Previous Year Paper

28th May 2023 (Shift 1)

Q1. Which of the following statements are not correct?
(A) The milk produced during the initial few days of lactation is called colostrum which contain several antibodies
(B) The signals for the parturition originate from the pituitary gland of the mother
(C) Parturition is induced by a complex neuroendocrine mechanism
(D) Oxytocin is released from the ovary of mother and acts on the uterine muscles

Choose the **correct** answer from the options given below:
(a) (A) and (B) only
(b) (B) and (D) only
(c) (C) and (D) only
(d) (A) and (C) only

Q2. Which of the following enzyme is used during isolation of DNA from plant cell?
(a) Pectinase
(b) Chitinase
(c) Lysozyme
(d) Cellulase

Q3. Arrange the following events in correct sequence:
(A) Virus infects macrophages
(B) Viral DNA is produced by reverse transcriptase
(C) Viral DNA incorporates into host genome
(D) Viral RNA is introduced into macrophages
(E) New viruses are produced

Choose the **correct** answer from the options given below:
(a) (A), (B), (D), (C), (E)
(b) (A), (D), (B), (C), (E)
(c) (A), (B), (C), (D), (E)
(d) (A), (C), (D), (B), (E)

Q4. Asexual reproductive structures in sponges are known as:
(a) Conidia
(b) Pseudopodiospores
(c) Gemmules
(d) Zoospores

Q5. Increase in concentration of toxicants at successive tropic levels in aquatic food chain called:
(a) Transformation
(b) Biofortification
(c) Biomagnification
(d) Eutrophication

Q6. Match **List-I** with **List-II**:

	List-I		List-II
(A)	Oncogenes	(I)	Allergy
(B)	Auto immunity	(II)	Cirrhosis
(C)	Histamine	(III)	Cancer
(D)	Alcohol and Drug	(IV)	Rheumatoid arthritis

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

Q7. Arrange the given steps in correct sequence of their occurrence when lactose is provided in the growth medium of bacteria:
(A) Operator got free, RNA polymerase binds to promoter
(B) Lactose is hydrolysed to glucose and galactose
(C) Lactose binds to repressor protein
(D) Gene z, y, a are transcribed

Choose the **correct** answer from the options given below:
(a) (D), (B), (C), (A)
(b) (C), (A), (D), (B)
(c) (C), (B), (D), (A)
(d) (A), (B), (C), (D)

Q8. Which one of the following, is NOT an example of intra uterine contraceptive device?
(a) Multiload 375
(b) Progestasert
(c) Progestogen
(d) LNG - 20

Q9. Which of the following variety of wheat has high protein content?
(a) Kalyan Sona
(b) Atlas-66
(c) Sonalika
(d) Sharbati sonara

Q10. Primary productivity does not depend upon which one of the following factors?
(a) Plant species inhabiting a particular area
(b) Predators and decomposers
(c) Availability of nutrients
(d) Photosynthetic capacity of plants

Q11. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Mutualism	(I)	Abingdon tortoise in Galapagos Island and goat
(B)	Commensalism	(II)	Crow and Cuckoo
(C)	Brood Parasitism	(III)	Sea anemone and Clown fish
(D)	Competition	(IV)	Lichen

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

Q12. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Wheat, resistant to leaf and stripe rust	(I)	*Himgiri*
(B)	*Brassica*, resistant to white rust	(II)	*Pusa Komal*
(C)	Cowpea, resistant to bacterial blight	(III)	*Pusa Shubhra*
(D)	Cauliflower, resistant to black rot	(IV)	*Pusa Swarnim*
		(V)	*Pusa Sadabahar*

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

Q13. Which method of reproduction will NOT produce morphologically and genetically identical progenies?
(a) Apomixis
(b) Binary Fission
(c) Syngamy
(d) Budding

Q14. Arrange the steps of gel electrophoresis in a proper sequence:
(A) Fragments of DNA are separated under an electric field in agarose gel
(B) DNA bands are cut out from the agarose gel and extracted
(C) DNA fragments are visualized by exposure to UV radiation
(D) Separated DNA fragment stained with ethidium bromide

