

NEET MOLECULAR BASIS OF INHERITANCE — REGULATION OF GENE EXPRESSION: LAC OPERON — PYQS

Max. Marks: 96

Questions: 24

Section A (MCQ) — 24 questions

Q.1 In the lac operon, the z gene codes for :

[NEET (UG) 2026]

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

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Q.2 Which of the following statements about lac-operon is correct?

[RE-NEET (UG) 2026]

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

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Q.3 The lactose present in the growth medium of bacteria is transported to the cell by the action of

[NEET (UG) 2024]

- (1) Beta-galactosidase
- (2) Acetylase
- (3) Permease
- (4) Polymerase

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Q.4 Given below are two statements :

Statement-I: In the lac operon, the z gene codes for beta-galactosidase which is primarily responsible for the hydrolysis of lactose into galactose and glucose.

Statement-II: In addition to lactose, glucose or galactose can also induce lac operon.

In the light of the above statements, choose the correct answer from the options given below :

[RE-NEET (UG) 2024]

- (1) Statement-I is true but Statement-II is false
- (2) Statement-I is false but Statement-II is true
- (3) Both Statement-I and Statement-II are true
- (4) Both Statement-I and Statement-II are false

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Q.5 Match List I with List II.

List I		List II	
A.	Gene 'a'	I.	β -galactosidase
B.	Gene 'y'	II.	Transacetylase
C.	Gene 'i'	III.	Permease
D.	Gene 'z'	IV.	Repressor protein

Choose the correct answer from the options given below :

[NEET (UG) 2023]

- (1) A-II, B-III, C-IV, D-I
- (2) A-III, B-IV, C-I, D-II
- (3) A-III, B-I, C-IV, D-II
- (4) A-II, B-I, C-IV, D-III

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Q.6 In an *E. coli* strain i gene gets mutated and its product cannot bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome?

[NEET (UG) 2022]

- (1) Only z gene will get transcribed
- (2) z, y, a genes will be transcribed
- (3) z, y, a genes will not be translated
- (4) RNA polymerase will bind the promoter region

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Q.7 In lac operon, z gene codes for

[NEET (UG) 2022 (Phase 2)]

- (1) Transacetylase
- (2) β -galactosidase
- (3) Permease
- (4) Repressor

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Q.8 Match List - I with List - II.

List - I		List - II	
a.	In lac operon i gene codes for	i.	transacetylase

List - I		List - II	
b.	In lac operon z gene codes for	ii.	permease
c.	In lac operon y gene codes for	iii.	β -galactosidase
d.	In lac operon a gene codes for	iv.	Repressor

Choose the correct answer from the options given below

[NEET (UG) 2022 (Phase 2)]

- (1) (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)
 (2) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)
 (3) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)
 (4) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

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Q.9 Match the following genes of the Lac operon with their respective products :

List-I		List-II	
a.	i gene	i.	β -galactosidase
b.	z gene	ii.	Permease
c.	a gene	iii.	Repressor
d.	y gene	iv.	Transacetylase

Select the **correct** option.

[NEET (UG) 2019]

- (1) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
 (2) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
 (3) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
 (4) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

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Q.10 Select the correct match :

[NEET 2018]

- (1) Alec Jeffreys - *Streptococcus pneumoniae*
 (2) Alfred Hershey and Martha Chase - TMV
 (3) Matthew Meselson and F. Stahl - *Pisum sativum*
 (4) Francois Jacob and Jacques Monod - Lac operon

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Q.11 All of the following are part of an operon except

[NEET 2018]

- (1) an operator (2) structural genes
 (3) an enhancer (4) a promoter

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Q.12 Which of the following is required as inducer(s) for the expression of Lac operon? [NEET 2016 (Phase 1)]

- (1) lactose (2) lactose and galactose
 (3) glucose (4) galactose

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Q.13 Gene regulation governing lactose operon of *E. coli* that involves the lac I gene product is

[AIPMT 2015 (Cancelled)]

- (1) negative and inducible because repressor protein prevents transcription.
 (2) positive and inducible because it can be induced by lactose
 (3) negative and repressible because repressor protein prevents transcription
 (4) feedback inhibition because excess of β -galactosidase can switch off transcription

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Q.14 Which one of the following is wrongly matched?

[AIPMT 2014]

- (1) Transcription – Writing information from DNA to t-RNA
 (2) Operon – Structural genes, operator and promoter
 (3) Repressor protein – Binds to operator to stop enzyme synthesis
 (4) Translation – Using information in m-RNA to make protein.

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Q.15 Which enzyme will be produced in a cell in which there is a non-sense mutation in the lac Y gene ?

[NEET 2013]

- (1) Transacetylase
 (2) Lactose permease and transacetylase
 (3) Lactose permease
 (4) β -galactosidase

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Q.16 In an inducible operon, the genes are :

[NEET 2013 (Karnataka)]

- (1) usually expressed unless a signal turns them "off"
 (2) always expressed
 (3) never expressed
 (4) usually not expressed unless a signal turns them "on"

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- Q.17** Read the following four statements (A-D) :
How many of the above statements are right ?
A. In transcription, adenine pairs with uracil
B. Regulation of lac operon by repressor is referred to as positive regulation
C. The human genome has approximately 50,000 genes
D. Haemophilia is a sex-linked recessive disease

[AIPMT 2012 (Mains)]

(1) Four (2) Two (3) Three (4) One

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- Q.18** The lac operon consists of - [AIPMT 2010 (Mains)]

- (1) Three regulatory genes and three structural genes
(2) Four regulatory genes only
(3) Two regulatory genes and two structural genes
(4) One regulatory gene and three structural genes

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- Q.19** Select the two correct statements out of the four (A–D) statements given below about lac operon.

The correct statements are :

- A. Glucose or galactose may bind with the repressor and inactivate it
B. In the absence of lactose the repressor binds with the operator region
C. The z-gene codes for permease
D. This was elucidated by François Jacob and Jacques Monod

[AIPMT 2010 (Prelims)]

(1) B and D (2) A and B (3) B and C (4) A and C

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- Q.20** *E. coli* cells with a mutated z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because - [AIPMT 2005]

- (1) They cannot transport lactose from the medium into the cell
(2) They cannot synthesize functional β -galactosidase
(3) In the presence of glucose, *E. coli* cells do not utilize lactose
(4) The lac operon is constitutively active in these cells

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- Q.21** What does "lac" refer to in what we call the lac operon? [AIPMT 2003]

- (1) The number 1,00,000 (2) Lac insect
(3) Lactase (4) Lactose

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- Q.22** Jacob and Monod studied lactose metabolism in *E. coli* and proposed operon concept. Operon concept is applicable for : [AIPMT 2002]

- (1) All prokaryotes and all eukaryotes
(2) All prokaryotes and some protozoans
(3) All prokaryotes
(4) All prokaryotes and some eukaryotes

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- Q.23** In *E. coli*, during lactose metabolism repressor binds to : - [AIPMT 2002]

- (1) Promoter gene (2) Operator gene
(3) Structural gene (4) Regulator gene

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- Q.24** In Negative operon : - [AIPMT 2001]

- (1) cAMP has negative effect on lac operon
(2) Co-repressor binds with inducer
(3) Co-repressor binds with repressor
(4) Co-repressor does not bind with repressor

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ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	4	2	3	1	1	3	2
Ques.	8	9	10	11	12	13	14
Ans.	3	1	4	3	1	1	1, 2
Ques.	15	16	17	18	19	20	21
Ans.	4	4	2	4	1	2	4
Ques.	22	23	24				
Ans.	4	2	3				