CUET Biology Question Paper 2024 Set D with Solutions

Question 1: In a country, at any time, the population has the same number of youngs and mature ones. What type of growth does it reflect?

(1) Expanding

(2) Declining

(3) Stable

(4) S-shaped

Correct Answer: (3) Stable

Solution: A stable population growth is characterized by equal proportions of young and mature individuals, indicating a balanced replacement rate.

Quick Tip

Stable growth indicates equilibrium between births and deaths, maintaining the population size over time.

Question 2: Two closely related species can co-exist indefinitely and violate the Gause's 'Competitive Exclusion Principle' by:

(1) eliminating the inferior species.

(2) resource partitioning.

(3) interacting with each other symbiotically.

(4) changing the area of grazing.

Correct Answer: (2) resource partitioning

Solution: Resource partitioning allows two closely related species to co-exist by using different resources or niches, thus avoiding direct competition.

Quick Tip

Resource partitioning involves dividing available resources to reduce competition and promote coexistence.

Question 3: The process of mineralisation by microorganisms helps in the release of:

(1) inorganic nutrients from detritus and formation of humus.

(2) organic nutrients from humus.

(3) inorganic nutrients from humus.

(4) organic and inorganic nutrients from detritus.

Correct Answer: (1) inorganic nutrients from detritus and formation of humus

Solution: Mineralisation is the process by which microorganisms decompose detritus, releasing inorganic nutrients and contributing to the formation of humus.

Quick Tip

Mineralisation releases nutrients essential for plant growth and helps maintain the soil's nutrient cycle.

Question 4: In which ecosystem is the biomass of primary consumers greater than producers?

(1) Forests

(2) Grassland

(3) Desert

(4) Sea

Correct Answer: (4) Sea

Solution: In marine ecosystems, primary consumers (such as zooplankton) can have more biomass than producers (like phytoplankton) due to high turnover rates of producers.

Quick Tip

In ocean ecosystems, the rapid reproduction of phytoplankton supports a larger biomass of primary consumers.

Question 5: Match List-I with List-II:

List-I (Interspecies Relationships)	**List-II** (Features)
(A) Commensalism	(I) One species is benefitted at the expense of the other
(B) Mutualism	(II) One species is harmed and the other is unaffected
(C) Amensalism	(III) Both the species are benefitted
(D) Parasitism	(IV) One species benefits and other remains unaffected

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Commensalism: (IV) One species benefits, and the other remains unaffected.

(B) Mutualism: (III) Both species benefit.

(C)Amensalism: (II) One species is harmed, and the other is unaffected.

(D) Parasitism: (I) One species benefits at the expense of the other.

Quick Tip

Interspecies relationships vary based on the impact on each species, from mutual benefit to harm.

Question 6: Choose the correct statements with respect to decomposition from the following:

(A) Decomposition is an anaerobic process.

(B) Decomposition rate of detritus depends upon the chemical nature of it.

(C) Water-soluble organic nutrients go into the soil and get precipitated in the process of leaching.

(D) Humification follows mineralisation.

Choose the correct answer from the options given below:

(1) (B) and (D) only

(2) (A) and (C) only

(3) (B) and (C) only

(4) (A) and (D) only

Correct Answer: (1) (B) and (D) only

Solution: The correct statements are: (B): The rate of decomposition depends on the chemical composition of detritus.

(D): Humification is followed by mineralisation.

Quick Tip

Decomposition involves the breakdown of organic matter, and the chemical nature of detritus affects its rate of decomposition. Humification is the formation of humus, followed by mineralisation.

Question 7: Match List-I with List-II:

List-I (Concepts)	**List-II** (Explanation)
(A) Standing state	(I) Available biomass for the consumption of heterotrophs
(B) Secondary productivity	(II) Rate of formation of organic matter by consumers
(C) Standing crop	(III) Mass of living matter in a trophic level at a given time
(D) Net primary productivity	(IV) Amount of mineral nutrients in the soil at a given time

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Standing state: (IV) Amount of mineral nutrients in the soil at a given time.

(B) Secondary productivity: (II) Rate of formation of organic matter by consumers.

