O^+. Their respective genotype can be
A. $I^Bi/I^Ai/ii$
B. $I^BI^B/I^AI^A/ii$
C. $I^AI^B/iI^A/i^Bi$
D. $I^Ai/I^Bi/I^Ai$
E. $iI^B/iI^A/I^AI^B$
Choose the most appropriate answer from the options given below.
Options:
(a) B only
(b) C & B
(c) D & E only
(d) A only
Answer: (d)
Solution:



Question 200: Given below are two statements :
Statement I : Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.
Statement II : Both Bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.
In the light of the above statements, choose the most appropriate answer from the options given below :
Options:
(a) Both Statement I and Statement II are incorrect.
(b) Statement I is Correct but Statement II is incorrect.
(c) Statement I is incorrect but Statement II is correct.
(d) Both Statement I and Statement II are correct.
Answer: (d)
Solution: The **bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced**. The thymus is a lobed organ located near the heart and beneath the breastbone. The thymus is quite large at the time of birth but keeps reducing in size with age and by the time puberty is attained it reduces to a very small size. **Both bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes**.