# Rajasthan JET Biology Sample Paper-9

**Duration: 40 Minutes** **Maximum Marks: 160**

## Instructions

- This paper contains **40** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries: **−1 marks**.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

**Q1.** A flowering plant specimen shows a papilionaceous corolla, stamens arranged as (9) + 1, a superior monocarpellary ovary, and marginal placentation. Which family is most strongly indicated by this combination?

(A) Brassicaceae

(B) Fabaceae

(C) Liliaceae

(D) Malvaceae

**Q2.** During PCR, the reaction mixture is heated repeatedly to separate DNA strands. Which feature allows the same enzyme to extend primers in cycle after cycle without being replaced each time?

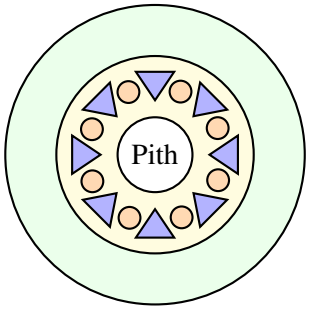
(A) Taq polymerase is heat-stable and remains active after denaturation temperatures

(B) DNA ligase seals every primer before extension begins

(C) Restriction endonuclease protects primers from heat damage

(D) Reverse transcriptase converts each amplified strand into RNA

**Q3.** The following simplified transverse section of a root stele shows many xylem patches arranged around a large central pith. Which identification is most appropriate?




Root stele with polyarch xylem

(A) Dicot root with tetrarch xylem and almost no pith

(B) Monocot root with polyarch xylem and a large pith

(C) Dicot stem with vascular bundles in a ring

(D) Monocot leaf with bulliform cells

**Q4.** On a newly formed sand dune, the first stabilizing plants are small grasses and herbs. After several years, shrubs begin to establish as soil organic matter increases. This pattern is best described as:

(A) hydrarch succession beginning in deep water

(B) xerarch succession with pioneer plants improving the dry habitat

(C) secondary succession after a mature forest is cut

(D) cyclic succession in which the same community repeats without habitat change

**Q5.** In Rajasthan, isabgol is valued as a medicinal crop. The commercial husk used as a bulk-forming laxative is obtained mainly from:

(A) seed coat of *Plantago ovata*

(B) latex of *Papaver somniferum*

(C) bark of *Cinchona* species

(D) dried rhizome of *Zingiber officinale*

**Q6.** A tall pea plant of unknown genotype is crossed with a dwarf plant. Out of 80 progeny, 39 are tall and 41 are dwarf. What is the most likely genotype of the tall parent?

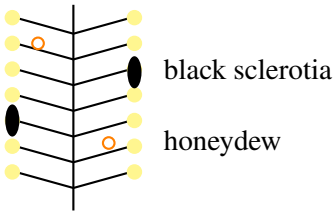
(A) $TT$

(B) $Tt$

(C) $tt$

(D) Cannot be determined from this cross

**Q7.** A pearl millet earhead shows sticky honeydew droplets at flowering and later dark sclerotial bodies replacing some grains, as suggested below. Which pathogen is responsible?




Diseased pearl millet earhead

(A) *Sclerospora graminicola*

(B) *Claviceps fusiformis*

(C) *Puccinia graminis*

(D) *Ustilago tritici*

**Q8.** In a maize leaf, the first stable product of carbon dioxide fixation in mesophyll cells is a four-carbon acid. Which compound is formed first?

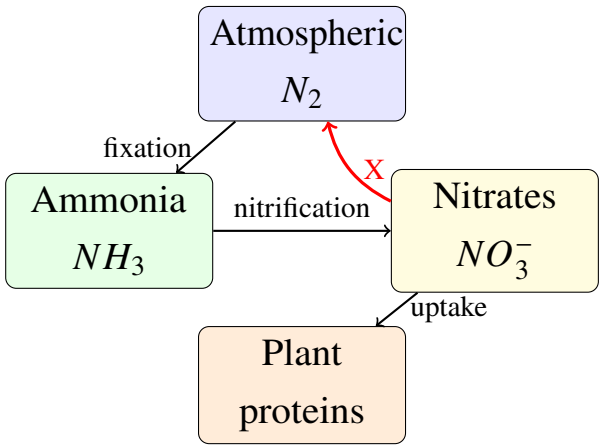
(A) 3-phosphoglyceric acid

(B) Oxaloacetic acid

(C) Ribulose-1,5-bisphosphate

(D) Glucose

**Q9.** In the simplified nitrogen cycle below, the arrow marked X shows conversion of soil nitrates back into atmospheric nitrogen. Which process is represented by X?




(A) Ammonification

(B) Nitrification

(C) Denitrification

(D) Nitrogen assimilation

**Q10.** During meiosis, homologous chromosomes move to opposite poles while sister chromatids remain attached at their centromeres. The stage described is:

(A) Metaphase I

(B) Anaphase I

(C) Anaphase II

(D) Telophase II

**Q11.** Mustard is an important oilseed crop. In the mature seed of mustard, most reserve oil is stored in the:

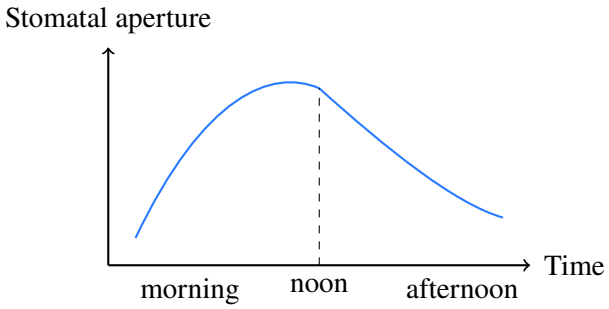
(A) cotyledons

(B) seed coat

(C) pericarp

(D) long persistent endosperm

**Q12.** The graph shows a common response of stomatal aperture in an arid-field plant during a hot sunny day. What best explains the decline after noon?




(A) Water stress increases abscisic acid, reducing guard-cell turgor

(B) Carbon dioxide becomes unlimited, so stomata must close completely

(C) Root pressure becomes the main force for transpiration pull

(D) Guard cells lose all chloroplasts after noon

**Q13.** In plant genetic transformation, the naturally occurring system that transfers T-DNA into a plant genome is associated with:

(A) F plasmid of *Escherichia coli*

(B) Ti plasmid of *Agrobacterium tumefaciens*

(C) capsid protein of tobacco mosaic virus

(D) plasmodesmata of companion cells

**Q14.** In a mature angiosperm embryo sac, which pair of cells lies near the egg cell and helps guide the pollen tube toward the egg apparatus?