Choose the **correct** answer from the options given below:
(a) (A), (C), (D), (B)
(b) (C), (B), (A), (D)
(c) (A), (D), (C), (B)
(d) (B), (A), (D), (C)

Q15. GM crops are better to grow because they:
(A) are more tolerant to abiotic stresses
(B) decrease efficiency of mineral usage
(C) are less reliant on chemical pesticides
(D) reduce post-harvest losses

Choose the **correct** answer from the options given below:
(a) (A), (C) and (D) only
(b) (A) and (D) only
(c) (A) and (B) only
(d) (B) only

Q16. Which one of the following is not an example of narrowly utilitarian reason to conserve biodiversity?
(a) Fire wood
(b) Food
(c) Pollination
(d) Tannins

Q17. Phytophagous insects feed on:
(a) Excreta
(b) Eggs of Frog
(c) Animal's blood
(d) Plant sap

Q18. Presence of which of the following element in petrol inactivates the catalyst in catalytic converter?
(a) Sulphur
(b) Nitrogen
(c) Lead
(d) Carbon

Q19. *Propionibacterium sharmanii* is used in the production of:
(a) Cottage Cheese
(b) Swiss Cheese
(c) Roquefort Cheese
(d) Toddy

Q20. Variation caused by mutation, according to Hugo deVries are:
(a) Random and directional
(b) Random and directionless
(c) Small and directional
(d) Small and directionless

Q21. Identify the statements which are not true with respect to transgenic animals?
(A) Transgenic mice are used to test the safety of polio vaccine.
(B) Transgenic animals are less sensitive to toxic substance than normal animals.
(C) The milk produced by the first transgenic cow contain human ß-lactalbumin.
(D) Transgenic animals can produce useful biological products.

Choose the correct answer from the options given below:

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

Q22. Down's syndrome is a result of gain of extra copy of chromosome number:
(a) 21
(b) 20
(c) 19
(d) 22

Q23. Which of the following are the parts of mammary glands?
(A) Lactiferous duct
(B) Ampulla
(C) Areola
(D) Acrosome

Choose the **correct** answer from the options given below:
(a) (B), (C) and (D) only
(b) (A), (B) and (D) only
(c) (A), (B) and (C) only
(d) (A) and (C) only

Q24. Match **List-I** with **List-II**:

List-I		List-II	
(A)	RNA	(I)	Adenosine
(B)	Nucleoside	(II)	Adenosine monophosphate
(C)	Nucleotide	(III)	Deoxyribose
(D)	Sugar	(IV)	Uracil

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

Q25. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Convergent evolution	(I)	Adaptive radiation
(B)	Thorns of *Bougainvillea* and tendrils of cucurbits	(II)	Analogous Structures
(C)	Darwin's finches	(III)	Use and disuse of organs
(D)	Lamarck	(IV)	Homologous organs

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

Q26. Which of the following is caused due to substitution of glutamic acid to valine on 6th position of β-globin chain of Haemoglobin molecule?
(a) Thalassaemia
(b) Haemophilia
(c) Sickle cell anaemia
(d) Phenylketonuria

Q27. Pyramid of which of the following is inverted?
(A) The pyramid of biomass in sea
(B) The pyramid of numbers in grassland
(C) The pyramid of biomass in terrestrial food chain
(D) The pyramid of number of insects feeding on a big tree

Choose the **correct** answer from the options given below:
(a) (A) and (D) only
(b) (A) and (B) only
(c) (C) and (D) only
(d) (B) and (C) only

Q28. Identify the conditions which prevent autogamy:
(A) Presence of male or female flowers on different plants
(B) Self incompatibility
(C) Unsynchronised pollen release and stigma receptivity
(D) Geitonogamy

Choose the **correct** answer from the options given below:
(a) (A), (B) and (D) only
(b) (A), (B) and (C) only
(c) (A), (B), (C) and (D) only
(d) (B), (C) and (D) only

Q29. The ring worm is one of the most common infectious disease caused by:
(a) Virus
(b) Bacteria
(c) Fungi
(d) Yeast