(C) Standing crop: (III) Mass of living matter in a trophic level at a given time.

(D) Net primary productivity: (I) Available biomass for the consumption of heterotrophs.

Quick Tip

Standing state refers to the nutrients present, while standing crop measures living biomass. Primary and secondary productivity track the rate of organic matter production.

Read the passage carefully and give the answer to the next five questions :

India was amongst the first countries in the world to initiate action plans and programmes at a national level to attain total reproductive health as a social goal. These programmes called 'family planning' were initiated in 1951 and were periodically assessed over the past decades. Improved programmes covering wider reproduction-related areas are currently in operation. Creating awareness among the people about various reproduction-related aspects

and providing facilities and support for building up a reproductively healthy society are the major tasks under these programmes.

Question 8: Which of the following is not a Sexually Transmitted Disease?

(1) Chlamydiasis

(2) Filariasis

(3) Genital herpes

(4) Trichomoniasis

Correct Answer: (2) Filariasis

Solution: Filariasis is not a sexually transmitted disease; it is caused by parasitic worms and is typically transmitted through mosquito bites, whereas the other options are sexually transmitted diseases.

Quick Tip

Filariasis is transmitted through mosquitoes and not through sexual contact, making it distinct from the other diseases listed.

Question 9: Which of the following statements is incorrect with respect to Medical Termination of Pregnancy?

(1) They are considered safe during the first trimester.

(2) It is legalised in India from 1971.

(3) MTPs can be performed even after 24 weeks, but with the opinion of 2 registered medical practitioners on specific grounds.

(4) About 20% of the total number of conceived pregnancies undergo MTP in a year globally.

Correct Answer: (4) About 20% of the total number of conceived pregnancies undergo MTP in a year globally.

Solution: The statement in option (4) is incorrect. The percentage of conceived pregnancies

that undergo MTP globally is much lower than 20%. The other options are accurate with respect to the safety of MTPs during the first trimester, legalisation in India, and specific grounds for performing MTPs after 24 weeks.

Quick Tip

Medical Termination of Pregnancy is a legal and regulated process, but the percentage of conceived pregnancies that undergo MTP globally is significantly lower than 20%.

Question 10: Match List-I with List-II:

List-I (Various Assisted Reproductive Technologies)	**List-II** (Process Involved)
(A) ZIFT	(I) Formation of embryo in vitro by injecting sperm directly into ovum
(B) ICSI	(II) Transferring of embryo with more than 8 blastomeres into the uterus
(C) IUI	(III) Transferring of fertilised egg up to 8 blastomeres into fallopian tube
(D) IUT	(IV) Transfer of semen from a healthy donor into the uterus artificially

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) ZIFT: (III) Transferring of fertilised egg up to 8 blastomeres into fallopian tube.

(B) ICSI: (I) Formation of embryo in vitro by injecting sperm directly into ovum.

(C) IUI: (IV) Transfer of semen from a healthy donor into the uterus artificially.

(D) IUT: (II) Transferring of embryo with more than 8 blastomeres into the uterus.

Quick Tip

Assisted Reproductive Technologies (ART) include various methods like ZIFT, ICSI, IUI, and IUT, which involve fertilisation or implantation in different ways.

Question 11: Which of the following methods of contraception is not meant for females?

(1) IUDs

(2) Lactational amenorrhea

(3) Vasectomy

(4) Condoms

Correct Answer: (3) Vasectomy

Solution: Vasectomy is a male sterilization method, while IUDs, lactational amenorrhea, and condoms can be used by females for contraception.

Quick Tip

Vasectomy is a male sterilization procedure, preventing the release of sperm during ejaculation.

Question 12: 'Saheli' – an oral contraceptive pill, also known as the 'Once a week' pill, was developed by:

(1) AIIMS

(2) NBRI

(3) CDRI

(4) NBPGR

Correct Answer: (3) CDRI

Solution: The 'Saheli' contraceptive pill was developed by the Central Drug Research Institute (CDRI), offering a non-hormonal, weekly oral contraceptive for women.

Quick Tip

'Saheli' is a non-hormonal oral contraceptive developed by CDRI, offering a unique once-a-week dosing regimen.

