

CUET Biology Question Paper 2024 Set C with Solutions

1. 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

Answer: (3) Vegetative cell and generative cell

Solution:

In pollen grains, the vegetative cell forms the pollen tube, and the generative cell divides to produce two sperm cells.

Quick Tip

Pollen grains contain a vegetative and generative cell that are essential for fertilization.

2. Match List-I with List-II:

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

Choose the correct answer from the options given below:

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

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

Solution:

- (A) Filiform apparatus guides the pollen tube into the synergid.
- (B) Tapetum nourishes the pollen grain.
- (C) Exine is made up of sporopollenin.
- (D) Funicle attaches the ovule to the placenta.

Quick Tip

Remember the function of key structures in pollen: Exine protects, tapetum nourishes, filiform guides, and funicle attaches.

3. Primary Endosperm Nucleus is the product of:

- (1) Double fusion
- (2) Triple fusion

- (3) Parthenogenesis
- (4) Apomixis

Answer: (2) Triple fusion

Solution:

The primary endosperm nucleus is formed during triple fusion when one sperm cell fuses with two polar nuclei in the embryo sac.

Quick Tip

Triple fusion results in the formation of the endosperm, which nourishes the developing embryo.

4. In humans, mammary gland is divided into ____ lobes:

- (1) 10 – 12
- (2) 25 – 30
- (3) 30 – 35
- (4) 15 – 20

Answer: (3) 30 – 35

Solution:

The human mammary gland typically has 30 to 35 lobes, which contain alveoli for milk production.

Quick Tip

Mammary glands are essential for milk production in mammals, consisting of lobes and alveoli.

5. 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

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

Solution:

The sex of the embryo is determined by whether the sperm carries an X chromosome (female) or a Y chromosome (male).

Quick Tip

Sperm determines the sex of the embryo by carrying either an X or Y chromosome.

6. 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) (B), (C), (D), (A)

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

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

Solution:

Oogenesis starts from oogonia, followed by primary oocyte, secondary oocyte, and finally the ovum.

Quick Tip

Oogenesis involves multiple stages starting from oogonia to form the mature ovum.

7. 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

Answer: (1) Pink and white flowers

Solution:

Mendel studied traits such as pod shape, flower position, and seed color, but not pink and white flowers, as he focused on different flower traits.

Quick Tip

Mendel's studies involved several pairs of contrasting traits but did not include flower color in the form of pink and white.

8. Failure of chromatids to segregate during cell division cycle results in:

- (1) Polyploidy
- (2) Euploidy
- (3) Aneuploidy
- (4) Autopolyploidy

Answer: (3) Aneuploidy

Solution:

Aneuploidy occurs when there is a failure in the segregation of chromatids during cell division, leading to an abnormal number of chromosomes.

Quick Tip

Aneuploidy is an abnormal condition where chromosomes fail to segregate properly, leading to conditions such as Down syndrome.

9. 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) $Hb^A Hb^S$: 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

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

Solution:

Sickle cell anaemia occurs in individuals with $Hb^S Hb^S$ (homozygous recessive). Individuals with $Hb^A Hb^S$ are carriers, and those with $Hb^A Hb^A$ are unaffected.

Quick Tip

Sickle cell anaemia is a genetic disorder that affects red blood cells, with carriers showing no symptoms.

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

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

Solution:

Sutton and Boveri proposed the Chromosomal Theory of Inheritance, Sturtevant mapped genes, Henking discovered the X-Body, and Griffith demonstrated transformation in bacteria.

Quick Tip

Remember key scientists and their discoveries in genetics, particularly the role of Sutton and Boveri in linking chromosomes to inheritance.

11. 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

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

Solution:

Nucleotides can be enzymatic molecules (such as ATP), and Thymine is a pyrimidine found in DNA, not RNA.

Quick Tip

Remember that Thymine is present in DNA and Uracil replaces it in RNA.

12. 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)

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

Solution:

DNA fingerprinting begins with the isolation of DNA, followed by digestion, blotting, and finally hybridisation using VNTR probes.

Quick Tip

Remember that DNA fingerprinting involves isolation, restriction digestion, blotting, and hybridisation.

13. Nucleosome is associated with _____ molecules of histones.

- (1) Four
- (2) Nine
- (3) Two
- (4) Eight

Answer: (4) Eight

Solution:

A nucleosome consists of eight histone proteins around which DNA is wrapped to

form chromatin.

Quick Tip

The "histone octamer" consists of two each of H2A, H2B, H3, and H4 histones.

14. 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)

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

Solution:

The Human Genome Project revealed that the human genome has approximately 3164.7 million base pairs, the average gene consists of around 3000 bases, and less than 2% of the genome codes for proteins.

Quick Tip

The Human Genome Project provided insights into the structure and function of the human genome, but many gene functions remain unknown.

