CUET 2026 May 14 Shift 2 Biology

Question Paper (Memory-Based) With Solutions

Conducted by National Testing Agency (NTA)

General Instructions

(i) The examination will be conducted in Computer-Based Test (CBT) mode.

(ii) Each question carries +5 marks for correct answer and -1 mark for wrong answer.

(iii) The total number of questions are 50.

(iv) Duration of the exam is 1 hour (60 minutes).

1. Double fertilisation in angiosperms involves:

(A) One male gamete fusing with egg and another with synergid

(B) Two male gametes fusing with two eggs

(C) One male gamete fusing with egg and another with polar nuclei

(D) Fusion of antipodals with synergids

Correct Answer: (C) One male gamete fusing with egg and another with polar nuclei

Solution:

Step 1: Understanding the Question:

The question asks for the definition of "double fertilization" as it occurs specifically in angiosperms (flowering plants).

Step 3: Detailed Explanation:

Double fertilization is a unique and defining characteristic of angiosperms. It involves two separate fusion events occurring simultaneously within the embryo sac:

1. **Syngamy (True Fertilization):** One male gamete (sperm nucleus) fuses with the egg cell to form a diploid zygote. This zygote will develop into the embryo.

2. **Triple Fusion:** The other male gamete fuses with the two polar nuclei (which form a diploid central cell) to produce a triploid primary endosperm nucleus. This triploid nucleus will develop into the endosperm, a nutritive tissue for the developing embryo.

Therefore, option (C) correctly describes these two fusion events.

- Options (A) and (D) incorrectly involve synergids or antipodals in the fusion. Synergids and antipodals are part of the embryo sac but are not directly involved in the fusion processes of double fertilization.
- Option (B) incorrectly states fusion with two eggs.

Step 4: Final Answer:

Double fertilisation in angiosperms involves one male gamete fusing with egg and another with polar nuclei.

Quick Tip: Remember the "two for one" rule of double fertilization: two male gametes participate in two fusion events. One forms the embryo (zygote from egg + sperm), and the other forms the endosperm (primary endosperm nucleus from polar nuclei + sperm).

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2. RNA interference (RNAi) is a method used to:

(A) Increase protein synthesis

(B) Silence the expression of specific genes

(C) Stimulate DNA replication

(D) Enhance mutation rate

Correct Answer: (B) Silence the expression of specific genes

Solution:

Step 1: Understanding the Question:

The question asks about the primary function or application of RNA interference (RNAi).

Step 3: Detailed Explanation:

RNA interference (RNAi): This is a biological process in which RNA molecules inhibit gene

expression or translation, by neutralizing targeted mRNA molecules. It is a natural mechanism for regulating gene expression in eukaryotes.

Mechanism: Small RNA molecules (like small interfering RNA - siRNA or microRNA - miRNA) bind to complementary mRNA molecules, leading to their degradation or inhibition of translation. This effectively prevents the production of the protein encoded by that mRNA.

Application: Due to its ability to selectively turn off specific genes, RNAi is a powerful tool in molecular biology research for studying gene function and has potential therapeutic applications (e.g., in treating viral infections, cancer, or genetic disorders).

Therefore, RNA interference is used to silence the expression of specific genes.

- Options (A), (C), and (D) describe processes that are not directly achieved by RNAi.

Step 4: Final Answer:

RNA interference (RNAi) is a method used to Silence the expression of specific genes.

Quick Tip: Remember that RNAi is a gene-silencing mechanism. It's like a cellular "off switch" for specific genes, preventing them from making their protein products.

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3. Which of the following statements correctly explains Mendel's law of dominance?

(A) Both alleles express equally in F_1 generation

(B) Dominant allele suppresses the expression of recessive allele in heterozygous condition

(C) Recessive allele always disappears permanently

(D) Traits blend together in offspring

Correct Answer: (B) Dominant allele suppresses the expression of recessive allele in heterozygous condition

Solution:

Step 1: Understanding the Question:

The question asks for the correct explanation of Mendel's Law of Dominance, a fundamental principle of genetics.