Read the passage carefully and give the answers to the next five questions :

Does the number of species in a community really matter to the functioning of the ecosystem? This is a question for which ecologists have not been able to give a definitive answer. For many decades, ecologists believed that communities with more species generally tend to be more stable than those with fewer species. According to the International Union for Conservation of Nature and Natural Resources (IUCN) (2004), the total number of plant and animal species described so far is more than 1.5 million.

Question 13: Which of the following is not a characteristic of a stable biological community?

(1) It must be resistant to invasions by alien species.

(2) It should not show too much variation in productivity from year to year.

(3) All the species are equally important in a stable community and absence of any one leads to its instability.

(4) It is resilient to occasional disturbances, whether natural or man-made.

Correct Answer: (3) All the species are equally important in a stable community and absence of any one leads to its instability.

Solution: In a stable community, not all species are equally important. Key species, or "keystone species," play a crucial role, but the absence of non-key species may not necessarily lead to instability.

Quick Tip

A stable ecosystem relies on key species, but the removal of a non-key species may not result in instability.

Question 14: In the 'rivet popper hypothesis', the 'rivet' signifies:

(1) Key species

(2) Endemic species

(3) Community

(4) Species

Correct Answer: (4) Species

Solution: In the 'rivet popper hypothesis,' each rivet represents a species, and the removal of too many rivets (species) can lead to ecosystem collapse.

Quick Tip

The "rivet popper hypothesis" emphasizes the importance of species diversity to prevent ecosystem collapse.

Question 15: The scientist who proved that species richness directly correlates with the stability of a community was _____ .

(1) Paul Ehrlich

(2) David Tilman

(3) Robert May

(4) Edward Wilson

Correct Answer: (2) David Tilman

Solution: David Tilman demonstrated that species richness contributes to the stability of ecosystems through his experiments.

Quick Tip

David Tilman's research linked species richness with greater ecosystem stability.

Question 16: Among the vertebrates, which of the following is the most species-rich group?

(1) Reptiles

(2) Fishes

(3) Insects

(4) Mammals

Correct Answer: (2) Fishes

Solution: Fishes represent the most species-rich group among vertebrates, with a vast diversity in aquatic ecosystems.

Quick Tip

Fishes are the most species-rich group among vertebrates, thriving in aquatic environments.

Question 17: The following are the various hypotheses proposed in explaining the greatest biological diversity in the tropics except:

(1) Temperate regions are subjected to glaciations, but tropical latitudes have remained relatively undisturbed.

(2) Tropical environments have more humidity/moisture which helps the diversity to flourish.

(3) Tropical environments are less seasonal and more constant.

(4) There is more solar energy available in the tropics which contributes to higher productivity

and hence, biodiversity.

Correct Answer: (2) Tropical environments have more humidity/moisture which helps the diversity to flourish.

Solution: While humidity may contribute to the diversity in certain ecosystems, it is not a primary hypothesis explaining the high biodiversity in the tropics.

Quick Tip

The primary factors explaining high biodiversity in the tropics are stability, solar energy, and lack of glaciations.

Question 18: Cells present in the mature pollen grains are _____ .

(1) Central cell and generative cell

(2) Antipodal cell and vegetative cell

(3) Vegetative cell and generative cell

(4) Filiform cell and micropylar cell

Correct Answer: (3) Vegetative cell and generative cell

Solution: Mature pollen grains typically contain two cells: a larger vegetative cell and a smaller generative cell. The generative cell later divides to form two sperm cells for fertilization.

Quick Tip

In mature pollen grains, the vegetative cell is responsible for pollen tube growth, while the generative cell divides to form sperm cells.

Question 19: Match List-I with List-II:

List-I (Structures)	**List-II** (Functions)
(A) Filiform apparatus	(I) Made up of sporopollenin
(B) Tapetum	(II) Attachment of ovule to the placenta
(C) Exine	(III) Guides pollen tube into the synergid
(D) Funicle	(IV) Nourishes the pollen grain

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Filiform apparatus: (III) Guides pollen tube into the synergid.

(B) Tapetum: (IV) Nourishes the pollen grain.

(C) Exine: (I) Made up of sporopollenin.