15. Analogous structures are a result of:

- (1) Convergent evolution
- (2) Divergent evolution
- (3) Parallel evolution
- (4) Retrogressive evolution

Answer: (1) Convergent evolution

Solution:

Analogous structures are features in different organisms that are similar in function but have different evolutionary origins, caused by convergent evolution.

Quick Tip

Analogous structures evolve independently in different species that face similar environmental challenges.

16. Which of the following does *not* affect the Hardy-Weinberg equilibrium?

- (1) Natural selection
- (2) Genetic drift
- (3) Gene pool

(4) Gene migration

Answer: (3) Gene pool

Solution:

The gene pool itself represents the sum of all alleles in a population, and its existence does not affect Hardy-Weinberg equilibrium directly, but factors like natural selection and genetic drift do.

Quick Tip

Hardy-Weinberg equilibrium is affected by changes such as selection, mutation, genetic drift, and gene flow, but the gene pool's size does not disturb it on its own.

17. Which of the following primates was more like an ape?

- (1) Homo erectus
- (2) Dryopithecus
- (3) Australopithecines
- (4) Ramapithecus

Answer: (2) Dryopithecus

Solution:

Dryopithecus was an extinct genus of primates that was closely related to modern apes and was more ape-like compared to the other listed species.

Quick Tip

Dryopithecus is believed to be one of the ancestors of modern apes, while Homo erectus and Australopithecines are more human-like ancestors.

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

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

Solution:

Placental mammals such as the Anteater, Bobcat, Lemur, and Flying Squirrel have marsupial counterparts like the Tasmanian tiger cat, Spotted cuscus, Flying Phalanger, and Numbat, respectively.

Quick Tip

Many placental mammals have evolved similar counterparts in marsupials due to convergent evolution.

19. 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 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

Answer: (3) (D) only

Solution:

Pneumonia is caused by bacteria like *Streptococcus pneumoniae* and *Haemophilus influenzae*, not *Salmonella*, which causes typhoid.

Quick Tip

Always associate *Salmonella* with typhoid fever, while pneumonia is caused by different bacteria such as *Streptococcus*.

20. Match List-I with List-II:

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

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)

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

Solution:

Cytokine barriers like interferons protect against viral infections, physical barriers like mucus prevent pathogen entry, cellular barriers like phagocytosis destroy invaders, and physiological barriers include substances like tears.

Quick Tip

Barriers are the body's first line of defense against pathogens: physical barriers block entry, while cytokines, cells, and physiological mechanisms destroy invaders.

21. Smack is chemically:

- (1) Diacetyl morphine
- (2) Cocaine
- (3) Benzodiazepine
- (4) Amphetamine

Answer: (1) Diacetyl morphine

Solution:

Smack, also known as heroin, is a chemically altered form of morphine, specifically diacetyl morphine.

Quick Tip

Smack is another name for heroin, a derivative of morphine that acts as a potent opioid.

22. Antibodies are secreted by:

- (1) T-Cells
- (2) B-Cells
- (3) α -Cells
- (4) β -Cells

Answer: (2) B-Cells

Solution:

B-cells, also known as B lymphocytes, are responsible for the production of antibod-

ies, which neutralize pathogens.

Quick Tip

B-cells are the main antibody-secreting cells of the immune system, while T-cells help in recognizing infected cells.

23. 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.

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

Solution:

In sewage treatment, flocs refer to the masses of bacteria that are clumped together with fungal filaments to help in the breakdown of organic matter.

Quick Tip

Flocs play an important role in biological sewage treatment, where bacteria and fungi work together to decompose organic material.

24. Match List-I with List-II:

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

Choose the correct answer from the options given below:

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

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

Solution:

Statin is produced by *Streptococcus*, clot buster is associated with *Trichoderma*, Swiss cheese production involves *Monascus*, and Cyclosporin-A is produced by *Propionibacterium*.

Quick Tip

Products such as Statin and Cyclosporin-A are produced by microorganisms, and their associated organisms are useful for biotechnological processes.

25. The beetle used as a biocontrol agent for aphids and mosquitoes is:

- (1) *Trichoderma*
- (2) Dragonflies
- (3) Ladybird

(4) Silver fish

Answer: (3) Ladybird

Solution:

Ladybird beetles are commonly used as biocontrol agents to control aphid populations, as they are natural predators of aphids and other insect pests.

Quick Tip

Ladybirds are often used in organic farming for pest control, especially against aphids.

26. Downstream processing method involves:

- (1) Identification
- (2) Amplification
- (3) Fermentation
- (4) Purification

Answer: (4) Purification

Solution:

Downstream processing in biotechnology refers to the recovery and purification of biosynthetic products, especially pharmaceuticals, from natural sources.

