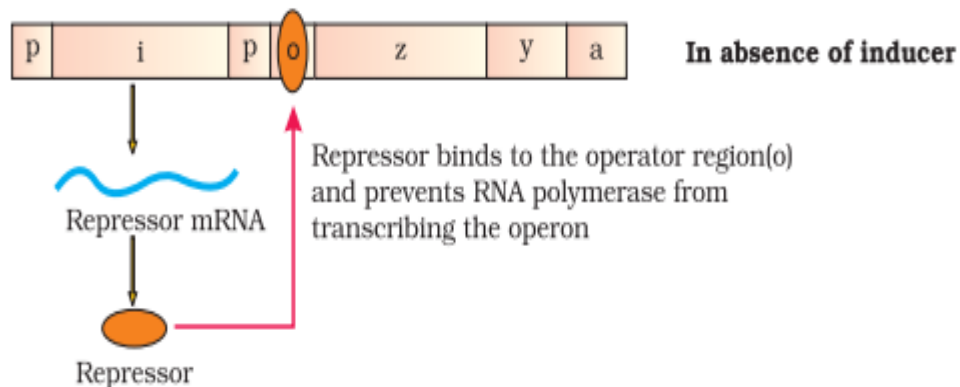




Class: XII	Department: SCIENCE 2021 -2022	Date of submission: 07.10.2021
Worksheet no.5	CHAPTER: MOLECULAR BASIS OF INHERITANCE	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

CASE STUDY-Lac Operon

The diagram given below illustrates the Lac operon, answer the questions in relation to it.



- The inducer in the figure is
 - Beta-galactosidase
 - Permease
 - Lactose
 - Glucose
- Identify the incorrect statement about the lac operon
 - i gene codes for the activator of the lac operon.
 - The z gene codes for beta-galactosidase (β -gal)
 - The y gene codes for permease.
 - The a gene encodes a transacetylase
- The RNA polymerase binds to the----- in the presence of the inducer
 - Operator
 - Structural genes

- c) Promoter
- d) i gene

4. **Assertion:** All the three gene products in lac operon are required for metabolism of lactose

Reason: The genes present in the operon are needed together to function in the same or related metabolic pathway

- 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.

5. The elucidation of the lac operon was also a result of a close association between a geneticist

- a) Francois Jacob and Jacque Monod
- b) Watson and Crick
- c) Marshall Nirenberg's
- d) Frederick Griffith

Assertion and Reasoning (Objective type 1-mark question)

1. **Assertion:** A codon is unambiguous

Reason: Some amino acids are coded by more than one codon

- e. Both assertion and reason are true, and reason is the correct explanation of assertion.
- f. Both assertion and reason are true, but reason is not the correct explanation of assertion.
- g. Assertion is true but reason is false.
- h. Both assertion and reason are false.

2. **Assertion:** Amino acids are added one by one and translated into a polypeptide.

Reason: The ribosome moves from codon to codon along the mRNA

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

3.

Assertion: Replication and transcription occur in the nucleus but translation occurs in the cytoplasm.

Reason: mRNA is transferred from the nucleus into the cytoplasm where ribosomes and amino acids are available for protein synthesis.

- a. Both Assertion and Reason are true
- b. Both Assertion and Reason are true
- c. Assertion is true, but Reason is false
- d. Both Assertion and Reason are false

4.

Assertion: Regulation of lac operon by a repressor is referred to as negative regulation.

Reason: Lac operon is under the control of positive regulation as well.

- a. Both Assertion and Reason are true
- b. Both Assertion and Reason are true
- c. Assertion is true, but Reason is false
- d. Both Assertion and Reason are false

5.

Assertion: UAA codon is a termination codon.

Reason: If in an mRNA, a termination codon is present, the protein synthesis stops abruptly whether the protein synthesis is complete or not.

- a. Both Assertion and Reason are true
- b. Both Assertion and Reason are true
- c. Both Assertion and Reason are false

MCQs 1-mark question

1. The DNA of a certain organism has cytosine as 20% of its bases. What percentage of its bases would be thymine?

- a) 80%
- b) 30%
- c) 20%
- d) 10%

2. Pyrimidines in DNA are:

- a) Adenine and guanine
- b) Cytosine and thymine
- c) Adenine and thymine
- d) Thymine and uracil

3. Each new amino acid is added to a growing protein by

- a) an ionic bond
- b) an RNA bond
- c) a peptide bond
- d) a hydrogen bond

4. In a DNA strand the two nucleotides are linked together by:

- a. glycosidic bonds
- b. phosphodiester bonds
- c. peptide bonds
- d. hydrogen bonds

5. A nucleoside differs from a nucleotide. It lacks the:

- a. base
- b. sugar
- c. phosphate group
- d. hydroxyl group

6. Both deoxyribose and ribose belong to a class of sugars called:

- a. trioses
- b. hexoses
- c. pentoses
- d. polysaccharides

7. 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 semiconservative nature
- c. uniform width throughout DNA
- d. uniform length in all DNA

8. The net electric charge on DNA and histones is:

- a. both positive
- b. both negative
- c. negative and positive, respectively
- d. zero

9. 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

10. Which of the following statements is the most appropriate for sickle cell anemia?

- a. It cannot be treated with iron supplements
- b. It is a molecular disease

c. It confers resistance to acquiring malaria

d. All of the above

Objective type-(mixed Bag) 1-mark

11. Put phrases 1 - 6 in the correct order to describe protein synthesis:

1. mRNA is produced in the nucleus
2. ribosomes move along mRNA
3. DNA has a code
4. polypeptide results
5. tRNA brings amino acids to ribosomes
6. mRNA moves to ribosomes

12. In RNA, the base _____ is replaced with the base _____.

13. DNA replication is called _____ because each new double helix is made of an old strand and a new strand.

14. A mutation is a change in the sequence of _____ within a DNA molecule.

15. During transcription, DNA serves as a _____ for mRNA formation.

16. DNA carries a _____; every three bases stand for one amino acid.

17. Each tRNA has an _____ at one end and a specific _____ at the other.

18. The nucleolus has a concentration of a nucleic acid called _____.

19. The "backbone" of a strand of DNA (i.e. the poles of the DNA "ladder") is composed of _____ and _____ held together with _____ bonds.

20. The "rungs" of the DNA ladder are composed of _____ held together with-----

Certain molecular processes are given in column (A). Provide the terms given to these processes in column (B), after selecting them from the terms: Recombination, gene regulation, prokaryotic, transcription, eukaryotic transcription, translation, replication, gene transfer, DNA fingerprinting.

	Column A	Column B
(i)	DNA → DNA	
(ii)	DNA → hnRNA	
(iii)	hnRNA → Protein	
(iv)	Repressor Protein + Operator → No transcription	

Hints

ANSWERS

MCQ's 1 to 10

1-b	2-b	3-c	4-b	5-c	6-c	7-c	8-c	9-b	10-b
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11) 3-1-6-2-5-4

12)Thymine, Uracil

13)Semiconservative

14)Genetic code

15)Template

16) Genetic code

17)Anti codon loop, amino acid acceptor end

18)RNA

19)Sugar, phosphate, hydrogen

20)Bases, hydrogen bond

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