(A) Antipodal cells

(B) Synergids

(C) Polar nuclei

(D) Megaspore mother cells

**Q15.** In a pond ecosystem, the pyramid of biomass may be inverted even though energy flow remains upright. The main reason is that phytoplankton:

(A) are absent at the producer level

(B) live longer than fishes and accumulate more standing biomass

(C) have a small standing crop but reproduce and turn over rapidly

(D) convert animal proteins directly into sunlight

**Q16.** A molecule structurally similar to an enzyme substrate slows the reaction, but the inhibition is largely overcome when substrate concentration is increased. The inhibition is best described as:

(A) non-competitive inhibition

(B) competitive inhibition

(C) irreversible enzyme destruction

(D) feedback activation

**Q17.** In a rabi field, chickpea plants show yellowing, drooping, and brown discoloration of vascular tissue near the root and lower stem. Which disease is most consistent with these symptoms?

(A) Ascochyta blight

(B) Fusarium wilt

(C) Downy mildew

(D) Loose smut

**Q18.** In wheat, florets are sessile and arranged in small spikelets along an elongated central axis. The inflorescence is best described as:

(A) simple raceme

(B) spike of spikelets

(C) scorpioid cyme

(D) capitulum

**Q19.** Guar or cluster bean is economically important because of guar gum. This gum is obtained chiefly from the:

(A) endosperm of seeds

(B) cotton-like seed hairs

(C) woody stem fibers

(D) latex canals of leaves

**Q20.** Meristem culture is often preferred for producing virus-free plantlets because the shoot apical meristem generally:

(A) contains mature phloem loaded with viral particles

(B) has no dividing cells, so viruses cannot survive

(C) has very low virus concentration due to rapid division and poor vascular connection

(D) converts every viral genome into harmless starch

**Q21.** During aerobic respiration, which stored food generally gives a respiratory quotient close to 0.7?

(A) Glucose

(B) Sucrose

(C) Fats

(D) Organic acids

**Q22.** Protection of birds and wetland biodiversity inside Keoladeo National Park is an example of:

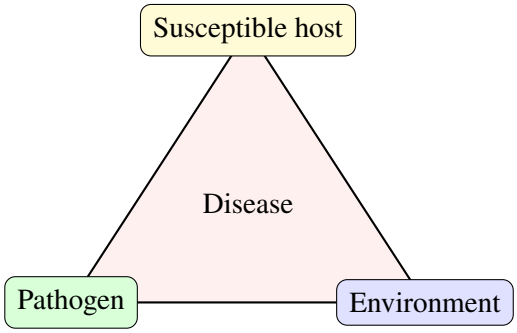
(A) in situ conservation

(B) ex situ conservation in a botanical garden

(C) cryopreservation only

(D) artificial selection in farms

**Q23.** The disease triangle shows that a plant disease becomes severe when a susceptible host, a virulent pathogen, and a favourable environment occur together. Which practice directly removes the susceptible-host corner for wheat rust management?




(A) Growing a rust-resistant wheat variety

(B) Applying excess nitrogen to produce soft growth

(C) Growing wheat continuously in the same field

(D) Irrigating at night to maintain leaf wetness

**Q24.** Root hair cells absorb nitrate ions from soil solution even when the nitrate concentration inside the cell is higher than outside. This uptake mainly requires:

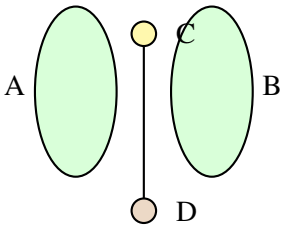
(A) diffusion through the waxy cuticle without energy

(B) ATP-driven carrier transport across the plasma membrane

(C) movement only through open stomata

(D) conversion of nitrate into cellulose outside the root

**Q25.** The simplified dicot embryo below has two cotyledons and an embryonic axis. Which label represents the plumule, the embryonic shoot apex?




Dicot embryo

(A) A

(B) B

(C) C

(D) D

**Q26.** An aquatic, diploblastic animal shows eight external rows of comb plates used in locomotion and is commonly bioluminescent. It belongs to:

(A) Porifera

(B) Ctenophora

(C) Annelida

(D) Echinodermata

**Q27.** Deep summer ploughing helps reduce red hairy caterpillar infestation in groundnut and other crops mainly because it:

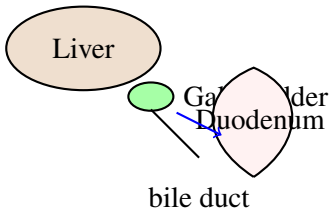
(A) increases sugar content of leaves

(B) kills only adult moths flying above the crop

(C) exposes soil-borne pupae to heat and natural enemies

(D) converts the larvae into beneficial pollinators

**Q28.** The diagram shows bile entering the small intestine from the liver-gall bladder region. What is the main digestive role of bile salts?




(A) It emulsifies fats and increases surface area for lipase action

(B) It directly converts proteins into amino acids

(C) It changes starch into maltose in the stomach

(D) It destroys all vitamins before absorption

**Q29.** In earthworm, the dorsal blood vessel is contractile and generally carries blood:

(A) from anterior to posterior only

(B) from posterior to anterior

(C) only from the intestine to the skin without direction

(D) only inside closed capillaries of the brain

**Q30.** Field sanitation helps in termite management because termites mainly attack crops by feeding on:

(A) cellulose-rich residues and underground plant parts

(B) only nectar inside flowers

(C) only chlorophyll in green leaves during noon

(D) only pollen grains carried by wind

**Q31.** The cobalt-containing vitamin required for normal red blood cell maturation and nerve function is:

(A) Vitamin A

(B) Vitamin $B_1$

(C) Vitamin $B_{12}$

(D) Vitamin K

**Q32.** Which statement best identifies the open circulatory system of cockroach?

(A) Blood always remains inside arteries, veins, and capillaries only

(B) Hemolymph directly bathes organs in body sinuses

(C) Red blood cells transport oxygen from lungs to tissues

(D) The heart is absent and all transport occurs by diffusion only

**Q33.** Release of *Trichogramma chilonis* in crop fields helps suppress lepidopteran pests mainly because this insect:

(A) parasitizes pest eggs before larvae hatch

(B) feeds only on crop roots

(C) acts as a fungal pathogen of weeds

(D) converts pesticide residues into fertilizer

**Q34.** In an animal nutrition experiment, 6 molecules of oxygen are consumed and 6 molecules of carbon dioxide are released during oxidation of a food substrate. The respiratory quotient is:

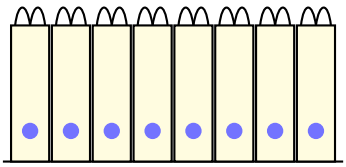
(A) 0.5

(B) 1.0

(C) 1.5

(D) 2.0

**Q35.** The tissue sketched below has tall cells, nuclei placed toward the base, and hair-like projections on the free surface. Identify the tissue.



