

Molecular Basis of Inheritance

NEET previous year questions · Biology

10 questions from the official papers: NEET 2026 (4), Re-NEET 2026 (2), NEET 2020 (4). Each is followed by its answer and a worked solution written by BrainIt. Generated on 23 October 2026.



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1. NEET 2026 · Q93

In the lac operon, the z gene codes for:

- (1) permease
- (2) transacetylase
- (3) beta-galactosidase
- (4) the repressor of lac operon

Answer (3)

Sol. In the lac operon the structural gene z codes for beta-galactosidase, the enzyme that hydrolyses lactose into glucose and galactose. Hence (3) is correct. The y gene codes for permease, the a gene for transacetylase, and the separate regulatory i gene codes for the repressor protein.

2. NEET 2026 · Q103

Which of the following statements are correct with reference to a transcription unit?

Statement I: A transcription unit in DNA is defined primarily by three regions : promoter, structural gene and terminator.

Statement II: The promoter is said to be located towards the 5'-end of the structural gene.

Statement III: The promoter is a DNA sequence that provides binding site for RNA polymerase.

Statement IV: The promoter defines the template and coding strands.

Statement V: The terminator is located towards the 3'-end of the coding strand and it defines the end of the process of transcription.

Choose the correct answer from the options given below:

- (1) I, II, III and IV only
- (2) I, III, IV and V only
- (3) II, III, IV and V only
- (4) I, II, III, IV and V

Answer (4)

Sol. A transcription unit is defined by a promoter, a structural gene and a terminator (Statement I); the promoter lies towards the 5'-end of the structural gene (Statement II), provides the binding site for RNA polymerase (Statement III), and by its position determines which strand is template and which is coding (Statement IV). The terminator lies towards the 3'-end of the coding strand and usually ends transcription (Statement V). All five statements are correct.

3. NEET 2026 · Q109

Arrange the following steps of DNA fingerprinting in the correct sequence

Statement I: Isolation of DNA and its digestion by restriction endonucleases.

Statement II: Hybridisation using a labelled VNTR probe.

Statement III: Transferring of separated DNA fragments to synthetic membranes.

Statement IV: Detection of hybridised DNA fragments by autoradiography.

Statement V: Separation of DNA fragments by electrophoresis.

Choose the correct answer from the options given below:

- (1) I, II, IV, III, V
- (2) I, IV, II, V, III
- (3) I, V, III, II, IV
- (4) I, V, II, III, IV

Answer (3)

Sol. (Statement I) DNA fingerprinting proceeds by isolating DNA and digesting it with restriction enzymes, (Statement V) separating the fragments by gel electrophoresis according to size, (Statement III) blotting them onto a synthetic nylon/nitrocellulose membrane,

(Statement II) hybridising with a labelled variable number of tandem repeats (VNTR) probe, and
(Statement IV) finally detecting the bound probe by autoradiography.

This gives the order I, V, III, II, IV.

4. NEET 2026 · Q110

Which of the following statements are correct with reference to packaging of DNA helix?

Statement I: Histones are organized to form a unit of eight molecules called histone octamer.

Statement II: Histones are negatively charged basic proteins.

Statement III: Histones are rich in the basic amino acid residues - lysine and arginine.

Statement IV: The positively charged DNA is wrapped around the histone octamer to form nucleosome.

Statement V: The packaging of chromatin at higher levels requires an additional set of proteins called non-histone chromosomal proteins.

Choose the correct answer from the options given below:

- (1) I, III and V only (2) II, IV and V only
(3) III, IV and V only (4) I, II and IV only

Answer (1)

Sol. Eight histone molecules assemble into a histone octamer (I correct), and histones are positively charged basic proteins rich in lysine and arginine (III correct), so Statement II is wrong. It is the negatively charged DNA (not positively charged) that wraps around the octamer to form a nucleosome, so Statement IV is wrong. Higher-order packaging needs additional non-histone chromosomal (NHC) proteins (V correct). Hence I, III and V only.

5. Re-NEET 2026 · Q153

Which of the following statements about lac-operon is correct?

- (1) Gene *i* is constitutively expressed
(2) Lactose activates repressor to bind to the operator
(3) Genes *i*, *z*, *y* and *a* share single common promoter
(4) Galactose can act as an inducer of lac operon

Answer (1)

Sol. The regulator gene *i* is transcribed continuously from its own promoter, independent of whether lactose is present, so the repressor protein is always available - that is what constitutive expression means. This is essential to the logic of the operon: the repressor must already exist in order to keep the structural genes

switched off in the absence of lactose. NCERT Class 12, Molecular Basis of Inheritance (regulation of gene expression).