Q30. For which of the following disease, the transgenic animal model has not been developed?
(a) Cancer
(b) Cystic Fibrosis
(c) AIDS
(d) Alzheimer's disease

Q31. In the grass family the cotyledon is called:
(a) Hypocotyl
(b) Scutellum
(c) Coleorhiza
(d) Coleoptile

Q32. Match **List-I** with **List-II**:

	List-I		List-II
(A)	Statin	(I)	Removal of oil stains
(B)	Cyclosporin A	(II)	Removal of clots from blood vessels
(C)	Streptokinase	(III)	Lowering of blood cholesterol
(D)	Lipase	(IV)	Immuno-suppressive agent

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

Q33. Which of the following is not a stop codon?
(a) UGA
(b) UAA
(c) AUG
(d) UAG

Q34. Which of the following is the highest species-rich taxonomic group among animals?
(a) Insects
(b) Molluscs
(c) Crustaceans
(d) Mammals

Q35. Which Assisted Reproductive Technology (ART) is more suitable when the male partner has low sperm count?
(a) Zygote intra fallopian transfer
(b) Artificial insemination
(c) Gamete intra fallopian transfer
(d) Intra Cytoplasmic sperm injection

Q36. *cryIAb* encodes a protein that controls the growth of _____.
(a) Beetles
(b) Cotton bollworms
(c) Corn borers
(d) Flies

Q37. Healthy plants can be obtained from virus infected plants through Tissue Culture by using its:
(a) Leaf tissues
(b) Cell suspension
(c) Meristem
(d) Anther

Q38. Match **List-I** with **List-II**:

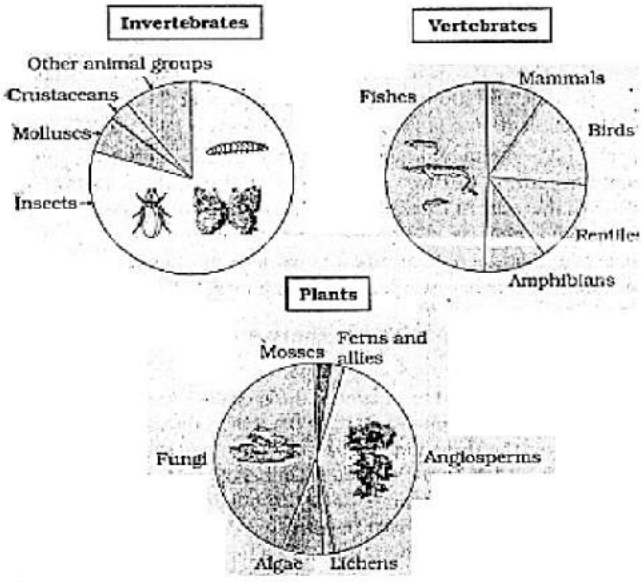
	List-I (Organism)		List-II (Product)
(A)	*Aspergillus niger*	(I)	Lactic Acid
(B)	*Acetobacter aceti*	(II)	Citric Acid
(C)	*Lactobacillus*	(III)	Butyric Acid
(D)	*Clostridium butylicum*	(IV)	Acetic Acid

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

Q39. If a man with blood group A marries a woman with blood group AB. Which of the following blood group will never be found in their children?
(a) A
(b) B
(c) AB
(d) O

Q40. The mutation theory of saltation given by Hugo deVries based on his work on:
(a) *Drosophila*
(b) *Antirrhinum*
(c) Evening primrose
(d) Garden Pea

Direction for the question 41 to 45: **Observe the given diagram representing global biodiversity and answer the question.**



Global Bio-diversity

Q41. _____ occupy more than 2/3rd of Global Biodiversity.
(a) Lichen
(b) Animals
(c) Algae
(d) Fungi

Q42. Out of every 10 animals on earth, 7 are _____.
(a) Molluscs
(b) Crustaceans
(c) Fishes
(d) Insects

Q43. Among invertebrates, the order of species richness from low to high is:
(A) Insect
(B) Other animal group
(C) Molluscs
(D) Crustaceans