Quick Tip

In downstream processing, the focus is on purification and recovery of the final product from a fermentation or biological process.

27. 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

Answer: (2) Algae – Methylase

Solution:

Methylase is not an enzyme involved in degrading algal cell walls. Instead, methylase refers to enzymes that add methyl groups to DNA or proteins.

Quick Tip

Cellulase breaks down cellulose in plant cell walls, chitinase degrades chitin in fungal cell walls, and lysozyme is involved in bacterial cell wall degradation.

28. 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)

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

Solution:

The transformation process involves treating bacterial cells with divalent cations, incubating them with rDNA, applying heat shock, placing them on ice, and finally selecting transformed cells on antibiotic plates.

Quick Tip

Transformation in bacteria involves using heat shock and divalent cations to increase the uptake of foreign DNA.

29. 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 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

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

Solution:

Fragments of DNA cannot be separated by ELISA, which is used for detecting proteins, and recombinant DNA technology does involve isolation of a desired DNA fragment.

Quick Tip

Recombinant DNA technology requires isolation of the desired DNA fragment, and ELISA is not used for separating DNA fragments.

30. 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 de-

velopment 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

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

Solution:

The GEAC (Genetic Engineering Appraisal Committee) is responsible for regulating the safety of GMOs, and transgenic animals are used for studying gene functions, especially in disease development.

Quick Tip

Transgenic animals are crucial in biomedical research for understanding gene-disease relationships, and GEAC regulates GMO safety in India.

31. Match List-I with List-II:

List-I (Transgene)	List-II (Used for/Products)
(A) α -1-antitrypsin	(I) <i>Meloidogyne incognitia</i>
(B) <i>cry1Ac</i>	(II) Corn borer
(C) Antisense RNA	(III) Treat emphysema
(D) <i>cry1Ab</i>	(IV) Cotton bollworms

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

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

Solution:

α -1-antitrypsin is used to treat emphysema, *cry1Ac* is used against the corn borer, antisense RNA is used to combat *Meloidogyne incognita*, and *cry1Ab* targets cotton bollworms.

Quick Tip

Transgenic crops like Bt cotton use genes like *cry1Ac* and *cry1Ab* to fight pests such as corn borers and cotton bollworms.

32. Expand “GEAC”:

- (1) Genetic and Environmental Advisory Committee
- (2) Gene Establishment Approval Committee
- (3) Genetic Engineering Advisory Committee
- (4) Genetic Engineering Approval Committee

Answer: (4) Genetic Engineering Approval Committee

Solution:

GEAC stands for Genetic Engineering Approval Committee, responsible for approving genetically modified organisms (GMOs) and ensuring their safe use in India.

Quick Tip

Remember that the GEAC is responsible for granting approvals for GMOs and conducting risk assessments related to their environmental and human health impacts.

33. 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.

Answer: (1) Alkaline pH of the gut

Solution:

When an insect ingests parts of a *Bt* plant, the protein from the *Bt* gene is activated in the insect's gut, where the alkaline pH triggers its insecticidal properties, leading to the insect's death.

Quick Tip

Bt crops contain a gene from *Bacillus thuringiensis*, which produces proteins that are toxic to certain insects but harmless to humans.

34. 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 species are benefitted
(D) Parasitism	(IV) One species benefits and the 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) - (III), (B) - (I), (C) - (IV), (D) - (II)
- (4) (A) - (IV), (B) - (I), (C) - (III), (D) - (II)

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

Solution:

Commensalism involves one species benefiting while the other remains unaffected. Mutualism involves both species benefiting. Amensalism involves one species being harmed, and parasitism involves one species benefiting at the expense of the other.

Quick Tip

Understanding different ecological relationships is important for studying biodiversity and species interactions in ecosystems.

35. 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

Answer: (3) Stable

Solution:

A stable population indicates that the number of young and mature individuals is balanced, with the population size remaining relatively constant over time.

Quick Tip

Population growth patterns can be categorized as expanding, declining, stable, or exhibiting an S-shaped (logistic) curve.

36. 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.

Answer: (2) resource partitioning

Solution:

The Competitive Exclusion Principle states that two species competing for the same resources cannot stably coexist, but resource partitioning allows them to coexist by utilizing different parts of the same resource.

Quick Tip

Resource partitioning is an essential concept in ecology, enabling multiple species to share a habitat by using resources differently.

37. 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.

Answer: (4) organic and inorganic nutrients from detritus

Solution:

Mineralisation is a process where microorganisms decompose organic matter into simpler inorganic forms, releasing both organic and inorganic nutrients from detritus.

Quick Tip

Mineralisation is crucial for recycling nutrients in ecosystems, making them available for primary producers.

