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# RBSE

**RAJASTHAN BOARD OF  
SECONDARY EDUCATION**

**2023**

**CLASS  
XII**

## Questions & Solutions

**Date: 1 April 2023 | TIME : (08:30 a.m. to 11:45 a.m)**

**Duration: 3 hr. 15 min. | Max. Marks: 56**

**SUBJECT: BIOLOGY**

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## SS-42-Biology

Roll No.

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# SENIOR SECONDARY EXAMINATION, 2023 BIOLOGY

Time allowed : 3 hr, 15 Min.

Maximum Marks : 56

### GENERAL INSTRUCTIONS TO THE EXAMINEES:

- 1) Candidate must write first his / her Roll No. on the question paper compulsorily.
- 2) All the questions are compulsory.
- 3) Write the answer to each question in the given answer-book only.
- 4) For questions having more than one part, the answers to those parts are to be written together in continuity.
- 5) If there is any error / difference / contradiction in the Hindi & English versions of the question paper, the question of Hindi version should be treated valid.
- 6) Write down the serial number of the question before attempting it.

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## SECTION A

Answer the following questions by selecting the correct option in answer book.

1. (i) Asexual reproductive structures in Hydra are - [1]  
(A) Bud (B) Conidia (C) Zoospores (D) Gemmules

Sol. (A) Bud

- (ii) Not an example of sexually transmitted disease is - [1]  
(A) Gonorrhea (B) Syphilis (C) Chlamydiasis (D) Cancer

Sol. (D) Cancer

- (iii) The genetic code that codes for Methionine is - [1]  
(A) UUU (B) AUG (C) ACG (D) AAA

Sol. (B) AUG

- (iv) Example of lymphoid organ is - [1]  
(A) Thymus (B) Liver (C) Pancreas (D) Stomach

Sol. (A) Thymus

- (v) Microbe that is used as biofertilizer. [1]  
(A) Trichoderma (B) Penicillium notatum (C) Cyanobacteria (D) Lactobacillus

Sol. (C) Cyanobacteria

- (vi) An enzyme that cut DNA into fragments - [1]  
(A) DNA Ligase (B) Restriction enzyme (C) DNA Polymerase (D) Proteases enzyme

Sol. (B) Restriction enzyme

- (vii) Which protein gene 'cry' controls the corn borer. [1]  
(A) I – Ac (B) I – Ac & II – Ab (C) II – Ac (D) I – Ab

Sol. (B) I – Ac & II – Ab

- (viii) Example of In-situ conservation of biodiversity is - [1]  
(A) Wildlife sanctuaries (B) Zoological park (C) Botanical garden (D) Wildlife safari park

Sol. (A) Wildlife sanctuaries

- (ix) Main example of greenhouse gas is [1]  
(A) Nitrogen (B) Carbon monoxide (C) Methane (D) Oxygen

Sol. (C) Methane

## 2. Fill in the blanks :






- (i) Male honey bee are Haploid (Ploidy) having Sixteen chromosomes. [ $\frac{1}{2} + \frac{1}{2} = 1$ ]  
(ii) Insulin used for diabetes was extracted from the pancreas (organ) of slaughtered pigs and animals. [1]  
(iii) The rate of biomass production is called productivity. [1]  
(iv) The world Summit on Sustainable Development held in 2002 in Johannesburg South Africa [1]

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**3. Give the answer of the following questions in a word or a line.**

(i) Define external fertilisation.

[1]

**Sol.** In most aquatic organisms, such as a majority of algae and fishes as well as amphibians, syngamy occurs in the external medium (water), i.e., outside the body of the organism. This type of gametic fusion is called external fertilisation.

(ii) Write full name of ZIFT.

[1]

**Sol.** Zygote intrafallopian transfer.

(iii) The phenotype of RRyy genotype seeded plant will be -

[1]

**Sol.** Round and green seed.

(iv) What is Transgenic animal?

[1]

**Sol.** Animals that have had their DNA manipulated to possess and express an extra (foreign) gene are known as transgenic animals.

(v) Write function of Adenosine deaminase.

[1]

**Sol.** This enzyme is crucial for the immune system to function.

(vi) Write name of components of nucleoside.