Epithelial tissue

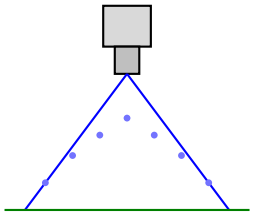
(A) Squamous epithelium

(B) Ciliated columnar epithelium

(C) Adipose tissue

(D) Cartilage

**Q36.** For insecticide or fungicide application on a vegetable canopy, a nozzle producing a fine cone-shaped spray is commonly preferred. Which nozzle type is indicated?



cone spray pattern

(A) Flat-fan nozzle only

(B) Hollow-cone nozzle

(C) Solid stream nozzle only

(D) Flood jet nozzle only

**Q37.** Which of the following amino acids is essential in the human diet and therefore must be supplied through food?

(A) Alanine

(B) Glycine

(C) Lysine

(D) Serine

**Q38.** In freshwater *Amoeba*, the contractile vacuole is especially active because it:

(A) digests bacteria inside food vacuoles

(B) expels excess water entering the cell by osmosis

(C) stores glycogen for winter dormancy

(D) forms a permanent shell around the cell

**Q39.** In the life cycle of the liver fluke, the stage that commonly infects grazing animals after being attached to aquatic vegetation is:

(A) miracidium

(B) redia

(C) metacercaria

(D) oncosphere

**Q40.** A child has edema, fatty liver, poor growth, and very low dietary protein intake, while total calorie intake is not extremely low. The condition is most likely:

(A) Kwashiorkor

(B) Marasmus

(C) Scurvy

(D) Rickets

## Detailed Solutions

# Q1.

## Solution

**Concept:**

Plant families are identified by a group of floral characters rather than by a single feature. In Fabaceae, the flower is usually zygomorphic, the corolla is papilionaceous, the androecium is commonly diadelphous with (9) + 1 stamens, and the gynoecium is monocarpellary with marginal placentation. These characters are especially useful in agricultural botany because many pulses and fodder crops belong to this family.

**Solution:**

(a) **Step 1:** The given corolla is papilionaceous. This means the petals are arranged as standard, wings, and keel, which is a characteristic floral pattern of Fabaceae.

(b) **Step 2:** The stamens are arranged as (9) + 1. Nine stamens are fused and one remains free, giving a diadelphous condition.

(c) **Step 3:** A superior monocarpellary ovary with marginal placentation also matches Fabaceae because the ovary is formed from a single carpel and ovules arise along one margin.

(d) **Step 4:** Brassicaceae has tetradynamous stamens, Liliaceae is usually trimerous, and Malvaceae has a monadelphous staminal tube. These do not fit the given combination.

(e) **Step 5:** Therefore, the specimen is best placed in Fabaceae.

**Final Answer:** Fabaceae

**Answer: (B)**

Go Back to Question 1

## Q2.

### Solution

**Concept:**

Polymerase chain reaction is a cyclic DNA amplification method. Each cycle includes denaturation, primer annealing, and primer extension. Since denaturation is carried out at a high temperature, an ordinary DNA polymerase would be inactivated. PCR therefore uses a thermostable DNA polymerase, commonly Taq polymerase, obtained from the thermophilic bacterium *Thermus aquaticus*.

**Solution:**

(a) **Step 1:** In PCR, the double-stranded DNA is first heated so that the two strands separate.

(b) **Step 2:** After cooling, primers bind to complementary sequences on the separated DNA strands.

(c) **Step 3:** DNA polymerase then extends the primers by adding nucleotides in the $5' \rightarrow 3'$ direction.

(d) **Step 4:** The high-temperature denaturation step is repeated many times. A normal enzyme would lose its shape and activity under such heat.

(e) **Step 5:** Taq polymerase is thermostable, so it survives repeated heating and continues extending primers in later cycles.

(f) **Step 6:** DNA ligase, restriction enzymes, and reverse transcriptase have different roles and do not explain repeated primer extension in PCR.

**Final Answer:** Taq polymerase is heat-stable

**Answer: (A)**

Go Back to Question 2

## Q3.

### Solution

**Concept:**

Root anatomy helps distinguish monocots from dicots. Dicot roots commonly have fewer xylem arms, such as diarch, triarch, tetrarch, or pentarch conditions, and the central pith is generally small or absent. Monocot roots usually show a polyarch xylem condition, meaning many xylem groups are present, and a large central pith is usually distinct.

**Solution:**

(a) **Step 1:** The diagram shows many xylem patches distributed around the centre. This rules out a typical dicot root with only a few xylem arms.

(b) **Step 2:** The presence of a prominent central pith is another important clue. A large pith is a common feature of monocot roots.

(c) **Step 3:** In a dicot stem, vascular bundles are arranged in a ring and contain cambium, but the diagram represents a radial arrangement inside a root stele.

(d) **Step 4:** A monocot leaf would show epidermis, mesophyll, veins, and bulliform cells. Those structures are not shown here.

(e) **Step 5:** Combining the polyarch xylem and large pith, the section is best identified as a monocot root.

**Final Answer:** Monocot root with polyarch xylem

**Answer: (B)**

Go Back to Question 3

## Q4.

### Solution

**Concept:**

Ecological succession is the gradual and directional change in species composition of a community over time. When succession begins in a very dry habitat such as bare rock or sand, it is called xerarch succession. Pioneer organisms modify the environment by trapping particles, adding organic matter, and reducing extremes, making the habitat suitable for later species.

**Solution:**

(a) **Step 1:** The habitat mentioned in the question is a newly formed sand dune, which is dry and poor in organic matter.

(b) **Step 2:** Small grasses and herbs act as pioneer or early colonizing plants because they can tolerate water stress and help bind the sand.

(c) **Step 3:** As these plants die and decompose, organic matter increases and the soil becomes more stable.

(d) **Step 4:** Shrubs can then establish because the earlier plants have improved the physical and chemical conditions of the habitat.

(e) **Step 5:** This is not hydrarch succession because it does not start in water. It is also not secondary succession because the question describes a newly formed habitat.

**Final Answer:** Xerarch succession

**Answer: (B)**

Go Back to Question 4

## Q5.

### Solution

**Concept:**

Economic botany studies plants and plant products useful to humans. Isabgol, botanically known as *Plantago ovata*, is an important medicinal and commercial crop. Its seed husk contains mucilage that swells in water and is used as a bulk-forming laxative.

**Solution:**

(a) **Step 1:** The question asks about isabgol, which is obtained from *Plantago ovata*.

(b) **Step 2:** The useful commercial part is the husk surrounding the seed. This husk is rich in mucilage.

(c) **Step 3:** When the husk absorbs water, it swells and increases the bulk of intestinal contents, helping bowel movement.

(d) **Step 4:** Latex of *Papaver* gives opium, bark of *Cinchona* is associated with alkaloids, and ginger rhizome is used as a spice and medicinal rhizome. These are not isabgol husk.

(e) **Step 5:** Therefore, the correct source is the seed coat or husk of *Plantago ovata*.