(D) Funicle: (II) Attachment of ovule to the placenta.

Quick Tip

The filiform apparatus helps direct the pollen tube, the tapetum nourishes developing pollen, exine is composed of sporopollenin, and the funicle attaches the ovule to the placenta.

Question 20: Primary Endosperm Nucleus is the product of:

(1) Double fusion

(2) Triple fusion

(3) Parthenogenesis

(4) Apomixis

Correct Answer: (2) Triple fusion

Solution: The primary endosperm nucleus is formed as a result of triple fusion, which occurs when one of the sperm nuclei fuses with the two polar nuclei in the embryo sac during fertilization.

Quick Tip

Triple fusion in angiosperms involves the fusion of one sperm with two polar nuclei, forming the triploid primary endosperm nucleus.

Question 21: In humans, the mammary gland is divided into _____ lobes .

(1) 10 – 12

(2) 25 – 30

(3) 30 – 35

(4) 15 – 20

Correct Answer: (4) 15 – 20

Solution: In humans, each mammary gland is divided into 15 to 20 lobes, which contain lobules responsible for producing milk.

Quick Tip

Each mammary gland in humans is divided into 15 to 20 lobes, which consist of smaller lobules where milk is produced.

Question 22: Sex in human embryo is determined by:

(1) 'X' chromosome of egg

(2) 'X' or 'Y' chromosome of sperm

(3) Only ‘Y’ chromosome of sperm

(4) Health of mother

Correct Answer: (2) ‘X’ or ‘Y’ chromosome of sperm

Solution: The sex of the human embryo is determined by the sperm, which can carry either an X or a Y chromosome. An X chromosome results in a female (XX), and a Y chromosome results in a male (XY).

Quick Tip

The X or Y chromosome in the sperm determines the sex of the embryo, while the egg always contributes an X chromosome.

Question 23: Arrange the following stages of oogenesis in order of their occurrence:

(A) Ovum

(B) Oogonia

(C) Primary oocyte

(D) Secondary oocyte

Choose the correct answer from the options given below:

(1) (C), (B), (D), (A)

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

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

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

Correct Answer: (2) (B), (C), (D), (A)

Solution: The correct sequence of oogenesis is: Oogonia (B) $\rightarrow$ Primary oocyte (C) $\rightarrow$ Secondary oocyte (D) $\rightarrow$ Ovum (A).

Quick Tip

Oogenesis starts with oogonia, followed by the primary oocyte, secondary oocyte, and ends with the formation of the ovum.

Question 24: Which of the following pair of contrasting traits was not studied by Mendel?

(1) Pink and white flowers

(2) Inflated and constricted pods

(3) Axial and terminal flowers

(4) Green and yellow pods

Correct Answer: (1) Pink and white flowers

Solution: Mendel did not study pink and white flowers. He focused on traits like flower position, pod shape, and seed color, but not flower color variations like pink and white.

Quick Tip

Mendel studied contrasting traits such as seed color, pod shape, and flower position, but he did not study flower color variations like pink and white.

Question 25: Failure of chromatids to segregate during the cell division cycle results in:

(1) Polyploidy

(2) Euploidy

(3) Aneuploidy

(4) Autopolyploidy

Correct Answer: (3) Aneuploidy

Solution: Aneuploidy results from the failure of chromatids to segregate during cell division,

leading to an abnormal number of chromosomes.

Quick Tip

Aneuploidy occurs due to improper segregation of chromatids, resulting in cells with abnormal chromosome numbers.

Question 26: Select the correctly matched pair about sickle cell anaemia: Genotype : Phenotype

(A) Hb^A Hb^A : Diseased phenotype

(B) Hb^A Hb^S : Diseased phenotype

(C) Hb^S Hb^S : Diseased phenotype

(D) Hb^S Hb^A : Carrier of disease

Choose the correct answer from the options given below:

(1) (C) and (D) only

(2) (A) and (C) only

(3) (B), (C) and (D) only

(4) (A), (B), and (C) only

Correct Answer: (1) (C) and (D) only

Solution: (A) Hb^A Hb^A represents the normal phenotype, not the diseased phenotype. (B) Hb^A Hb^S represents the carrier state, not the diseased phenotype. (C) Hb^S Hb^S represents the diseased phenotype in sickle cell anaemia. (D) Hb^S Hb^A represents the carrier of the disease.