Step 3: Detailed Explanation:

Mendel's Law of Dominance: This law states that in a pair of contrasting traits (alleles), one allele (the dominant allele) will mask or suppress the expression of the other allele (the recessive allele) in a heterozygous individual (an individual carrying both alleles). The dominant trait will be expressed in the phenotype.

Option Analysis:

- (A) "Both alleles express equally in F_1 generation": This describes codominance or incomplete dominance, not simple dominance. In dominance, only the dominant allele expresses.
- (B) "Dominant allele suppresses the expression of recessive allele in heterozygous condition": This perfectly defines the Law of Dominance. The recessive allele is present but phenotypically unexpressed.
- (C) "Recessive allele always disappears permanently": The recessive allele is suppressed in the phenotype but is not destroyed; it can be passed on to the next generation and reappear if two recessive alleles are inherited.
- (D) "Traits blend together in offspring": This describes blending inheritance, an outdated concept that Mendel's work disproved.

Therefore, option (B) correctly explains the law of dominance.

Step 4: Final Answer:

Dominant allele suppresses the expression of recessive allele in heterozygous condition.

Quick Tip: Remember the core of dominance: in heterozygotes, the dominant allele's trait is expressed, while the recessive allele's trait is hidden but not lost. Contrast this with incomplete dominance (blending) and codominance (both expressed).

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4. Ribozymes are:

(A) DNA molecules with catalytic activity

(B) Protein enzymes involved in transcription

(C) RNA molecules having catalytic activity

(D) Lipids involved in protein synthesis

Correct Answer: (C) RNA molecules having catalytic activity

Solution:

Step 1: Understanding the Question:

The question asks for the correct definition or nature of ribozymes.

Step 3: Detailed Explanation:

Ribozymes: Ribozymes are ribonucleic acid (RNA) molecules that possess catalytic activity. This means they can catalyze specific biochemical reactions, much like protein enzymes do. The discovery of ribozymes challenged the long-held belief that all biological catalysts are proteins.

Examples: Ribozymes are involved in various crucial cellular processes, including RNA splicing (intron removal), protein synthesis (the peptidyl transferase activity of the ribosome is carried out by ribosomal RNA), and viral replication.

Option Analysis:

- (A) DNA molecules with catalytic activity: DNA typically stores genetic information and does not usually exhibit catalytic activity.
- (B) Protein enzymes involved in transcription: Protein enzymes are catalysts, but transcription is primarily mediated by RNA polymerase (a protein enzyme), and ribozymes are RNA, not protein.
- (C) RNA molecules having catalytic activity: This is the precise definition of ribozymes.
- (D) Lipids involved in protein synthesis: Lipids are structural components and energy stores, not directly involved in protein synthesis as catalytic agents.

Therefore, ribozymes are RNA molecules with catalytic activity.

Step 4: Final Answer:

Ribozymes are RNA molecules having catalytic activity.

Quick Tip: Remember that while most enzymes are proteins, ribozymes are a key exception, demonstrating that RNA can also perform catalytic functions. The "ribo" prefix points to RNA.

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5. In the Hershey and Chase experiment, radioactive phosphorus ((^{32}P)) was used to label:

(A) Protein coat of bacteriophage

(B) RNA of bacteriophage

(C) DNA of bacteriophage

(D) Bacterial cell wall

Correct Answer: (C) DNA of bacteriophage

Solution:

Step 1: Understanding the Question:

The question asks about the specific component of a bacteriophage that was labeled with radioactive phosphorus (^{32}P) in the Hershey-Chase experiment.

Step 3: Detailed Explanation:

Hershey-Chase Experiment (1952): This landmark experiment provided definitive evidence that DNA, not protein, is the genetic material. They used bacteriophages (viruses that infect bacteria).

Labeling Strategy:

- **DNA labeling:** DNA contains phosphorus (in its phosphate backbone) but no sulfur. So, they used radioactive phosphorus (^{32}P) to specifically label the **DNA of the bacteriophage**.
- **Protein labeling:** Proteins contain sulfur (in amino acids like methionine and cysteine) but generally no phosphorus. So, they used radioactive sulfur (^{35}S) to specifically label the **protein coat of the bacteriophage**.