6. Re-NEET 2026 · Q167

Which of the following enzymes synthesizes precursor mRNA?

- (1) RNA polymerase I (2) RNA polymerase II
(3) RNA polymerase III (4) DNA polymerase

Answer (2)

Sol. Eukaryotes use three nuclear RNA polymerases with a clean division of labour. RNA polymerase II transcribes the precursor of messenger RNA (mRNA), the heterogeneous nuclear RNA (hnRNA), which is then capped, tailed and spliced into mature mRNA. RNA polymerase I handles the ribosomal RNAs and RNA polymerase III the transfer RNAs (tRNAs), 5S rRNA and small nuclear RNAs. NCERT Class 12, Molecular Basis of Inheritance.

7. NEET 2020 · Q1

If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately

- (1) 2.5 meters (2) 2.2 meters
(3) 2.7 meters (4) 2.0 meters

Answer (2)

Sol. The length of the DNA can be calculated using the formula $L = n \times d$, where n is the number of base pairs and d is the distance between two consecutive base pairs. Substituting the values, $L = 6.6 \times 10^9 \times 0.34 \times 10^{-9} \text{ m} = 2.244 \text{ m} \approx 2.2 \text{ m}$. Chapter: Molecular Basis of Inheritance.

8. NEET 2020 · Q12

Name the enzyme that facilitates opening of DNA helix during transcription.

- (1) DNA helicase (2) DNA polymerase
(3) RNA polymerase (4) DNA ligase

Answer (3)

Sol. During transcription, DNA-dependent RNA polymerase binds the promoter and locally opens the DNA helix to expose the template strand. DNA helicase is primarily associated with replication, so the keyed answer is RNA polymerase. Chapter: Molecular Basis of Inheritance.

9. NEET 2020 · Q24

Which of the following statements is correct?

- (1) Adenine pairs with thymine through one H- bond
- (2) Adenine pairs with thymine through three H- bonds
- (3) Adenine does not pair with thymine
- (4) Adenine pairs with thymine through two H- bonds

Answer (4)

Sol. In double-stranded DNA, adenine pairs with thymine through two hydrogen bonds, while guanine pairs with cytosine through three. Complementary base pairing explains the hydrogen-bond count asked here.

10. NEET 2020 · Q62

The first phase of translation is

- (1) Recognition of DNA molecule
- (2) Aminoacylation of tRNA
- (3) Recognition of an anti-codon
- (4) Binding of mRNA to ribosome

Answer (2)

Sol. Before peptide synthesis begins, each amino acid is activated and attached to its cognate transfer RNA (tRNA) by aminoacyl-tRNA synthetase. This aminoacylation or charging of tRNA is the first phase of translation. Chapter: Molecular Basis of Inheritance.

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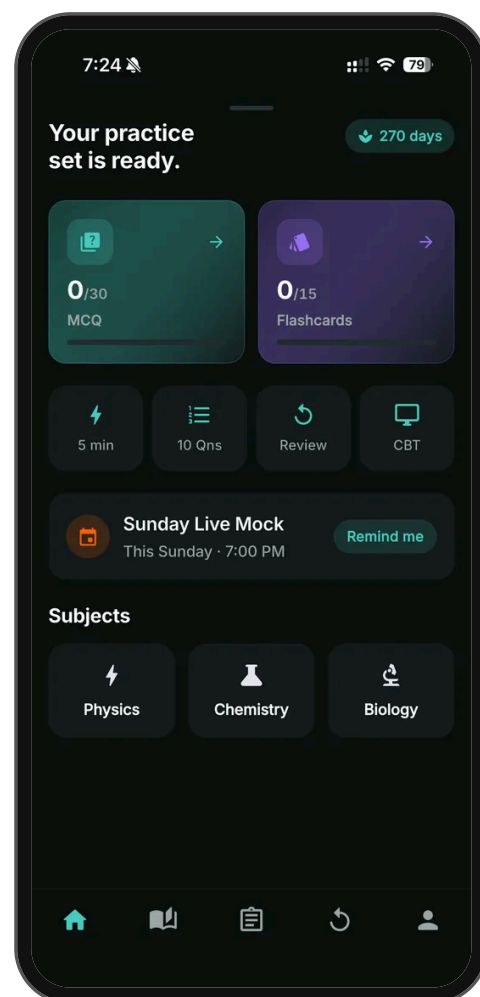
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