Choose the **correct** answer from the options given below:
(a) (C), (B), (A), (D)
(b) (B), (C), (D), (A)
(c) (D), (C), (B), (A)
(d) (C), (A), (B), (D)

Q44. Identify which is not represented in the figure?
(a) Crabs and Prawns
(b) *Chlamydomonas*
(c) Bacteria
(d) *Funaria* and *Sphagnum*

Q45. Identify the statements which hold true for biodiversity in India?
(A) India is amongst one of the twelve megadiversity countries of the world.
(B) India has only 8.4 percent of the world's land area.
(C) India has 8.1 percent of the global species diversity.
(D) Almost 45,000 species of plants have been recorded in India.

Choose the **correct** answer from the options given below:
(a) (A), (B), (C) only
(b) (A), (C), (D) only
(c) (B), (C), (D) only
(d) (A), (B), (D) only

Direction for the question 46 to 50:
Read the given passage and answer the question.
ABO blood groups in human beings are controlled by the gene **I**. The plasma membrane of the red blood cells has sugar polymers that protrude from its surfaces and the kind of sugar is controlled by the gene. The gene **(I)** has three alleles $\mathbf{I^A}$, $\mathbf{I^B}$ and *i*. The alleles $\mathbf{I^A}$ and $\mathbf{I^B}$ produce a slightly different form of the sugar while allele i does not produce any sugar. Because humans are diploid organisms, each person possesses any two of the three **I** gene alleles, $\mathbf{I^A}$ and $\mathbf{I^B}$ are completely dominant over i.

Q46. The number of phenotypes in ABO blood groups is:
(a) 3
(b) 4
(c) 5
(d) 6

Q47. Select the correct option for number of alleles present in ABO blood groups:
(a) Two different alleles
(b) Three different alleles
(c) Four different alleles
(d) Six different alleles

Q48. Blood group 'AB' is an example of:
(a) Incomplete dominance
(b) Complete dominance
(c) Co-dominance
(d) Test cross

Q49. Match **List-I** with **List-II**:

List-I (Phenotype)		**List-II (Genotype)**	
(A)	Blood group A	(I)	$I^B I^B$, $I^B i$
(B)	Blood group B	(II)	$I^A i$, $I^A I^A$
(C)	Blood group O	(III)	$I^A I^B$
(D)	Blood group AB	(IV)	i i

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

Q50. The genotype of Universal donor is:
(a) I^A i
(b) I^B i
(c) i i
(d) $I^A I^B$

SOLUTIONS

S1. Ans. (d)

Sol. Parturition is induced by a complex neuroendocrine mechanism. The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex. This triggers release of oxytocin from the maternal pituitary.

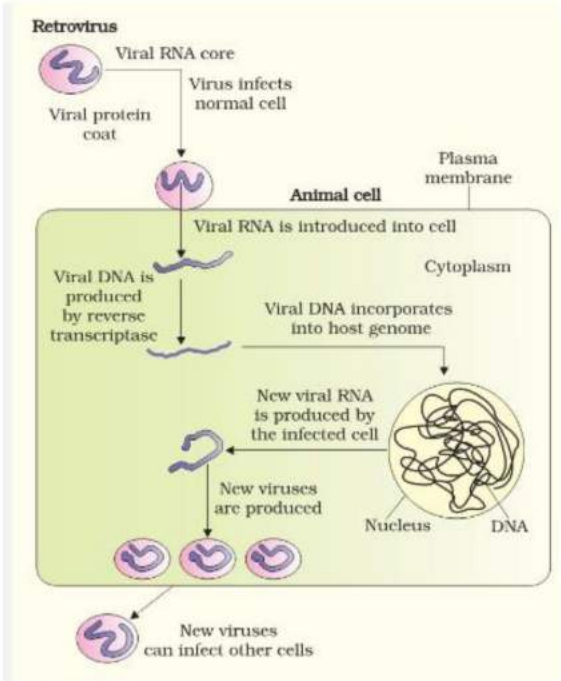
S2. Ans. (d)

Sol. Since the DNA is enclosed within the membranes, we have to break the cell open to release DNA along with other macromolecules such as RNA, proteins, polysaccharides and also lipids. This can be achieved by treating the bacterial cells/plant or animal tissue with enzymes such as lysozyme (bacteria), cellulase (plant cells), chitinase (fungus)

S3. Ans. (b)

Sol.