Quick Tip

Sickle cell anaemia is caused by the homozygous condition Hb^S Hb^S, while the heterozygous condition Hb^A Hb^S makes an individual a carrier.

Question 27: Match List-I with List-II:

List-I (Scientists)	**List-II** (Discovery)
(A) Sutton and Boveri	(I) X-Body
(B) Sturtevant	(II) Chromosomal Theory of Inheritance
(C) Henking	(III) Transformation in bacteria
(D) Griffith	(IV) Genetic maps

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Sutton and Boveri: (II) Chromosomal Theory of Inheritance.

(B) Sturtevant: (IV) Genetic maps.

(C) Henking: (I) X-Body.

(D) Griffith: (III) Transformation in bacteria.

Quick Tip

The Chromosomal Theory of Inheritance was proposed by Sutton and Boveri, while Griffith is known for discovering transformation in bacteria. Henking discovered the X-Body, and Sturtevant created the first genetic maps.

Question 28: Which of the following statements are incorrect with respect to nucleotides?

(A) Purines and pyrimidines are nitrogenous bases.

(B) Nucleotides are non-enzymatic molecules.

(C) Phosphate group is linked to – OH of 5' C of a nucleoside through phosphoester linkage.

(D) In RNA, every nucleotide residue has an additional – OH group present at 2' position in

the ribose.

(E) Thymine is an example of Pyrimidine.

Choose the correct answer from the options given below:

(1) (A), (B) and (E) only

(2) (D) and (E) only

(3) (B) and (D) only

(4) (B) and (E) only

Correct Answer: (4) (B) and (E) only

Solution: Nucleotides are not non-enzymatic molecules (they play important roles in enzymatic reactions), and thymine is a pyrimidine, so these statements are incorrect.

Quick Tip

Nucleotides are essential for enzymatic reactions, and thymine is a pyrimidine, which pairs with adenine in DNA.

Question 29: Arrange the given steps of DNA fingerprinting in the sequence from initiation to end:

(A) Digestion of DNA by restriction endonuclease

(B) Isolation of DNA

(C) Hybridisation using labelled VNTR probe

(D) Transferring (blotting) of separated DNA fragments to synthetic membrane

Choose the correct answer from the options given below:

(1) (A), (B), (C), (D)

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

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

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

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

Solution: The correct sequence of steps in DNA fingerprinting is: (B) Isolation of DNA
(A) Digestion of DNA by restriction endonuclease
(D) Transferring (blotting) of separated DNA fragments to synthetic membrane
(C) Hybridisation using labelled VNTR probe

Quick Tip

DNA fingerprinting involves isolating DNA, cutting it with restriction enzymes, blotting it onto a membrane, and probing with a labelled VNTR probe.

Question 30: Nucleosome is associated with _____ molecules of histones:
(1) Four
(2) Nine
(3) Two
(4) Eight

Correct Answer: (4) Eight

Solution: A nucleosome is associated with eight histone proteins, forming the histone octamer around which DNA is wrapped.

Quick Tip

Nucleosomes are composed of eight histone molecules (two each of H2A, H2B, H3, and H4) and help package DNA into chromatin.

Question 31: Select the observations drawn from the human genome project which are correct:

(A) The human genome contains 3164.7 million bp.

(B) The average gene consists of 3000 bases.

(C) Total number of genes is estimated at 30,000.

(D) The functions are unknown for over 50% of discovered genes.

(E) Less than 2% of the genome codes for proteins.

Choose the correct answer from the options given below:

(1) (A), (B), (C) and (D) only

(2) (A), (C), (D) and (E) only

(3) (A), (C) and (E) only

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

Correct Answer: (4) (A), (B), (C), (D) and (E)

Solution: All the given statements are correct. The human genome contains approximately 3164.7 million base pairs, the average gene size is 3000 bases, there are around 30,000 genes, over 50% of the genes have unknown functions, and less than 2% of the genome codes for proteins.