**Final Answer:** Seed coat of Plantago ovata

**Answer: (A)**

Go Back to Question 5

## Q6.

### Solution

**Concept:**

A test cross is used to determine the genotype of an organism showing a dominant phenotype. The dominant individual is crossed with a homozygous recessive individual. If the dominant parent is homozygous, all progeny show the dominant trait. If it is heterozygous, the progeny are expected to appear in an approximate $1:1$ phenotypic ratio.

**Solution:**

(a) **Step 1:** Tallness is dominant over dwarfness, so the dwarf parent must have genotype $tt$.

(b) **Step 2:** The tall parent may be either $TT$ or $Tt$. The cross result helps distinguish between these two possibilities.

(c) **Step 3:** If the tall parent were $TT$, the cross $TT \times tt$ would produce all $Tt$ offspring, so all progeny would be tall.

(d) **Step 4:** The observed progeny are 39 tall and 41 dwarf, which is very close to a $1:1$ ratio.

(e) **Step 5:** A $1:1$ tall to dwarf ratio is expected from $Tt \times tt$ because the heterozygous parent produces $T$ and $t$ gametes in equal proportion.

(f) **Step 6:** Hence, the tall parent is heterozygous.

**Final Answer:** $\boxed{Tt}$

**Answer: (B)**

Go Back to Question 6

## Q7.

### Solution

**Concept:**

Plant diseases are often recognized by characteristic symptoms and signs. Ergot of pearl millet is a seed replacement disease. At the flowering stage, infected florets may exude sugary honeydew droplets, and later the grains are replaced by hard dark sclerotia. The causal organism is *Claviceps fusiformis*.

**Solution:**

(a) **Step 1:** The crop mentioned is pearl millet, an important crop in dry regions including Rajasthan.

(b) **Step 2:** The symptom of honeydew at flowering is a strong clue because ergot infection produces sticky exudates from infected florets.

(c) **Step 3:** The later appearance of dark sclerotia replacing grains is another diagnostic feature of ergot disease.

(d) **Step 4:** *Sclerospora graminicola* causes downy mildew of pearl millet, not ergot. *Puccinia graminis* is linked with stem rust, and *Ustilago tritici* is a smut pathogen of wheat.

(e) **Step 5:** Therefore, the pathogen is *Claviceps fusiformis*.

**Final Answer:** *Claviceps fusiformis*

**Answer: (B)**

Go Back to Question 7

## Q8.

### Solution

**Concept:**

Maize is a $C_4$ plant. In $C_4$ photosynthesis, atmospheric carbon dioxide is first fixed in mesophyll cells by phosphoenolpyruvate carboxylase. The first stable product is a four-carbon compound, commonly oxaloacetic acid, which may later be converted into malate or aspartate and transported to bundle sheath cells.

**Solution:**

(a) **Step 1:** The question states that the plant is maize, which shows $C_4$ photosynthesis and Kranz anatomy.

(b) **Step 2:** In the mesophyll cell, phosphoenolpyruvate combines with carbon dioxide in the presence of PEP carboxylase.

(c) **Step 3:** This reaction forms oxaloacetic acid, a four-carbon compound, as the first stable product.

(d) **Step 4:** 3-phosphoglyceric acid is the first stable product in the $C_3$ pathway, not the $C_4$ pathway.

(e) **Step 5:** Ribulose-1,5-bisphosphate is the carbon dioxide acceptor in the Calvin cycle, and glucose is a later product of photosynthesis.

(f) **Step 6:** Hence, the correct option is oxaloacetic acid.

**Final Answer:** Oxaloacetic acid

**Answer: (B)**

Go Back to Question 8

## Q9.

### Solution

**Concept:**

The nitrogen cycle includes several microbial transformations. Nitrogen fixation converts atmospheric nitrogen into ammonia or related compounds. Nitrification converts ammonia into nitrites and nitrates. Denitrification reduces nitrates back to atmospheric nitrogen, especially under oxygen-poor soil conditions.

**Solution:**

(a) **Step 1:** The arrow X begins at soil nitrates, shown as $NO_3^-$.

(b) **Step 2:** The arrow ends at atmospheric $N_2$.

(c) **Step 3:** The process converting nitrates into nitrogen gas is denitrification.

(d) **Step 4:** Ammonification forms ammonia from organic nitrogen, so it does not match the direction of X.

(e) **Step 5:** Nitrification changes ammonia to nitrite and nitrate, which is the opposite part of the cycle.

(f) **Step 6:** Assimilation is the uptake of nitrates by plants to make organic nitrogen compounds.

**Final Answer:** Denitrification

**Answer: (C)**

Go Back to Question 9

## Q10.

### Solution

**Concept:**

Meiosis reduces chromosome number by separating homologous chromosomes in the first division and sister chromatids in the second division. The key difference between anaphase I and anaphase II is that centromeres do not split in anaphase I, but they split in anaphase II.

**Solution:**

(a) **Step 1:** The question states that homologous chromosomes move to opposite poles.

(b) **Step 2:** Separation of homologous chromosomes occurs in meiosis I, not meiosis II.

(c) **Step 3:** The sister chromatids remain attached at their centromeres. This confirms that centromeres have not divided.

(d) **Step 4:** In anaphase II, sister chromatids separate because the centromeres divide. That does not match the question.

(e) **Step 5:** Metaphase I is the stage of alignment at the equator, and telophase II is after chromatid separation.

(f) **Step 6:** Therefore, the described stage is anaphase I.

**Final Answer:** Anaphase I

**Answer: (B)**

Go Back to Question 10

## Q11.

### Solution

**Concept:**

Seeds may be albuminous or exalbuminous depending on whether endosperm persists at maturity. Mustard belongs to Brassicaceae and has exalbuminous seeds. In such seeds, food reserves are mainly stored in the embryo, especially the cotyledons.

**Solution:**

(a) **Step 1:** Mustard seed is rich in oil and is used as an oilseed.

(b) **Step 2:** In mustard, the mature seed has little or no persistent endosperm.

(c) **Step 3:** The reserve food is transferred to the embryo during seed development.

(d) **Step 4:** The cotyledons of the embryo become thick and store oil and other reserve materials.

(e) **Step 5:** The seed coat protects the seed, the pericarp is fruit wall tissue, and a long persistent endosperm is not typical for mature mustard seed.

**Final Answer:** Cotyledons

**Answer: (A)**

Go Back to Question 11

## Q12.

### Solution

**Concept:**

Stomata regulate the balance between carbon dioxide entry and water loss. In hot and dry conditions, plants may show midday depression of stomatal opening. Water stress increases abscisic acid, which causes ion efflux from guard cells, lowers guard-cell turgor, and reduces stomatal aperture.

**Solution:**

(a) **Step 1:** The graph rises in the morning, meaning stomata open when light becomes available for photosynthesis.

(b) **Step 2:** After noon, temperature and evaporative demand are high. The plant begins losing water rapidly.

(c) **Step 3:** Under water stress, abscisic acid concentration increases in leaves.

(d) **Step 4:** Abscisic acid causes guard cells to lose ions such as potassium ions. Water then leaves the guard cells by osmosis.