Replication of retrovirus



S4. Ans. (c)

Sol. The most common of these structures are zoospores that usually are microscopic motile structures. Other common asexual reproductive structures are conidia (Penicillium), buds (Hydra) and gemmules (sponge).

S5. Ans. (c)

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

S6. Ans. (d)

Sol. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells. Several genes called cellular oncogenes (c-onc) or proto oncogenes have been identified in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cells. Rheumatoid arthritis which affects many people in our society is an auto-immune disease. The chronic use of drugs and alcohol damages nervous system and liver (cirrhosis).

S7. Ans. (b)

Sol. Lactose is the substrate for the enzyme beta-galactosidase and it regulates switching on and off of the operon. Hence, it is termed as inducer. 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. In the presence of an inducer, such as lactose or allolactose, the repressor is inactivated by interaction with the inducer. This allows RNA polymerase access to the promoter and transcription proceeds.

S8. Ans. (c)

Sol. 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).

S9. Ans. (b)

Sol. Wheat variety, Atlas 66 , has a high protein content and has been used as a donor for improving cultivated wheat.

S10. Ans. (b)

Sol. Primary productivity depends on the plant species inhabiting a particular area. It also depends on a variety of environmental factors, availability of nutrients and photosynthetic capacity of plants.

S11. Ans. (a)

Sol. example of commensalism is the interaction between sea anemone that has stinging tentacles and the clown fish that lives among them. Lichens represent an intimate mutualistic relationship between a fungus and photosynthesising algae or cyanobacteria. Brood parasitism in birds is a fascinating example of parasitism in which the parasitic bird lays its eggs in the nest of its host and lets the host incubate them. E.g crow and cuckoo. The Abingdon tortoise in Galapagos Islands became extinct within a decade after goats were introduced on the island, apparently due to the greater browsing efficiency of the goats. It is competition.

S12. Ans. (c)

Sol.

Crop	Variety	Resistance to diseases
Wheat	*Himgiri*	*Leaf and stripe rust, hill bunt*
Brassica	*Pusa swarnim (Karan rai)*	*White rust*
Cauliflower	*Pusa Shubhra, Pusa Snowball K-1*	*Black rot and Curl blight black rot*
Cowpea	*Pusa Komal*	*Bacterial blight*
Chilli	*Pusa Sadabahar*	*Chilly mosaic virus, Tobacco mosaic virus and Leaf curl*

S13. Ans. (c)

Sol. The most vital event of sexual reproduction is perhaps the fusion of gametes. This process called syngamy results in the formation of a diploid zygote.

S14. Ans. (c)

Sol. These fragments produced by restriction enzyme digestion can be separated by a technique known as gel electrophoresis. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. Bright orange coloured bands of DNA in a ethidium bromide stained gel exposed to UV light are seen. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution. The DNA fragments purified in this way are used in constructing recombinant DNA by joining them with cloning vectors.

S15. Ans. (a)

Sol. GM plants have been useful in many ways. It has (i) made crops more tolerant to abiotic stresses (cold, drought, salt, heat). (ii) reduced reliance on chemical pesticides (pest-resistant crops). (iii) helped to reduce post harvest losses. (iv) increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil). (v) enhanced nutritional value of food, e.g., golden rice, i.e., Vitamin 'A' enriched rice.

S16. Ans. (c)

Sol. The narrowly utilitarian arguments for conserving biodiversity are obvious; humans derive countless direct economic benefits from naturefood (cereals, pulses, fruits), firewood, fibre, construction material, industrial products (tannins, lubricants, dyes, resins, perfumes) and products of medicinal importance. Pollination comes under broadly utilitarian argument.

S17. Ans. (d)

Sol. For plants, herbivores are the predators. Nearly 25 per cent of all insects are known to be phytophagous (feeding on plant sap and other parts of plants).

