

DPP MCQ TERM I CLASS XII
BIOLOGY – Molecular Basis of
Inheritance Solution

Q. 1. In a DNA strand, the nucleotides are linked together by

- (A) glycosidic bonds
- (B) phosphodiester bonds
- (C) peptide bonds
- (D) hydrogen bonds

Q. 2. A nucleoside differs from a nucleotide. It lacks the

- (A) base (B) sugar
- (C) phosphate group (D) hydroxyl group

Q. 3. Both deoxyribose and ribose belong to a class of sugars called

- (A) trioses (B) hexoses
- (C) pentoses (D) polysaccharides

Q. 4. The fact that a purine base always paired through hydrogen bonds with a pyrimidine base leads to, in the DNA double helix

- (A) the antiparallel nature
- (B) the semi-conservative nature
- (C) uniform width throughout DNA
- (D) uniform length in all DNA R

Q. 5. The net electric charge on DNA and histones is

- (A) both positive
- (B) both negative
- (C) negative and positive, respectively
- (D) zero

Q. 6. The first genetic material could be

- (A) protein (B) carbohydrates
- (C) DNA (D) RNA

Q. 7. With regard to mature mRNA in eukaryotes (A) exons and introns do not appear in the mature RNA.

(B) exons appear, but introns do not appear in the

mature RNA.

(C) introns appear but exons do not appear in the mature RNA.

(D) both exons and introns appear in the mature RNA.

Q. 8. Which of the following are the functions of RNA?

(A) It is a carrier of genetic information from DNA

to ribosomes synthesising polypeptides.

(B) It carries amino acids to ribosomes.

(C) It is a constituent component of ribosomes.

(D) All of the above

Q. 9. While analysing the DNA of an organism a total

number of 5,386 nucleotides were found out of which the proportion of different bases were :

Adenine = 29%, Guanine = 17%, Cytosine = 32% and Thymine = 17%. Considering the Chargaff's rule, it can be concluded that

(A) it is a double-stranded circular DNA.

(B) it is single-stranded DNA.

(C) it is a double-stranded linear DNA.

(D) no conclusion can be drawn.

Q. 10. If the sequence of nitrogen bases of the coding strand

of DNA in a transcription unit is : 5'-ATGAATG-3',

the sequence of bases in its RNA transcript would be

(A) 5'-AUGAAUG-3' (B) 5'-UACUUAC-3'

(C) 5'-CAUUCAU-3' (D) 5'-GUAAGUA-3' A

Q. 11. One of the following is true with respect to AUG.

(A) It codes for methionine only.

(B) It is also an initiation codon.

(C) It codes for methionine in both prokaryotes and eukaryotes.

(D) All of the above

Q. 12. The promoter site and the terminator site for

transcription are located at
(A) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit.
(B) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit.
(C) the 5' (upstream) end.
(D) the 3' (downstream) end.

Q. 13. Which of the following steps in transcription is catalysed by RNA polymerase?
(A) Initiation (B) Elongation
(C) Termination (D) All of the above

Q. 14. In some viruses, DNA is synthesised by using RNA as template. Such a DNA is called
(A) A-DNA (B) B-DNA
(C) cDNA (D) rDNA

Q. 15. To initiate translation, the mRNA first binds to
(A) the smaller ribosomal sub-unit.
(B) the larger ribosomal sub-unit.
(C) the whole ribosome.
(D) No such specificity exists.

Q. 16. Control of gene expression takes place at the level of
(A) DNA-replication (B) transcription
(C) translation (D) None of the above

Q. 17. Regulatory proteins are the accessory proteins that interact with RNA polymerase and affect its role in transcription. Which of the following statements is correct about regulatory protein?
(A) They only increase expression.
(B) They only decrease expression.
(C) They interact with RNA polymerase, but do not affect the expression.
(D) They can act both as activators and as repressors.

Q. 18. The RNA polymerase holoenzyme transcribes
(A) the promoter, structural gene and the terminator region.
(B) the promoter and the terminator gene.
(C) the structural gene and the terminator regions.
(D) the structural gene only. R

Q. 19. Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid ?
(A) GUU, GCU – Alanine
(B) UAG, UGA – stop
(C) AUG, ACG – Start/methionine
(D) UUA, UCA – Leucine U

Q. 20. Which one of the following is not a part of transcription unit in DNA ?
(A) The inducer (B) A terminator
(C) A promoter (D) The structural gene

Directions : In the following questions a statement

of assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A) : In RNA uracil is present at the place of thymine.

Reason (R) : 5-methyl uracil is chemical name of thymine.

Q. 2. Assertion (A) : Chargaff's rule is applicable to RNA.

Reason (R) : RNA contains deoxyribose sugar in them.

Q. 3. Assertion (A) : The enzyme involved in the continuous replication of DNA strand is DNA polymerase .

Reason (R) : The polarity of the template strand is $3' \rightarrow 5'$.

Q. 4. Assertion (A) : Primary transcripts in eukaryotes are non-functional.

Reason (R) : Methyl guanosine triphosphate is attached to 5' – end of hnRNA.

Q. 5. Assertion (A) : In Griffith's experiment, the dead

R strain bacteria was capable of causing the transformation of the live S-strain bacteria.

Reason(R) : The S-strain is non-virulent strain.