Results: After infection and centrifugation, they found that ^{32}P entered the bacterial cells and was passed on to progeny phages, while ^{35}S remained outside the cells. This indicated that DNA was the genetic material.

Therefore, radioactive phosphorus (^{32}P) was used to label the DNA of the bacteriophage.

Step 4: Final Answer:

Radioactive phosphorus (^{32}P) was used to label DNA of bacteriophage.

Quick Tip: Remember the labels for Hershey-Chase: ^{32}P for DNA (phosphate backbone) and ^{35}S for protein (sulfur-containing amino acids). This is a crucial distinction.

6. India possesses nearly what percentage of the world's biodiversity?

(A) 8%

(B) 2.4%

(C) 10.2%

(D) 15.5%

Correct Answer: (A) 8%

Solution:

Step 1: Understanding the Question:

The question asks about the percentage of the world's biodiversity possessed by India.

Step 2: Key Fact or Concept:

India is known as one of the *mega-diverse* countries of the world and possesses nearly 8% of the world's recorded biodiversity.

Step 3: Detailed Explanation:

Although India occupies only about 2.4% of the world's geographical area, it accounts for nearly:

$$8\%$$

of the world's biodiversity.

Hence, the correct value should be:

$$8\%$$

Step 4: Final Answer:

The correct option is:

$$\boxed{\text{(A) } 8\%}$$

Quick Tip: Remember this important biodiversity fact: India has only 2.4% of the world's land area but supports nearly 8% of global biodiversity.

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7. Which organic molecules were formed in the Miller-Urey experiment?

(A) Nucleotides

(B) Amino acids

(C) Polysaccharides

(D) Vitamins

Correct Answer: (B) Amino acids

Solution:

Step 1: Understanding the Question:

The question asks to identify the primary type of organic molecules that were synthesized in the famous Miller-Urey experiment.

Step 3: Detailed Explanation:

Miller-Urey Experiment (1952): Stanley Miller and Harold Urey conducted an experiment to simulate the conditions of early Earth's atmosphere and test the hypothesis that organic compounds could have spontaneously formed from inorganic precursors.

Setup: They used a closed system containing water, methane (CH_4), ammonia (NH_3), and hydrogen gas (H_2) to represent the primitive atmosphere. Electrical sparks simulated lightning, and heating/cooling cycles simulated precipitation.

Results: After about a week, they analyzed the contents of the flask and found that various organic compounds had formed. The most significant finding was the presence of several **amino acids** (e.g., glycine, alanine, aspartic acid), which are the building blocks of proteins. They also detected other simple organic molecules.

Option Analysis:

- (A) Nucleotides: More complex molecules, not the primary output.
- (B) Amino acids: This was the main discovery.
- (C) Polysaccharides: These are complex polymers of sugars, not directly formed.
- (D) Vitamins: Complex organic molecules, not formed.

Therefore, amino acids were the organic molecules formed.

Step 4: Final Answer:

Amino acids were formed in the Miller-Urey experiment.

Quick Tip: Remember Miller-Urey = Amino Acids. This experiment is a cornerstone of abiogenesis research, demonstrating that fundamental organic building blocks of life could have formed under primitive Earth conditions.

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8. Klinefelter's syndrome is generally characterised by:

(A) XO chromosomes in females

(B) XXY chromosomes in males

(C) Trisomy of chromosome 21

(D) Absence of one autosome

Correct Answer: (B) XXY chromosomes in males

Solution:

Step 1: Understanding the Question:

The question asks for the typical chromosomal characteristic of Klinefelter's syndrome.

Step 3: Detailed Explanation:

Klinefelter's Syndrome: This is a genetic condition that results from the presence of an extra X chromosome in males.

Chromosomal Abnormality: Individuals with Klinefelter's syndrome typically have a karyotype of **XXY** (instead of the normal XY for males). In some cases, more than two X chromosomes (e.g., XXXY) can be present.

Characteristics: Affected individuals are phenotypically male but often exhibit features such as tall stature, reduced fertility (due to hypogonadism), small testes, gynecomastia (breast development), and sometimes learning disabilities.