[ $\frac{1}{2} + \frac{1}{2} = 1$ ]

**Sol.** components of nucleoside- Pentose sugar and phosphate group.

(vii) Write one adaptation of seals found in polar seas.

[1]

**Sol.** Mammals from colder climates generally have shorter ears and limbs to minimise heat loss. (This is called the Allen's Rule.) In the polar seas aquatic mammals like seals have a thick layer of fat (blubber) below their skin that acts as an insulator and reduces loss of body heat.

(viii) Explain one reason of deforestation.

[1]

**Sol.** One of the major reasons is the conversion of forest to agricultural land so as to feed the growing human population. Trees are axed for timber, firewood, cattle ranching and for several other purposes.

## SECTION B

### Short answer type questions (Answer word limit 50 words) :

4. Write name and function of three parts of female reproductive system.

[ $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ ]

**Sol.** (i) Ovaries- are the primary female sex organs that produce the female gamete (ovum) and several steroid hormones (ovarian hormones).

(ii) Oviducts /fallopian tubes - Site for fertilization.

(iii) Uterus- The uterus is single and it is also called womb. It is site of implantation of embryo.

5. Write three hormones secreted by placenta.

[ $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ ]

**Sol.** Three hormones secreted by placenta are-

(i) human chorionic gonadotropin (hCG)

(ii) human placental lactogen(hPL)

(iii) Estrogens

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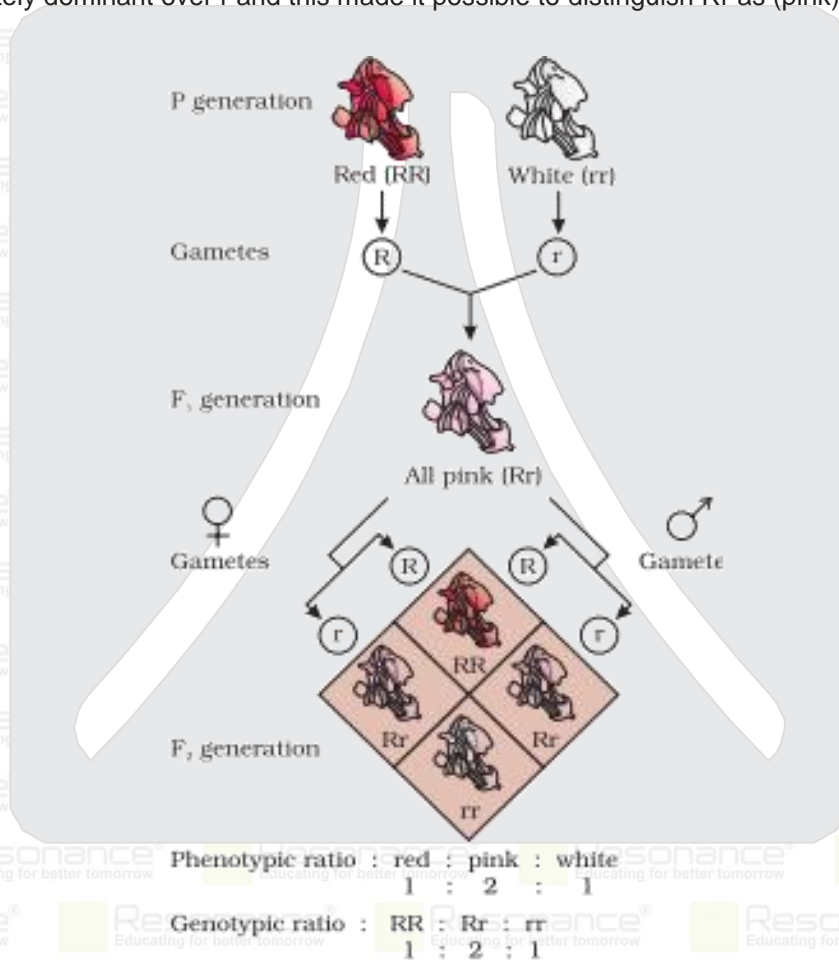
6. Explain 'Incomplete dominance' with example. [1½]

**Sol.** Incomplete dominance -

When experiments on peas were repeated using other traits in other plants, it was found that sometimes the F<sub>1</sub> had a phenotype that did not resemble either of the two parents and was in between the two.