38. In which ecosystem is the biomass of primary consumers greater than producers?

- (1) Forests

- (2) Grassland
- (3) Desert
- (4) Sea

Answer: (4) Sea

Solution:

In aquatic ecosystems like seas, the biomass of primary consumers (e.g., zooplankton) often exceeds that of producers (e.g., phytoplankton), because the turnover rate of phytoplankton is much faster than that of consumers.

Quick Tip

In marine ecosystems, phytoplankton reproduce rapidly, leading to a lower standing biomass compared to primary consumers like zooplankton.

39. 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

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

Solution:

Decomposition rate depends on the chemical composition of detritus, and humification (formation of humus) follows mineralisation during the decomposition process.

Quick Tip

Decomposition is influenced by environmental factors and the chemical nature of the detritus, leading to nutrient cycling in ecosystems.

40. 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) - (III), (D) - (II)

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

Solution:

In ecology, standing crop refers to the mass of living organisms, while net primary productivity is the rate at which plants accumulate biomass minus the energy they use.

Quick Tip

Standing state refers to the total available biomass, while net primary productivity focuses on the growth rate of producers.

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.

41. Which of the following is *not* a Sexually Transmitted Disease?

- (1) Chlamydiasis
- (2) Filariasis
- (3) Genital herpes
- (4) Trichomoniasis

Answer: (2) Filariasis

Solution:

Filariasis is a parasitic disease spread by mosquitoes, not a sexually transmitted disease, while the other options are sexually transmitted diseases (STDs).

Quick Tip

STDs include Chlamydia, Herpes, and Trichomoniasis, but Filariasis is a mosquito-borne disease.

42. 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.

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

Solution:

The percentage of global pregnancies undergoing Medical Termination (abortion) is lower than 20%, making this statement incorrect, while the other statements are factual.

Quick Tip

Medical Termination of Pregnancy (MTP) is legal under specific conditions in many countries, including India, and is considered safest in the first trimester.

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44. Which of the following methods of contraception is *not* meant for females?

- (1) IUDs
- (2) Lactational amenorrhea
- (3) Vasectomy
- (4) Condoms

Answer: (3) Vasectomy

Solution:

A vasectomy is a form of male sterilization, while the other methods listed are used by females.

Quick Tip

Vasectomy is a permanent contraceptive method for men, involving the cutting or sealing of the vas deferens.

45. ‘Saheli’ – an oral contraceptive pill, also known as the ‘Once a week’ pill, was developed by:

- (1) AIIMS
- (2) NBRI
- (3) CDRI
- (4) NBPGR

Answer: (3) CDRI

Solution:

‘Saheli’, a non-steroidal oral contraceptive, was developed by the Central Drug Research Institute (CDRI), India. It is known for being taken once a week.

Quick Tip

‘Saheli’ is a popular contraceptive option in India due to its non-hormonal nature and weekly dosage.

Read the passage carefully and give the answer 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 less 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.

46. 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.

Answer: (3)

Solution:

In stable biological communities, different species play distinct roles, but some species may be more critical to ecosystem function than others. Stability comes from resilience to disturbances, not equal dependence on every species.

Quick Tip

Stable biological communities are resilient to changes and do not rely equally on all species.

47. In 'rivet popper hypothesis' the 'rivet' signifies:

- (1) Key species
- (2) Endemic species
- (3) Community
- (4) Species

Answer: (1)

Solution:

The 'rivet popper hypothesis' was proposed by Paul Ehrlich. It suggests that species in an ecosystem are like rivets in an airplane. Losing a few rivets (species) may not immediately cause a disaster, but continued loss will eventually result in ecosystem collapse.

Quick Tip

Key species play critical roles in the functioning and stability of ecosystems.

48. 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

Answer: (2)

Solution:

David Tilman conducted experiments demonstrating that ecosystems with greater species richness tend to be more stable and productive. His work shows that biodiversity is essential for the resilience of ecosystems.

Quick Tip

David Tilman conducted experiments showing that ecosystems with higher species diversity are more stable.

49. Among the vertebrates, which of the following is the most species-rich group?

- (1) Reptiles
- (2) Fishes
- (3) Insects
- (4) Mammals

Answer: (2)

Solution:

Fishes are the most diverse group of vertebrates, with more than 32,000 known species. This makes them the most species-rich vertebrate group.

Quick Tip

Fishes are the most diverse group of vertebrates, with thousands of species inhabiting various aquatic environments.

50. The following are the various hypotheses proposed in explaining the greatest biological diversity in 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.

Answer: (1)

Solution:

The tropical latitudes did not undergo extensive glaciations like temperate zones, and the continuous climate of the tropics is favorable for species richness. The exception is the statement that glaciation impacts tropical diversity.

Quick Tip

Tropical regions exhibit high biodiversity due to favorable climate, constant environmental conditions, and energy availability.