Quick Tip

The Human Genome Project revealed that most of the genome does not code for proteins, and many genes have unknown functions.

Question 32: Analogous structures are a result of:

(1) Convergent evolution

(2) Divergent evolution

(3) Parallel evolution

(4) Retrogressive evolution

Correct Answer: (1) Convergent evolution

Solution: Analogous structures are a result of convergent evolution, where unrelated species evolve similar traits due to similar environmental pressures.

Quick Tip

Convergent evolution leads to the development of analogous structures, where organisms from different lineages develop similar adaptations.

Question 33: Which of the following does not affect the Hardy-Weinberg equilibrium?

(1) Natural selection

(2) Genetic drift

(3) Gene pool

(4) Gene migration

Correct Answer: (3) Gene pool

Solution: The gene pool itself does not affect Hardy-Weinberg equilibrium, while factors like natural selection, genetic drift, and gene migration do.

Quick Tip

The gene pool refers to the collection of genes in a population, but factors like selection, drift, and migration can affect Hardy-Weinberg equilibrium.

Question 34: Which of the following primates was more like an ape?

(1) Homo erectus

(2) Dryopithecus

(3) Australopithecines

(4) Ramapithecus

Correct Answer: (2) Dryopithecus

Solution: Dryopithecus was more like an ape in its overall structure and is considered an ancient ancestor of modern apes and humans.

Quick Tip

Dryopithecus is an ancient genus of primates that was more similar to modern apes in terms of structure and behavior.

Question 35: Match List-I with List-II:

List-I (Placental mammals)	**List-II** (Counterpart Marsupials)
(A) Anteater	(I) Spotted cuscus
(B) Bobcat	(II) Numbat
(C) Lemur	(III) Flying Phalanger
(D) Flying squirrel	(IV) Tasmanian tiger cat

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Anteater: (II) Numbat

(B) Bobcat: (IV) Tasmanian tiger cat

(C) Lemur: (I) Spotted cuscus

(D) Flying squirrel: (III) Flying Phalanger

Quick Tip

Placental mammals and their marsupial counterparts share similar ecological niches despite being geographically separated. For example, the numbat is the marsupial counterpart of the placental anteater.

Question 36: Identify the incorrect statement/s:

(A) Intestinal perforation and death may occur in severe cases of typhoid infection.

(B) Common cold is caused by Rhinoviruses.

(C) Lips and fingernails may turn grey to bluish colour in severe cases of pneumonia.

(D) Pneumonia is caused by Salmonella.

(E) Typhoid fever could be confirmed by Widal test.

Choose the correct answer from the options given below:

(1) (A), (C) and (D) only

(2) (B) and (E) only

(3) (D) only

(4) (A) and (D) only

Correct Answer: (3) (D) only

Solution: Pneumonia is caused by bacteria such as Streptococcus pneumoniae or Haemophilus influenzae, not Salmonella, which causes typhoid.

Quick Tip

Pneumonia is caused by bacteria like Streptococcus pneumoniae, while Salmonella is responsible for typhoid fever.

Question 37: Match List-I with List-II:

List-I (Types of barriers)	**List-II** (Examples)
(A) Cytokine barriers	(IV) Interferons
(B) Physical barriers	(I) Mucus coating
(C) Cellular barriers	(III) Phagocytosis
(D) Physiological barriers	(II) Tears from eyes

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) Cytokine barriers: (IV) Interferons

(B) Physical barriers: (I) Mucus coating

(C) Cellular barriers: (III) Phagocytosis

(D) Physiological barriers: (II) Tears from eyes

Quick Tip

The immune system uses various barriers like cytokines (interferons), physical barriers (mucus), cellular barriers (phagocytes), and physiological barriers (tears) to defend the body.

Question 38: Smack is chemically:

(1) Diacetyl morphine

(2) Cocaine

(3) Benzodiazepine

(4) Amphetamine

Correct Answer: (1) Diacetyl morphine

Solution: Smack is chemically known as diacetyl morphine, which is a derivative of heroin and is highly addictive.

Quick Tip

Smack is another name for heroin, and its chemical name is diacetyl morphine, which is a potent opioid.