The inheritance of flower colour in the dog flower (snapdragon or *Antirrhinum* sp.) is a good example to understand incomplete dominance. In a cross between true-breeding red-flowered (RR) and truebreeding white-flowered plants(rr), the F<sub>1</sub> (Rr) was pink.

When the F<sub>1</sub> was self-pollinated the F<sub>2</sub> resulted in the following ratio 1 (RR) Red: 2 (Rr)Pink: 1(rr)White. Here the genotype ratios were exactly as we would expect in any mendelian monohybrid cross, but the phenotype ratios had changed from the 3:1 dominant : recessive ratio. What happened was that R was not completely dominant over r and this made it possible to distinguish Rr as (pink) from RR (red) and rr (white) .



7. Explain Turner's syndrome with symptoms. [1½]

**Sol.** Turner's Syndrome : Such a disorder is caused due to the absence of one of the X chromosomes, i.e., 45 with X0, Such females are sterile as ovaries are rudimentary besides other features including lack of other secondary sexual characters.

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8. Write brain capacity and two characters of life style of Neanderthal man. [ $\frac{1}{2}+1=1\frac{1}{2}$ ]

**Sol.** The brain capacity of Neanderthal man is 1400cc.  
Life Style- They used hides to protect their body and buried their dead.

9. Explain 'Adaptive radiation' with example. [ $1\frac{1}{2}$ ]

**Sol.** The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats) is called adaptive radiation.  
Darwin's finches represent one of the best examples of this phenomenon.  
During his journey Darwin went to Galapagos Islands. There he observed an amazing diversity of creatures. Of particular interest, small black birds later called Darwin's Finches amazed him. He realised that there were many varieties of finches in the same island. All the varieties, he conjectured, evolved on the island itself. From the original seed-eating features, many other forms with altered beaks arose, enabling them to become insectivorous and vegetarian finches.

10. Define inbreeding. Write name of any one animal developed from interspecific hybridisation. [ $1+1\frac{1}{2}=1\frac{1}{2}$ ]

**Sol.** Inbreeding:- When breeding is between animals of the same breed it is called inbreeding.  
Name of any one animal developed from interspecific hybridisation-Mule.

11. Part - A contains the name of crop and Part - B contains their related disease resistance variety. Match the following: [ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=1\frac{1}{2}$ ]

	PART-A		PART - B
(A)	Cowpea	(i)	Pusa Sadabahar
(B)	Cauliflower	(ii)	Pusa Komal
(C)	Chilli	(iii)	Pusa Shubhra

**Sol.**

	PART-A		PART - B
(A)	Cowpea	(i)	Pusa Komal
(B)	Cauliflower	(ii)	Pusa Shubhra
(C)	Chilli	(iii)	Pusa Sadabahar

2. Write the name of the microorganism commonly called brewer's yeast. Write one use of it. [ $1+1\frac{1}{2}=1\frac{1}{2}$ ]

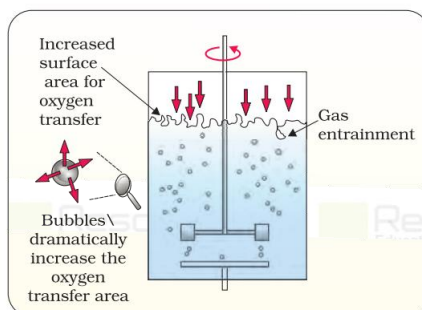
**Sol.** Brewer's yeast- *Saccharomyces cerevisiae*.  
Use- For fermenting malted cereals and fruit juices.