Q. 6. Assertion (A) : Termination codons or stop codons are UAA, UAG and UGA.

Reason (R) : Stop codons represent termination of translation.

Q. 7. Assertion (A) : Aminoacylation is an essential step for the synthesis of protein.

Reason (R) : It is the process of adding an activated amino acid to the acceptor arm of a transfer RNA.

Q. 8. Assertion (A) : Genetic codes are commaless.

Reason (R) : Genetic codes are overlapping.

Q. 9. Assertion (A) : The newly formed mRNA has same sequence as the coding strand of transcriptional unit with uracil present at place of thymine.

Reason (R) : The rule of complementarity guides the formation of DNA and RNA.

Q. 10. Assertion (A) : DNA fingerprinting is applied in paternity testing in case of disputes.

Reason(R) : It employs the principle of polymorphism in DNA sequences as polymorphisms

are inheritable from parent to children

Attempt any four sub-parts from each question.

Each sub-part carries 1 mark.

I. Read the following and answer the question Q.1 to

Q.S. given below:

The lac operon consists of a regulation gene and three structural gene. The lactose acts as inducer. In the presence of an Inducer such as lactose, the repressor is inactivated during the interaction. This allows RNA polymerase access to the promoter

and transcription proceeds. The repressor is synthesized which in turn binds with the operator region of the operon and prevents RNA polymerase from transcribing the operon.

Q.1. When the process of Lac operon is blocked by a repressor it represents :

- (A) Positive regulation
- (B) Negative regulation
- (C) sometimes positive sometimes negative
- (D) both positive and negative regulation

Q.2. Identify the correct sequence of the structural genes in the lac operon.

- (A) lacA-lacZ-lacY (B) lacZ-lacA-lacY
- (C) lacZ-lacY-lacA (D) lacA-lacY-lacZ

Q.3. Which of the following statement is true in reference to the lac operon process in *E.coli*?

- (i) Galactosidase is the only enzyme produced in large quantities when lac operon is turned on
 - (ii) The messenger RNA in lac operon is a polycistronic mRNA
- (A) Only i is correct
 - (B) Only ii is correct
 - (C) Both (i) and (ii) are correct
 - (D) None of them are correct

Q.4. What provides binding site to RNA polymerase?

- (A) Exons (B) Promoter
- (C) Inducer (D) Repressor

Q.5. The lac operon of *E. coli* contains genes involved in lactose metabolism. It's expressed only when lactose is _____ (1) and glucose is _____ (2).

- (A) 1: Present, 2: Absent
(B) 1: Absent, 2: Present
(C) 1: More, 2: less
(D) 1: repressed, 2: promoted

II. Read the following text and answer the following

questions on the basis of the same :

DNA, a long polymer of deoxyribonucleotide. Altmann and these substances to be acidic hence he named nucleic acid. The basic unit of DNA is a nucleotide which has three components—a nitrogenous base, a pentose sugar (deoxyribose) and a phosphate group. There are two types of nitrogenous bases in DNA, Purine and Pyrimidine.

J. Watson and F. Crick proposed a double helix model for the structure of DNA. There are four types of DNA *i.e.*, A, B, C, Z.

Q. 1. Which DNA form has maximum number of base pairs per turn ?

- (A) A-DNA (B) B-DNA
(C) C-DNA (D) Z-DNA.

Q. 2. Which among the following does not confer stability to the helical structure of DNA ?

- (A) Phosphodiester bond (B) H-bond
(C) N-glycosidic linkage (D) All of these.

Q. 3. Cytidine is a :

- (A) Nucleoside
(B) Nitrogen base
(C) Nucleotide
(D) Common dinucleotide in DNA and RNA.

Q. 4. Heaviest molecule of protoplasm is :

- (A) Lipids (B) Proteins
(C) DNA (D) RNA.

Q. 5. Phosphoric acid is found in :

- (A) Nucleic acids (B) NAD and FAD

(C) Phosphoprotein (D) All of these.

III. The DNA replication is semi-conservative is proved by an experiment conducted by Meselson and Stahl in 1958. To perform their experiment they use heavy nitrogen (^{15}N) in *E. coli*. The process of replication in living cells requires a set of enzymes. The main enzyme is DNA dependent DNA polymerase. The DNA-A dependent DNA polymerase catalyse polymerization only in one direction, that is $5 \rightarrow 3'$. In eukaryotes, the replication of DNA takes place at the S-phase of the cell cycle.

Q. 1. Viruses grown in the presence of radioactive phosphorus contained radioactive _____ but not radioactive _____.

- (A) DNA, protein (B) Protein, DNA
(C) RNA, Nucleoside (D) mRNA, Protein

Q. 2. During DNA replication, the breaking of H-bonds is performed by :

- (A) Topoisomerase (B) Gyrase
(C) Helicases (D) None.

Q. 3. How many types of DNA polymerases are associated with eukaryotic cell ?

- (A) Three (B) Six
(C) Five (D) One.

Q. 4. DNA replication is :

- (A) Semi-conservative, continuous
(B) Semi-continuous, conservative
(C) Semi-conservative, semi-discontinuous
(D) Conservative.

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reason (R). Mark the correct choice as :

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(B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

Q. 5. Assertion (A) : Teminism is bidirectional flow of information.

Reason (R) : It requires DNA dependent RNA polymerase enzyme.

(MCQ) TERM -1
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