S18. Ans. (c)

Sol. Motor vehicles equipped with catalytic converter should use unleaded petrol because lead in the petrol inactivates the catalyst.

S19. Ans. (b)

Sol. the large holes in 'Swiss cheese' are due to production of a large amount of CO_2 by a bacterium named *Propionibacterium sharmanii.*

S20. Ans. (b)

Sol. Hugo deVries based on his work on evening primrose brought forth the idea of mutations – large difference arising suddenly in a population. He believed that it is mutation which causes evolution and not the minor variations (heritable) that Darwin talked about. Mutations are random and directionless while Darwinian variations are small and directional.

S21. Ans. (a)

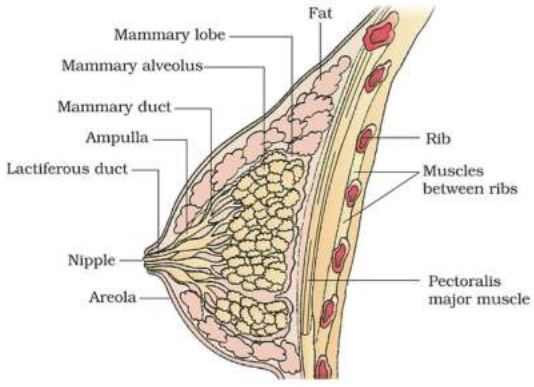
Sol. Transgenic animals are made that carry genes which make them more sensitive to toxic substances than non-transgenic animals. In 1997, the first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk.

S22. Ans. (a)

Sol. Down's Syndrome is caused due to the presence of an additional copy of the chromosome number 21.

S23. Ans. (c)

Sol.



Sectional view of Mammary gland

S24. Ans. (d)

Sol. Adenosine monophosphate (AMP) is one of the components of RNA and the organic component of the energy-carrying molecule ATP. It has a phosphate group, the sugar ribose and the nucleobase adenine.

S25. Ans. (d)

Sol. Homology indicates common ancestry, the thorn and tendrils of Bougainvillea and Cucurbita represent homology. The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats) is called adaptive radiation. Darwin's finches represent one of the best examples of this phenomenon. Lamarck gave the theory of use and disuse of organs.

S26. Ans. (c)

Sol. Sickle cell anaemia is caused due to substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule.

S27. Ans. (a)

Sol. The pyramid of biomass in sea is generally inverted because the biomass of fishes far exceeds that of phytoplankton.

S28. Ans. (b)

Sol. In some other species, the anther and stigma are placed at different positions so that the pollen cannot come in contact with the stigma of the same flower. Both these devices prevent autogamy. The third device to prevent inbreeding is self-incompatibility. This is a genetic mechanism and prevents self-pollen (from the same flower or other flowers of the same plant) from fertilising the ovules by inhibiting pollen germination or pollen tube growth in the pistil. Another device to prevent self-pollination is the production of unisexual flowers. If both male and female flowers are present on the same plant such as castor and maize (monoecious), it prevents autogamy but not geitonogamy. In several species such as papaya, male and female flowers are present on different plants, that is each plant is either male or female (dioecy). This condition prevents both autogamy and geitonogamy.

S29. Ans. (c)

Sol. Many fungi belonging to the genera *Microsporum, Trichophyton and Epidermophyton* are responsible for ringworms which is one of the most common infectious diseases in man

S30. Ans. (c)

Sol. Today transgenic models exist for many human diseases such as cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's.

S31. Ans. (b)

Sol. Embryos of monocotyledons possess only one cotyledon. In the grass family the cotyledon is called scutellum.

S32. Ans. (d)

Sol. Lipases are used in detergent formulations and are helpful in removing oily stains from the laundry. 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. Another bioactive molecule, cyclosporin A, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus *Trichoderma polysporum*. Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents. It acts by competitively inhibiting the enzyme responsible for synthesis of cholesterol.

S33. Ans. (c)

Sol. UAA, UAG, UGA are stop terminator codons. AUG codes for Methionine (met), and it also act as initiator codon.