(e) **Step 5:** Loss of guard-cell turgor narrows the stomatal pore, reducing further water loss.

(f) **Step 6:** The other options either ignore water stress or state incorrect facts about guard cells.

**Final Answer:** ABA-mediated stomatal closure

**Answer: (A)**

Go Back to Question 12

## Q13.

### Solution

**Concept:**

*Agrobacterium tumefaciens* is a soil bacterium that naturally causes crown gall disease in plants. It carries a Ti plasmid, and a segment of this plasmid called T-DNA can be transferred into plant cells. Biotechnology uses this natural transfer system after removing disease-causing genes and inserting useful genes.

**Solution:**

(a) **Step 1:** The question asks about a system that transfers DNA into the plant genome.

(b) **Step 2:** *Agrobacterium tumefaciens* has a tumor-inducing plasmid, called the Ti plasmid.

(c) **Step 3:** The T-DNA region of this plasmid can integrate into plant nuclear DNA.

(d) **Step 4:** In genetic engineering, the unwanted tumor-forming genes are removed and replaced with desired genes.

(e) **Step 5:** F plasmid is related to bacterial conjugation, viral capsid proteins package viral genomes, and plasmodesmata are plant cell connections. None of these describes T-DNA transfer.

**Final Answer:** Ti plasmid of Agrobacterium

**Answer: (B)**

Go Back to Question 13

## Q14.

### Solution

**Concept:**

The typical angiosperm female gametophyte is seven-celled and eight-nucleate. It has an egg apparatus at the micropylar end, consisting of one egg cell and two synergids. Synergids have a filiform apparatus that helps attract and guide the pollen tube.

**Solution:**

(a) **Step 1:** The question asks for the cells located near the egg cell.

(b) **Step 2:** The egg apparatus consists of one egg cell and two synergids at the micropylar end.

(c) **Step 3:** Synergids possess specialized wall thickenings called the filiform apparatus.

(d) **Step 4:** The filiform apparatus helps in pollen tube guidance and reception.

(e) **Step 5:** Antipodal cells are at the chalazal end, polar nuclei are in the central cell, and the megaspore mother cell is a pre-meiotic cell, not part of the mature embryo sac.

**Final Answer:** Synergids

**Answer: (B)**

Go Back to Question 14

## Q15.

### Solution

**Concept:**

Ecological pyramids can represent number, biomass, or energy. The pyramid of energy is always upright because energy is lost at every transfer. The pyramid of biomass can be inverted in aquatic ecosystems because producers such as phytoplankton have a small standing biomass at a given moment but a very high rate of reproduction.

**Solution:**

(a) **Step 1:** The question specifically refers to a pond ecosystem, where microscopic phytoplankton are the main producers.

(b) **Step 2:** At any one time, the standing biomass of phytoplankton may be lower than that of consumers such as zooplankton and small fish.

(c) **Step 3:** This does not mean productivity is low. Phytoplankton divide rapidly and replace themselves quickly.

(d) **Step 4:** Because of this rapid turnover, a small producer biomass can support a larger consumer biomass.

(e) **Step 5:** Energy flow is still upright because energy is lost as heat and metabolic work at each trophic transfer.

**Final Answer:** Small standing crop with rapid turnover

**Answer: (C)**

Go Back to Question 15

## Q16.

### Solution

**Concept:**

Competitive inhibition occurs when an inhibitor resembles the normal substrate and competes for the active site of an enzyme. Because the inhibitor and substrate compete for the same site, increasing substrate concentration can reduce the effect of the inhibitor. This is a classic feature used to identify competitive inhibition.

**Solution:**

(a) **Step 1:** The inhibitor is described as structurally similar to the substrate.

(b) **Step 2:** A substrate-like molecule can fit into the enzyme active site and block access of the actual substrate.

(c) **Step 3:** When more substrate is added, the actual substrate has a better chance of occupying the active site.

(d) **Step 4:** This is why the inhibition can be overcome by increasing substrate concentration.

(e) **Step 5:** In non-competitive inhibition, the inhibitor usually binds away from the active site, and increasing substrate does not fully overcome the inhibition.

(f) **Step 6:** Therefore, the situation represents competitive inhibition.

**Final Answer:** Competitive inhibition

**Answer: (B)**

Go Back to Question 16

## Q17.

### Solution

**Concept:**

Vascular wilt diseases disturb water transport by invading xylem tissue. In chickpea, Fusarium wilt is a major disease that causes yellowing, drooping, root discoloration, and browning of vascular tissues. Recognizing vascular browning is important because it separates wilt from leaf spot or surface mildew diseases.

**Solution:**

(a) **Step 1:** The crop is chickpea, a major rabi pulse crop.

(b) **Step 2:** The key symptom is brown discoloration inside vascular tissue near the root and lower stem.

(c) **Step 3:** Vascular browning indicates blockage and infection of xylem elements.

(d) **Step 4:** Fusarium wilt of chickpea, caused by *Fusarium oxysporum* f. sp. *ciceris*, produces these symptoms.

(e) **Step 5:** Ascochyta blight mainly causes leaf, stem, and pod lesions; downy mildew produces downy growth; loose smut is associated with cereal ears.

(f) **Step 6:** Hence, the disease is Fusarium wilt.

**Final Answer:** Fusarium wilt

**Answer: (B)**

Go Back to Question 17

## Q18.

### Solution

**Concept:**

Inflorescence refers to the arrangement of flowers on the floral axis. In grasses such as wheat, the basic floral unit is a spikelet. These spikelets are arranged along the main axis without distinct stalks, giving a spike-like arrangement. Therefore, wheat is described as having a spike of spikelets.

**Solution:**

(a) **Step 1:** The question mentions wheat, which belongs to the grass family Poaceae.

(b) **Step 2:** In Poaceae, individual florets are organized into spikelets.

(c) **Step 3:** In wheat, these spikelets are arranged along an elongated central axis.

(d) **Step 4:** Because the spikelets are essentially sessile on the main axis, the whole inflorescence is a spike of spikelets.

(e) **Step 5:** A raceme has stalked flowers, a cyme has determinate branching, and a capitulum is a head-like inflorescence found in Asteraceae.

**Final Answer:** Spike of spikelets

**Answer: (B)**

Go Back to Question 18

## Q19.

### Solution

**Concept:**

Cluster bean, or guar, is an important crop in arid and semi-arid regions. Its seeds contain a galactomannan-rich endosperm. Guar gum extracted from this endosperm is widely used as a thickener and stabilizer in food, textile, paper, and oil industries.

**Solution:**

(a) **Step 1:** The crop named in the question is guar, also called cluster bean.

(b) **Step 2:** The valuable product is guar gum, which is not obtained from fibers or latex.

(c) **Step 3:** Guar seeds contain a hard endosperm rich in galactomannan.

(d) **Step 4:** Industrial processing separates this endosperm and extracts the gum.