13. Write full name of BOD. What is the relation of polluting potential and BOD of waste water. [ $1+1\frac{1}{2}=1\frac{1}{2}$ ]

**Sol.** BOD- Biochemical Oxygen Demand  
The greater the BOD of waste water, More is its polluting potential.

14. Draw a labelled diagram of sparged stirred-tank bioreactor. [ $1\frac{1}{2}$ ]

**Sol.**



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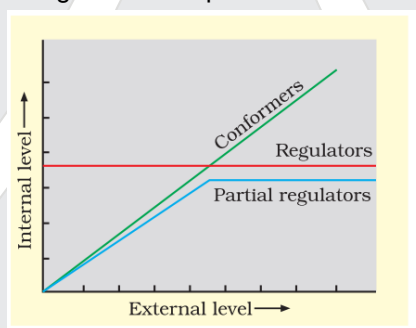


15. Explain any one feature of cloning vector. [1½]  
**Sol.** Origin of replication (ori) : This is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells. This sequence is also responsible for controlling the copy number of the linked DNA. So, if one wants to recover many copies of the target DNA it should be cloned in a vector whose origin support high copy number

### SECTION C

#### Long answer type questions (Answer word limit 100 words)

16. Write the name of the pathogen of amoebiasis. Write two symptoms and two source of infection. [1+1+1=3]  
**Sol.** Pathogen-Entamoeba histolytica  
 Symptoms- Constipation, Abdominal pain, cramps and stools with excess mucus and blood clots.  
 Two source of infection-  
 Houseflies act as mechanical carriers and serve to transmit the parasite from faeces of infected person to food and food products, thereby contaminating them. Drinking water and food contaminated by the faecal matter are the main source of infection.
17. What are the stenothermal organism? Draw a diagrammatic representation of organismic response. [1+2=3]  
**Sol.** A vast majority of organisms are restricted to a narrow range of temperatures such organisms are called stenothermal.  
 Diagrammatic representation of organismic response-



Dia. organism response

18. Define ecological succession. Explain Hydrarch succession and Xerarch succession in brief. [1+2=3]  
**Sol.** Ecological succession-The gradual and fairly predictable change in the species composition of a given area is called ecological succession.  
 Based on the nature of the habitat – whether it is water (or very wet areas) or it is on very dry areas – succession of plants is called hydrarch or xerarch, respectively.  
 Hydrarch succession takes place in wet areas and the successional series progress from hydric to the mesic conditions.  
 xerarch succession takes place in dry areas and the series progress from xeric to mesic conditions.  
 Hence, both hydrarch and xerarch successions lead to medium water conditions (mesic) – neither too dry (xeric) nor too wet (hydric).

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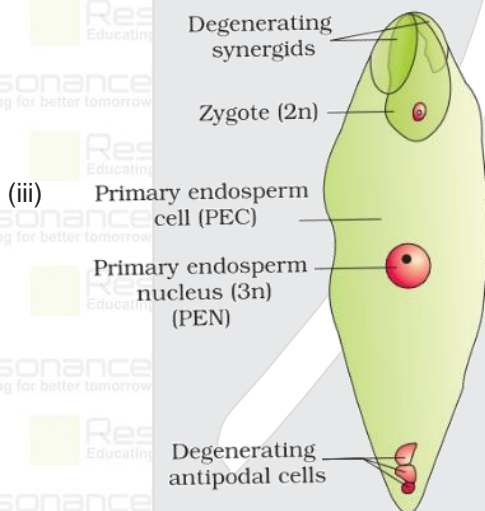
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## SECTION D

### Essay type questions (Answer word limit 100 words) :

19.  
(i) Define pollination.  
(ii) Explain double fertilisation.  
(iii) Draw a labelled diagram of structure of fertilised embryo sac. [1+1½ +1½ = 4]

**Sol.** (i) Pollination-Transfer of pollen grains (shed from the anther) to the stigma of a pistil is termed pollination.  
(ii) Double Fertilization- After entering one of the synergids, the pollen tube releases the two male gametes into the cytoplasm of the synergid.  
Syngamy- One of the male gametes moves towards the egg cell and fuses with its nucleus thus completing the syngamy. This results in the formation of a diploid cell, the zygote.  
Triple fusion- The other male gamete moves towards the two polar nuclei located in the central cell and fuses with them to produce a triploid primary endosperm nucleus (PEN).  
As this involves the fusion of three haploid nuclei it is termed triple fusion. Since two types of fusions, syngamy and triple fusion take place in an embryo sac the phenomenon is termed double fertilisation, an event unique to flowering plants.  
The central cell after triple fusion becomes the primary endosperm cell (PEC) and develops into the endosperm while the zygote develops into an embryo.