Option Analysis:

- (A) XO chromosomes in females: This describes Turner's syndrome (monosomy X).

- (B) XXY chromosomes in males: This accurately describes Klinefelter's syndrome.
- (C) Trisomy of chromosome 21: This describes Down syndrome.
- (D) Absence of one autosome: This would be a lethal condition in most cases.

Therefore, Klinefelter's syndrome is characterized by XXY chromosomes in males.

Step 4: Final Answer:

Klinefelter's syndrome is generally characterised by XXY chromosomes in males.

Quick Tip: Remember the common chromosomal disorders:
- Turner's Syndrome: XO (female)
- Klinefelter's Syndrome: XXY (male)
- Down Syndrome: Trisomy 21

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9. Match the following microorganism with the product formed:

Microorganism	Product
A. Monascus purpureus	1. Cyclosporin A
B. Trichoderma polysporum	2. Statins

Choose the correct option:

(A) A1, B-2

(B) A-2, B-1

(C) A-1, B-1

(D) A-2, B-2

Correct Answer: (B) A-2, B-1

Solution:

Step 1: Understanding the Question:

The question asks to match specific microorganisms with the commercially important secondary metabolites they produce.

Step 3: Detailed Explanation:

A. Monascus purpureus: This is a yeast-like fungus. It is well-known for producing **statins** (specifically, lovastatin). Statins are a class of drugs used to lower cholesterol levels by inhibiting HMG-CoA reductase, an enzyme involved in cholesterol synthesis.

So, A → **2. Statins**.

B. Trichoderma polysporum: This is a fungus. It is a source of **Cyclosporin A**. Cyclosporin A is an immunosuppressive drug used to prevent organ rejection in transplant patients and to treat autoimmune diseases.

So, B → **1. Cyclosporin A**.

Combining the matches: A-2, B-1.

Step 4: Final Answer:

The correct matching option is A-2, B-1.

Quick Tip: Memorize these classic examples of microbial products:

- Monascus purpureus → Statins (cholesterol-lowering).
- Trichoderma polysporum → Cyclosporin A (immunosuppressant).
- Penicillium notatum → Penicillin (antibiotic).
- Saccharomyces cerevisiae (yeast) → Ethanol (fermentation).

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10. Which phase of the menstrual cycle is also known as the proliferative phase?

(A) Menstrual phase

(B) Secretory phase

(C) Follicular phase

(D) Ovulatory phase

Correct Answer: (C) Follicular phase

Solution:

Step 1: Understanding the Question:

The question asks for an alternative name for the proliferative phase of the human menstrual cycle.

Step 3: Detailed Explanation:

The menstrual cycle can be divided into ovarian phases (follicular, ovulatory, luteal) and uterine phases (menstrual, proliferative, secretory).

Follicular phase (Ovarian phase): This phase begins on the first day of menstruation and lasts until ovulation. During this time, follicles in the ovary mature.

Proliferative phase (Uterine phase): This phase occurs concurrently with the follicular phase. After menstruation, the uterine endometrium starts to rebuild and thicken (proliferate) in response to increasing estrogen levels produced by the developing ovarian follicles. This preparation is for a potential pregnancy.

Menstrual phase: This is the shedding of the uterine lining (menstruation).

Ovulatory phase: The short phase around ovulation when the egg is released.

Secretory phase (Uterine phase) / Luteal phase (Ovarian phase): This phase occurs after ovulation, where the endometrium becomes secretory in response to progesterone from the corpus luteum, preparing for implantation.

Therefore, the follicular phase is concurrent with the proliferative phase, and often, the terms are used interchangeably when referring to the period of endometrial growth. In common terminology, the follicular phase is linked to the proliferative phase.

Step 4: Final Answer:

The follicular phase of the menstrual cycle is also known as the proliferative phase.

Quick Tip: Remember the synchronization between ovarian and uterine cycles:

- Follicular phase ⟷ Proliferative phase (estrogen-driven endometrial growth).
- Ovulatory phase ⟷ Ovulation.
- Luteal phase ⟷ Secretory phase (progesterone-driven endometrial thickening and secretion).