(e) **Step 5:** Therefore, the commercial source of guar gum is the seed endosperm.

**Final Answer:** Seed endosperm

**Answer: (A)**

Go Back to Question 19

## Q20.

### Solution

**Concept:**

Plant tissue culture can be used to produce healthy planting material. Viruses often spread through vascular tissues, especially phloem. The shoot apical meristem is a small actively dividing region with limited vascular differentiation, so virus concentration there is usually very low. Culturing this region can produce virus-free plantlets.

**Solution:**

(a) **Step 1:** Meristem culture uses a small shoot tip or apical meristem as the explant.

(b) **Step 2:** Viruses move inside plants mainly through living tissues and vascular connections.

(c) **Step 3:** The apical meristem has rapidly dividing cells and is poorly connected to mature vascular tissue.

(d) **Step 4:** Because of this, virus concentration in the meristem is often very low or absent.

(e) **Step 5:** When this region is cultured under aseptic conditions, it can regenerate plantlets that are free from the virus.

(f) **Step 6:** The other options are biologically incorrect because meristems do divide and do not convert viral genomes into starch.

**Final Answer:** Very low virus concentration

**Answer: (C)**

Go Back to Question 20

## Q21.

### Solution

**Concept:**

Respiratory quotient, or RQ, is the ratio of carbon dioxide released to oxygen consumed during respiration. Carbohydrates generally have an RQ of about 1.0, fats have an RQ around 0.7, and organic acids may have an RQ greater than 1.0. The value depends on the chemical composition of the respiratory substrate.

**Solution:**

(a) **Step 1:** The formula is $RQ = \frac{CO_2 \text{ released}}{O_2 \text{ consumed}}$.

(b) **Step 2:** Fats are more reduced than carbohydrates and contain less oxygen in their molecules.

(c) **Step 3:** Therefore, more oxygen is required to oxidize fats completely.

(d) **Step 4:** Since the oxygen consumed is high relative to carbon dioxide released, the RQ becomes less than 1.

(e) **Step 5:** The common value for fats is close to 0.7.

(f) **Step 6:** Glucose and sucrose are carbohydrates, while organic acids usually give a higher RQ.

**Final Answer:** Fats

**Answer: (C)**

Go Back to Question 21

## Q22.

### Solution

**Concept:**

Biodiversity conservation can be in situ or ex situ. In situ conservation protects species in their natural habitats, such as national parks, wildlife sanctuaries, biosphere reserves, and community reserves. Ex situ conservation protects species outside their natural habitats, such as in zoos, seed banks, tissue culture collections, and botanical gardens.

**Solution:**

(a) **Step 1:** Keoladeo National Park is a protected natural habitat.

(b) **Step 2:** The birds and wetland organisms are conserved where they live and interact with their ecosystem.

(c) **Step 3:** This matches the definition of in situ conservation.

(d) **Step 4:** Ex situ conservation would involve moving organisms or germplasm away from their natural habitat.

(e) **Step 5:** Cryopreservation and botanical gardens are examples of ex situ methods, not the case described here.

**Final Answer:** In situ conservation

**Answer: (A)**

Go Back to Question 22

## Q23.

### Solution

**Concept:**

The disease triangle explains that disease requires three components: a susceptible host, a pathogen, and favourable environmental conditions. Disease management can work by weakening or removing any one corner of the triangle. Growing a resistant variety specifically changes the host factor by making the crop less susceptible.

**Solution:**

(a) **Step 1:** The question asks for a practice that removes or reduces the susceptible-host component.

(b) **Step 2:** A rust-resistant wheat variety carries genetic resistance against the rust pathogen.

(c) **Step 3:** Even if pathogen spores are present, a resistant host prevents or reduces successful infection.

(d) **Step 4:** Excess nitrogen and prolonged leaf wetness may actually favour disease development.

(e) **Step 5:** Continuous cropping can maintain pathogen inoculum in or around the field.

(f) **Step 6:** Hence, using a resistant variety directly breaks the susceptible-host corner of the triangle.

**Final Answer:** Growing a resistant variety

**Answer: (A)**

Go Back to Question 23

## Q24.

### Solution

**Concept:**

Mineral ions may enter root cells by passive or active transport. If ions move against a concentration gradient, the process cannot occur by simple diffusion. It needs energy from ATP and specific membrane carrier proteins or pumps. Root respiration is therefore important for active mineral absorption.

**Solution:**

(a) **Step 1:** The nitrate concentration is stated to be higher inside the root hair cell than outside.

(b) **Step 2:** Movement from lower external concentration to higher internal concentration is against the concentration gradient.

(c) **Step 3:** Such movement requires metabolic energy, usually supplied by ATP from respiration.

(d) **Step 4:** Carrier proteins in the plasma membrane help nitrate ions cross the membrane selectively.

(e) **Step 5:** Stomata are leaf pores and do not absorb nitrate from soil. The cuticle is not the route for root ion uptake.

(f) **Step 6:** Therefore, the correct explanation is ATP-driven carrier transport.

**Final Answer:** ATP-driven carrier transport

**Answer: (B)**

Go Back to Question 24

## Q25.

### Solution

**Concept:**

A dicot embryo has two cotyledons and an embryonal axis. The upper end of the axis bears the plumule, which develops into the shoot system. The lower end bears the radicle, which develops into the root system. Correct identification depends on position on the embryo axis.

**Solution:**

(a) **Step 1:** Labels A and B point to the two cotyledons, which store or transfer food for the embryo.

(b) **Step 2:** The embryonic axis runs between the cotyledons.

(c) **Step 3:** The upper end of the axis is the plumule, which gives rise to the shoot.

(d) **Step 4:** In the diagram, the upper small structure is labelled C.

(e) **Step 5:** The lower end of the axis, labelled D, is the radicle and gives rise to the root.

(f) **Step 6:** Therefore, label C represents the plumule.

**Final Answer:** C

**Answer: (C)**

Go Back to Question 25

## Q26.

### Solution

**Concept:**

Animal phyla are identified by diagnostic body-plan characters. Ctenophores are marine diploblastic animals commonly called comb jellies. They possess eight rows of ciliary comb plates used for locomotion and often show bioluminescence.

**Solution:**

(a) **Step 1:** The question describes an aquatic diploblastic animal.

(b) **Step 2:** The key character is the presence of eight rows of comb plates.

(c) **Step 3:** Comb plates are rows of fused cilia used for swimming in ctenophores.

(d) **Step 4:** Bioluminescence is also commonly associated with members of Ctenophora.

(e) **Step 5:** Porifera are sponges, Annelida are segmented worms, and Echinodermata are triploblastic marine animals with a water vascular system.

(f) **Step 6:** Hence, the animal belongs to Ctenophora.