Question 39: Antibodies are secreted by:

(1) T-Cells

(2) B-Cells

(3) α-Cells

(4) β-Cells

Correct Answer: (2) B-Cells

Solution: Antibodies are secreted by B-cells (B lymphocytes) in response to the presence of antigens in the body.

Quick Tip

B-cells are a type of lymphocyte that produce and secrete antibodies to fight against pathogens.

Question 40: In sewage treatment, flocs are:

(1) the solids that settle during sedimentation.

(2) the supernatant that is formed above the primary sludge.

(3) the masses of bacteria associated with fungal filaments.

(4) the bacteria which grow anaerobically and are also called anaerobic sludge digesters.

Correct Answer: (3) the masses of bacteria associated with fungal filaments.

Solution: In sewage treatment, flocs are masses of bacteria associated with fungal filaments that help in the breakdown of organic matter during the secondary treatment process.

Quick Tip

Flocs, in sewage treatment, are bacterial masses that work in conjunction with fungal filaments to decompose organic material.

Question 41: Match List-I with List-II:

List-I (Products)	**List-II** (Organisms)
(A) Statin	(III) Monascus
(B) Clot buster	(I) Streptococcus
(C) Swiss cheese	(IV) Propionibacterium
(D) Cyclosporin-A	(II) Trichoderma

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: (A) Statin: (III) Monascus (Statins are produced by the fungus Monascus purpureus).

(B) Clot buster: (I) Streptococcus (Streptokinase, a clot buster, is produced by Streptococcus).

(C) Swiss cheese: (IV) Propionibacterium (Swiss cheese is made using Propionibacterium).

(D) Cyclosporin-A: (II) Trichoderma (Cyclosporin-A is produced by Trichoderma).

Quick Tip

Statin from Monascus, clot buster from Streptococcus, Swiss cheese from Propionibacterium, and cyclosporin-A from Trichoderma are examples of biotechnology products.

Question 42: The beetle used as a biocontrol agent for aphids and mosquitoes is:

(1) Trichoderma

(2) Dragonflies

(3) Ladybird

(4) Silver fish

Correct Answer: (3) Ladybird

Solution: Ladybird beetles are used as biocontrol agents to control aphids and other pests in agriculture.

Quick Tip

Ladybird beetles are beneficial insects that control pest populations like aphids, making them effective biocontrol agents.

Question 43: Downstream processing method involves:

(1) Identification

(2) Amplification

(3) Fermentation

(4) Purification

Correct Answer: (4) Purification

Solution: Downstream processing in biotechnology refers to the purification of the product

from the fermentation or synthesis process.

Quick Tip

Downstream processing is the stage after fermentation or synthesis, where the desired product is purified and prepared for use.

Question 44: Which of the following is not the correctly matched pair of organism and its respective cell wall degrading enzyme?

(1) Fungi– Chitinase

(2) Algae– Methylase

(3) Plant cells – Cellulase

(4) Bacteria– Lysozyme

Correct Answer: (2) Algae– Methylase

Solution: Algae do not use methylase for cell wall degradation. Enzymes like cellulase or pectinase are more commonly associated with degrading algal cell walls.

Quick Tip

Cell wall degrading enzymes such as cellulase (for plant cells), chitinase (for fungi), and lysozyme (for bacteria) help break down cell walls in various organisms.

Question 45: Arrange the following steps involved in transformation of bacteria in a sequence from initiation to end:

(A) Incubation of rDNA with bacterial cell on ice

(B) Treatment with divalent cations

(C) Heat shock treatment

(D) Selection on antibiotic containing agar plate

(E) Placed them again on ice

Choose the correct answer from the options given below:

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

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

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

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

Correct Answer: (2) (B), (A), (C), (E), (D)

Solution: The correct sequence of steps for bacterial transformation is: (B) Treatment with divalent cations, (A) Incubation of rDNA with bacterial cells on ice, (C) Heat shock treatment, (E) Placing them again on ice, (D) Selection on antibiotic-containing agar plate.

Quick Tip

Transformation involves preparing bacterial cells using divalent cations, incubating with rDNA, performing heat shock, and selecting transformed cells on antibiotic plates.

