

QB365 Question Paper Software
12th Standard - Biology

Molecular Basis of Inheritance Case Study Questions

Exam Time: 00:30 Hrs

Date: 2025-10-14

Total Marks: 8

Questions:

Case Study Questions

1. Read the following and answer any four questions from (i) to (v) given below:

Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are the two types of nucleic acids in most of the organisms. Although RNA also acts as a genetic material in some organism

(i) In which of the following organisms, RNA acts as a genetic material?

- (a) **Escherichia coli** (b) **$Q\beta$ Bacteriophage** (c) **Tobacco Mosaic viruses** (d) **Both (b) and (c)**

(ii) What is the reason for the additional stability of DNA in comparison to RNA?

- (a) **Presence of thymine** (b) **Presence of uracil** (c) **Presence of OH group** (d) **Presence of deo sugar**

(iii) Which of the following criteria a molecule must fulfill to act as a genetic material?

- (a) **It should be able to generate its replica.** (b) **It should be stable chemically and structurally**
(c) **It should be able to express itself in the form of Mendelian character.** (d) **All of these**

(iv) **Assertion:** RNA is liable and easily degradable.

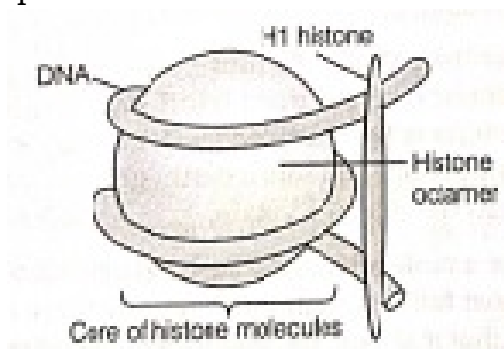
Reason: The 2'-OH group present at every nucleotide in RNA is a reactive group.

- (a) **Both assertion and reason are true and reason is the correct explanation of assertion.** (b) **Both assertion and reason are true but reason is not the correct explanation of assertion.**
(c) **Assertion is true but reason is false.** (d) **Both assertion and reason are false.**

(v) Read the given statement and select the option that correctly fill in the blanks. Pyrimidines in RNA are (iii) and (iv) .

- (a) **(i)-Adenine, (ii)-Guanine, (iii)-Cytosine, (iv)-Thymine** (b) **(i)-Cytosine, (ii)-Thymine, (iii)-Cytosine, (iv)-Uracil**
(c) **(i)-Cytosine, (ii)-Uracil, (iii)-Adenine, (iv)-Guanine** (d) **(i)-Cytosine, (ii)-Uracil, (iii)-Cytosine, (iv)-Thymine.**

2. Observe the diagram given below of a nucleosome model and answer the following questions.



(i) The number of nucleosomes present in human cell is

- (a) 3.3 $\times 10^7$ nucleosome (b) 1.1 $\times 10^7$ nucleosome
(c) 6.6 $\times 10^7$ nucleosome (d) indefinite

(ii) Which amino acids are present in histones?

- (a) Lysine and histidine (b) Valine and histidine
(c) Arginine and lysine (d) Arginine and histidine

(iii) Linker DNA is

- (a) a part of nucleosome
(b) a part that joins two Octamer cores
(c) ssDNA
(d) Both (a) and (b)

(iv) The association of histone H1 with a nucleosome indicates

- (a) transcription is occurring
(b) DNA replication is occurring
(c) the DNA is condensed into a chromatin fibre
(d) the DNA double helix is exposed

Answers Key:

Case Study Questions

- (i) (d): DNA is the genetic material in E. coli. RNA is the genetic material in Tobacco Mosaic virus and Q β bacteriophage.

(ii) (a): The presence of thymine in DNA at the place of uracil which is present in RNA provides additional stability to DNA.

(iii) (d)

(iv) (a)

(v) (b): Purines present in DNA and RNA are adenine and guanine, while pyrimidines present in DNA are cytosine and thymine and pyrimidines present in RNA are cytosine and uracil.
- (i) (a)

(ii) (c)

(iii) (d)

(iv) (c)