**Final Answer:** Ctenophora

**Answer: (B)**

Go Back to Question 26

## Q27.

### Solution

**Concept:**

Cultural control is an important part of insect pest management. It changes field conditions so that the pest population is reduced before it reaches the crop. Some insects pupate in soil, and deep ploughing can expose these stages to sunlight, desiccation, birds, and predators.

**Solution:**

(a) **Step 1:** Red hairy caterpillar is a field pest whose immature stages can be linked with soil phases.

(b) **Step 2:** Deep summer ploughing turns the soil and exposes hidden pupae.

(c) **Step 3:** Exposed pupae are damaged by high temperature and drying.

(d) **Step 4:** Birds and other natural enemies can also feed on the exposed pupae.

(e) **Step 5:** This reduces the next generation of pests before the crop is attacked.

(f) **Step 6:** The practice does not work by increasing sugar content or by affecting only flying adult moths.

**Final Answer:** It exposes soil-borne pupae

**Answer: (C)**

Go Back to Question 27

## Q28.

### Solution

**Concept:**

Bile is produced by the liver and stored in the gall bladder. It contains bile salts, pigments, cholesterol, and other substances. Bile salts do not digest fats enzymatically; instead, they emulsify large fat globules into smaller droplets, increasing surface area for pancreatic lipase.

**Solution:**

(a) **Step 1:** The diagram shows bile entering the duodenum, the first part of the small intestine.

(b) **Step 2:** Fats are hydrophobic and tend to form large globules in the watery intestinal contents.

(c) **Step 3:** Bile salts break large fat globules into many tiny droplets. This is called emulsification.

(d) **Step 4:** Smaller droplets provide a much larger surface area for pancreatic lipase.

(e) **Step 5:** Bile salts do not act as proteases or amylases and do not destroy vitamins.

(f) **Step 6:** Therefore, the main digestive role is emulsification of fats.

**Final Answer:** Emulsification of fats

**Answer: (A)**

Go Back to Question 28

## Q29.

### Solution

**Concept:**

Earthworm has a closed circulatory system. The dorsal blood vessel is the main contractile vessel located above the alimentary canal. It generally conducts blood from the posterior end toward the anterior end, while the ventral vessel carries blood backward to different body parts.

**Solution:**

(a) **Step 1:** The question asks about the direction of flow in the dorsal blood vessel.

(b) **Step 2:** In earthworm, the dorsal vessel lies above the gut and is contractile.

(c) **Step 3:** Its rhythmic contractions push blood toward the anterior region.

(d) **Step 4:** Blood is then distributed through connecting vessels and other channels.

(e) **Step 5:** The option saying posterior to anterior matches this direction.

(f) **Step 6:** The other options either reverse the direction or describe non-specific movement.

**Final Answer:** Posterior to anterior

**Answer: (B)**

Go Back to Question 29

## Q30.

### Solution

**Concept:**

Termites are social insects that feed largely on cellulose-containing material. In agricultural fields, crop residues, stubbles, and underground plant parts can support termite populations. Removing residues and destroying termite shelters are cultural practices that reduce pest buildup.

**Solution:**

(a) **Step 1:** Termites have symbiotic microorganisms that help digest cellulose.

(b) **Step 2:** Crop residues and dry organic matter in the field provide cellulose-rich food and shelter.

(c) **Step 3:** Termites can also attack underground roots and stems, causing wilting or plant death.

(d) **Step 4:** Field sanitation removes residues that support termite colonies.

(e) **Step 5:** Feeding only on nectar, chlorophyll, or pollen does not describe termite damage in crop fields.

(f) **Step 6:** Therefore, cellulose-rich residues and underground plant parts are the correct target.

**Final Answer:** Cellulose-rich residues and underground parts

**Answer: (A)**

Go Back to Question 30

## Q31.

### Solution

**Concept:**

Vitamins are organic nutrients needed in small amounts. Vitamin $B_{12}$, also called cobalamin, contains cobalt. It is important for DNA synthesis, red blood cell maturation, and normal nervous system function. Its deficiency may cause megaloblastic anemia and neurological problems.

**Solution:**

(a) **Step 1:** The clue in the question is the presence of cobalt.

(b) **Step 2:** Cobalamin is the chemical name of vitamin $B_{12}$; the name itself indicates cobalt content.

(c) **Step 3:** Vitamin $B_{12}$ is required for normal formation of red blood cells.

(d) **Step 4:** It also supports myelin maintenance and nerve function.

(e) **Step 5:** Vitamin A is related to vision, vitamin $B_1$ to carbohydrate metabolism and nerve function, and vitamin K to blood clotting.

(f) **Step 6:** Therefore, the cobalt-containing vitamin is vitamin $B_{12}$.

**Final Answer:** Vitamin $B_{12}$

**Answer: (C)**

Go Back to Question 31

## Q32.

### Solution

**Concept:**

In an open circulatory system, the circulating fluid is not confined to a continuous network of blood vessels. In cockroach, the fluid is called hemolymph. It flows through sinuses of the body cavity and directly bathes tissues and organs. This differs from a closed circulatory system, where blood remains inside vessels.

**Solution:**

(a) **Step 1:** Cockroach is an arthropod and has an open circulatory system.

(b) **Step 2:** Its dorsal tubular heart pumps hemolymph into the body cavity.

(c) **Step 3:** The hemolymph flows through sinuses and comes in direct contact with organs.

(d) **Step 4:** It is not restricted to capillaries as in a closed circulatory system.

(e) **Step 5:** Cockroach hemolymph does not transport oxygen by red blood cells as mammalian blood does.

(f) **Step 6:** Thus, direct bathing of organs by hemolymph is the best identification.

**Final Answer:** Hemolymph bathes organs in sinuses

**Answer: (B)**

Go Back to Question 32

## Q33.

### Solution

**Concept:**

Biological control uses natural enemies to reduce pest populations. *Trichogramma chilonis* is an egg parasitoid. It lays eggs inside the eggs of lepidopteran pests, and the developing parasitoid prevents the pest larva from hatching and damaging the crop.

**Solution:**

(a) **Step 1:** The organism named is *Trichogramma chilonis*.

(b) **Step 2:** *Trichogramma* species are tiny parasitoid wasps used in pest management.

(c) **Step 3:** They attack the egg stage of many lepidopteran pests.

(d) **Step 4:** When the pest egg is parasitized, the pest larva does not emerge normally.

(e) **Step 5:** This reduces crop damage because the damaging caterpillar stage is suppressed early.

(f) **Step 6:** The other options do not describe the biological role of *Trichogramma*.

**Final Answer:** It parasitizes pest eggs

**Answer: (A)**

Go Back to Question 33

## Q34.

### Solution

**Concept:**

Respiratory quotient is calculated as the ratio of carbon dioxide produced to oxygen consumed. It helps indicate the type of food being oxidized. For carbohydrates such as glucose, the amount of oxygen consumed and carbon dioxide released are equal, giving an RQ of 1.0.

**Solution:**

(a) **Step 1:** Use the formula $RQ = \frac{CO_2 \text{ released}}{O_2 \text{ consumed}}$.