Question 46: Which of the following statements are incorrect?

(A) Fragments of DNA can be separated by ELISA.

(B) Transformation is a procedure through which a piece of DNA is introduced in a host bacterium.

(C) Recombinant DNA technology does not involve isolation of a desired DNA fragment.

(D) DNA ligases are used for stitching DNA fragments into a vector.

Choose the correct answer from the options given below:

(1) (A) and (C) only

(2) (A) and (B) only

(3) (B) and (C) only

(4) (A), (C) and (D) only

Correct Answer: (1) (A) and (C) only

Solution: Statement (A) is incorrect because ELISA is used for detecting proteins or antigens, not for separating DNA fragments.
Statement (C) is also incorrect because recombinant DNA technology does involve isolation of the desired DNA fragment.

Quick Tip

Recombinant DNA technology includes the isolation of specific DNA fragments, transformation, and ligation of DNA fragments into vectors using DNA ligases.

Question 47: Which of the following statements are true?
(A) Milk obtained from 'Rosie' is nutritionally more balanced for human babies than natural human milk.
(B) Biopiracy refers to the use of bioresources without proper authorisation from MNCs.
(C) GEAC is the decisive body for safety and validity of GMOs and GM research respectively.
(D) Transgenic animals help us to understand the contribution of genes in the development of disease.

Choose the correct answer from the options given below:
(1) (A) and (C) only
(2) (C) and (D) only
(3) (A) and (D) only
(4) (B) and (C) only

Correct Answer: (2) (C) and (D) only

Solution: (C) is correct because the Genetic Engineering Appraisal Committee (GEAC) is responsible for approving the use of genetically modified organisms (GMOs) and GM research

in India.

(D) is correct because transgenic animals are used in research to study the role of specific genes in the development of diseases, thereby helping in understanding genetic contributions to diseases.

Quick Tip

Transgenic animals are valuable for studying gene function and disease development, while GEAC regulates GMOs and ensures their safety and efficacy.

Question 48: Match List-I with List-II:

List-I (Transgene)	**List-II** (Used for/Products)
(A) α-1-antitrypsin	(III) Treat emphysema
(B) cryIAc	(IV) Cotton bollworms
(C) Antisense RNA	(I) Meloidegyne incognitia
(D) cryIAb	(II) Corn borer

Choose the correct answer from the options given below:

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

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

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

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

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

Solution: The correct matches are: (A) α-1-antitrypsin: (III) Treat emphysema.

(B) cryIAc: (IV) Cotton bollworms.

(C) Antisense RNA: (I) Meloidegyne incognitia (a nematode).

(D) cryIAb: (II) Corn borer.

Quick Tip

Transgenic products like α-1-antitrypsin are used in treating genetic disorders, while cry genes (cryIAc and cryIAb) provide resistance against specific insect pests like cotton bollworms and corn borers.

Question 49: Expand "GEAC":

(1) Genetic and Environmental Advisory Committee

(2) Gene Establishment Approval Committee

(3) Genetic Engineering Advisory Committee

(4) Genetic Engineering Approval Committee

Correct Answer: (4) Genetic Engineering Approval Committee

Solution: GEAC stands for Genetic Engineering Approval Committee, which is responsible for approving the use of genetically modified organisms (GMOs) and ensuring their safety in India.

Quick Tip

The Genetic Engineering Approval Committee (GEAC) is a regulatory body that ensures the safe use of GMOs and approves genetically engineered products in India.

Question 50: When an insect feeds on the Bt plant, the insect dies due to the conversion of inactive protein to active protein in:

(1) Alkaline pH of the gut.

(2) Acidic pH of the gut.

(3) Acidic pH of saliva.

(4) Alkaline pH of saliva.

Correct Answer: (1) Alkaline pH of the gut.

Solution: Insects die when they feed on Bt plants because the Bt toxin is converted from its inactive form to an active form in the alkaline pH of the insect's gut, where it disrupts the gut cells, causing death.

Quick Tip

Bt toxins work by converting into their active form in the alkaline conditions of the insect's gut, which leads to the death of pests like cotton bollworms and corn borers.