S34. Ans. (a)

Sol. Among animals, insects are the most species-rich taxonomic group, making up more than 70 per cent of the total.

S35. Ans. (b)

Sol. Infertility cases either due to inability of the male partner to inseminate the female or due to very low sperm counts in the ejaculates, could be corrected by artificial insemination (AI) technique.

S36. Ans. (c)

Sol. the proteins encoded by the genes *cryIAc* and *cryIIAb* control the cotton bollworms, that of *cryIAb* controls corn borer.

S37. Ans. (c)

Sol. if the plant is infected with a virus, the meristem (apical and axillary) is free of virus. Hence, one can remove the meristem and grow it in vitro to obtain virus-free plants.

S38. Ans. (c)

Sol. Examples of acid producers are *Aspergillus niger* (a fungus) of citric acid, *Acetobacter aceti* (a bacterium) of acetic acid; *Clostridium butylicum* (a bacterium) of butyric acid *and Lactobacillus* (a bacterium) of lactic acid.

S39. Ans. (d)

Sol. If a man with blood group A marries a woman with blood group AB. Then the genotype of the man can be I^AI^A or I^A i. The woman will have genotype I^A I^B. When I^A I^A is crossed with I^A I^B, then the offspring will have blood group A or blood group AB. When I^A i is crossed with I^A I^B, then the offspring can have genotype of A, B or AB. But in either of the cases O blood group is not possible.

S40. Ans. (c)

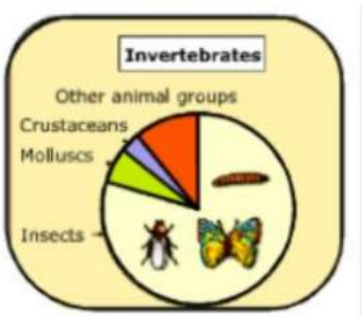
Sol. Hugo deVries based on his work on evening primrose brought forth the idea of mutations – large difference arising suddenly in a population. He believed that it is mutation which causes evolution and not the minor variations (heritable) that Darwin talked about.

S41. Ans. (d)

Sol. Fungi reflect the largest number of species in global biodiversity. They are widely distributed in the world. Many of them are inconspicuous because of their small size structures and their mysterious way of presence in plants, animals, or other fungi in the soil, on dead matter, and as symbionts.

S42. Ans. (d)
Sol. out of every 10 animals on this planet, 7 are insects.

S43. Ans. (c)
Sol.



S44. Ans. (c)
Sol. Bacteria are not represented in the diagram.

S45. Ans. (b)
Sol. Although India has only 2.4 per cent of the world's land area, its share of the global species diversity is an impressive 8.1 per cent. That is what makes our country one of the 12 mega diversity countries of the world. Nearly 45,000 species of plants and twice as many of animals have been recorded from India.

S46. Ans. (b)
Sol. In ABO blood groups, six genotypes and four phenotypes are possible.

S47. Ans. (b)
Sol. ABO blood groups are controlled by the gene I. The plasma membrane of the red blood cells has sugar polymers that protrude from its surface and the kind of sugar is controlled by the gene. The gene (I) has three alleles I^A , I^B and i.

S48. Ans. (c)
Sol. Because humans are diploid organisms, each person possesses any two of the three I gene alleles. I^A and I^B are completely dominant over i, in other words when I^A and i are present only I^A expresses (because i does not produce any sugar), and when I^B and i are present I^B expresses. But when I^A and I^B are present together they both express their own types of sugars: this is because of co-dominance.

S49. Ans. (b)
Sol.

Allele from Parent 1	Allele from Parent 2	Genotype of offspring	Blood type of offspring
I^A	I^A	$I^A I^A$	A
I^A	I^B	$I^A I^B$	AB
I^A	i	$I^A i$	A
I^B	I^A	$I^A I^B$	AB
I^B	I^B	$I^B I^B$	B
I^B	i	$I^B i$	B
i	i	ii	O

S50. Ans. (c)
Sol. Persons with blood group O have no antigens on the surface of RBCs but have both the antibodies in the plasma. Hence, these can donate blood to anyone(universal donors).