(b) **Step 2:** The experiment reports 6 molecules of carbon dioxide released.

(c) **Step 3:** It also reports 6 molecules of oxygen consumed.

(d) **Step 4:** Substitute the values: $RQ = \frac{6}{6} = 1.0$.

(e) **Step 5:** The value 1.0 is typical of carbohydrate oxidation under aerobic conditions.

(f) **Step 6:** Therefore, the correct option is 1.0.

**Final Answer:** $\boxed{1.0}$

**Answer: (B)**

Go Back to Question 34

## Q35.

### Solution

**Concept:**

Epithelial tissues are classified by cell shape and surface modifications. Columnar epithelium has tall cells. When cilia are present on the free surface, it is called ciliated columnar epithelium. Such tissue helps move mucus, particles, or ova in different organs.

**Solution:**

(a) **Step 1:** The cells shown are tall and rectangular, which indicates columnar epithelium.

(b) **Step 2:** The nuclei are toward the basal side, a common feature of columnar epithelial cells.

(c) **Step 3:** The free surface has hair-like projections.

(d) **Step 4:** Hair-like motile projections on epithelial cells are cilia.

(e) **Step 5:** Combining tall cell shape and cilia, the tissue is ciliated columnar epithelium.

(f) **Step 6:** Squamous epithelium is flat, adipose tissue stores fat, and cartilage is a connective tissue.

**Final Answer:** Ciliated columnar epithelium

**Answer: (B)**

Go Back to Question 35

## Q36.

### Solution

**Concept:**

Sprayer nozzle selection depends on the target and desired droplet pattern. For insecticides and fungicides, good coverage of leaf surfaces is important. Hollow-cone nozzles produce fine droplets in a cone-shaped pattern and are commonly used for such applications, especially on dense canopies.

**Solution:**

(a) **Step 1:** The question describes a fine cone-shaped spray.

(b) **Step 2:** A hollow-cone nozzle produces droplets in a ring or cone pattern.

(c) **Step 3:** Fine droplets improve coverage of the plant canopy, which is important for insecticide and fungicide action.

(d) **Step 4:** Flat-fan nozzles are often used for more uniform band or broadcast herbicide application.

(e) **Step 5:** Solid stream and flood jet patterns do not match the fine cone spray shown.

(f) **Step 6:** Therefore, the nozzle is a hollow-cone nozzle.

**Final Answer:** Hollow-cone nozzle

**Answer: (B)**

Go Back to Question 36

## Q37.

### Solution

**Concept:**

Essential amino acids are those that the human body cannot synthesize in adequate amounts. They must be obtained from dietary proteins. Lysine is one of the essential amino acids and is especially important in evaluating the protein quality of cereal-based diets.

**Solution:**

(a) **Step 1:** The question asks for an amino acid that must be supplied through food.

(b) **Step 2:** Such amino acids are called essential amino acids.

(c) **Step 3:** Lysine is an essential amino acid for humans.

(d) **Step 4:** Alanine, glycine, and serine can generally be synthesized by the human body and are considered non-essential under normal conditions.

(e) **Step 5:** Therefore, among the given options, lysine is the correct choice.

**Final Answer:** Lysine

**Answer: (C)**

Go Back to Question 37

## Q38.

### Solution

**Concept:**

Freshwater protozoans live in a hypotonic environment. Water continuously enters their cells by osmosis. A contractile vacuole collects and expels excess water, preventing the cell from swelling and bursting. This function is called osmoregulation.

**Solution:**

(a) **Step 1:** Freshwater has a lower solute concentration than the cytoplasm of *Amoeba*.

(b) **Step 2:** Because of this difference, water tends to enter the cell by osmosis.

(c) **Step 3:** If excess water is not removed, the cell may swell and burst.

(d) **Step 4:** The contractile vacuole collects this excess water.

(e) **Step 5:** It periodically contracts and expels the water outside the cell.

(f) **Step 6:** Digestion is performed by food vacuoles, not the contractile vacuole.

**Final Answer:** It expels excess osmotic water

**Answer: (B)**

Go Back to Question 38

## Q39.

### Solution

**Concept:**

The liver fluke is a parasitic flatworm with a complex life cycle involving snails and grazing mammals. The infective stage for grazing animals is the encysted metacercaria. It attaches to aquatic vegetation, and animals become infected when they eat the contaminated vegetation.

**Solution:**

(a) **Step 1:** The question asks about the stage infecting grazing animals.

(b) **Step 2:** Miracidium is a ciliated larva that infects the snail host.

(c) **Step 3:** Redia is an internal larval stage within the snail.

(d) **Step 4:** Cercariae leave the snail and encyst on aquatic vegetation as metacercariae.

(e) **Step 5:** Grazing animals eat vegetation carrying metacercariae and become infected.

(f) **Step 6:** Oncosphere is associated with tapeworm life cycles, not the infective vegetation stage of liver fluke.

**Final Answer:** Metacercaria

**Answer: (C)**

Go Back to Question 39

## Q40.

### Solution

**Concept:**

Protein-energy malnutrition can appear as kwashiorkor or marasmus. Kwashiorkor is mainly due to severe protein deficiency with relatively better calorie intake. It is characterized by edema, fatty liver, growth failure, and changes in hair and skin. Marasmus is due to severe deficiency of both calories and protein and causes extreme wasting without edema.

**Solution:**

(a) **Step 1:** The question mentions edema and fatty liver, which are characteristic signs of kwashiorkor.

(b) **Step 2:** It also states that dietary protein is very low but calories are not extremely low.

(c) **Step 3:** This pattern matches kwashiorkor, where lack of protein lowers plasma proteins and contributes to edema.

(d) **Step 4:** Marasmus usually causes severe wasting due to deficiency of both calories and protein, and edema is typically absent.

(e) **Step 5:** Scurvy is due to vitamin C deficiency, and rickets is due mainly to vitamin D deficiency.

(f) **Step 6:** Therefore, the most likely condition is kwashiorkor.

**Final Answer:** Kwashiorkor

**Answer: (A)**

Go Back to Question 40

# Answer Key

| Q | Ans | Q | Ans | Q | Ans | Q | Ans | Q | Ans |
|---|---|---|---|---|---|---|---|---|---|
| 1 | B | 2 | A | 3 | B | 4 | B | 5 | A |
| 6 | B | 7 | B | 8 | B | 9 | C | 10 | B |
| 11 | A | 12 | A | 13 | B | 14 | B | 15 | C |
| 16 | B | 17 | B | 18 | B | 19 | A | 20 | C |
| 21 | C | 22 | A | 23 | A | 24 | B | 25 | C |
| 26 | B | 27 | C | 28 | A | 29 | B | 30 | A |
| 31 | C | 32 | B | 33 | A | 34 | B | 35 | B |
| 36 | B | 37 | C | 38 | B | 39 | C | 40 | A |