OR

- (i) Define Xenogamy pollination.  
(ii) Write one example of each non-albuminous, albuminous, perispermic seed.  
(iii) Draw a labelled diagram of L.S. of pistil showing path of pollen tube growth. [1+1½ +1½ = 4]

**Sol.** (i) Xenogamy – Transfer of pollen grains from anther to the stigma of a different plant. This is the only type of pollination which during pollination brings genetically different types of pollen grains to the stigma.  
(ii) non-albuminous- e.g. pea, groundnut.  
albuminous- e.g. wheat, maize, barley, castor, sunflowers.  
perispermic seed- e.g. black pepper, beet.

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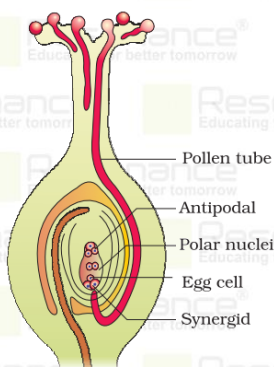
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(iii)



Longitudinal section of a flower showing growth of pollen tube

20. (i) Define translation.  
(ii) Explain process of translation.  
(iii) Draw a labelled diagram of translation.

[1+ 1½+1½ = 4]

**Sol.** (i) Translation - The process of polymerisation of amino acids form a polypeptide.

(ii) Translation refers to the process of polymerisation of amino acids to form a polypeptide. The order and sequence of amino acids are defined by the sequence of bases in the mRNA. The amino acids are joined by a bond which is known as a peptide bond.

Formation of a peptide bond requires energy. Therefore, in the first phase itself amino acids are activated in the presence of ATP and linked to their cognate t-RNA –a process commonly called as charging of tRNA or aminoacylation of tRNA to be more specific.

If two such charged tRNAs brought close enough, the formation of peptide bond between them would be favoured energetically. The presence of a catalyst would enhance the rate of peptide bond formation.

The cellular factory responsible for synthesising proteins is the ribosome. The ribosome consists of structural RNAs and about 80 different proteins. In its inactive state, it exists as two subunits; a large subunit and a small subunit. When the small subunit encounters an mRNA, the process of translation of the mRNA to protein begins. There are two sites in the large subunit, for subsequent amino acids to bind to and thus, be close enough peptide bond. The ribosome also acts as a catalyst (23S rRNA in bacteria is the enzyme- ribozyme) for the formation of peptide bond. A translational unit in mRNA is the sequence of RNA that is flanked by the start codon (AUG) and the stop codon and codes for a polypeptide. An mRNA also has some additional sequences that are not translated and are referred as untranslated regions (UTR). The UTRs are present at both 5'-end (before start codon) and at 3'-end (after stop codon). They are required for efficient translation process. For initiation, the ribosome binds to the mRNA at the start codon (AUG) that is recognised only by the initiator tRNA. The ribosome proceeds to the elongation phase of protein synthesis. During this stage, complexes composed of an amino acid linked to tRNA, sequentially bind to the appropriate codon in mRNA by forming complementary base pairs with the tRNA anticodon. The ribosome moves from codon to codon along the mRNA. Amino acids are added one by one, translated into Polypeptide sequences dictated by DNA and represented by mRNA. At the end, a release factor binds to the stop codon, terminating translation and releasing the complete polypeptide from the ribosome.

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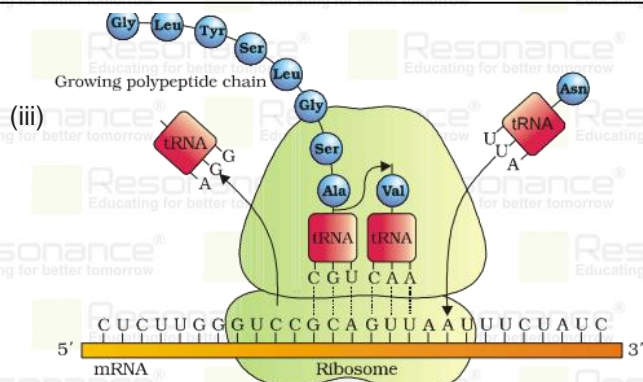


Figure 6.13 Translation

OR

- (i) Name the disease that results from point mutation.  
(ii) Explain the Lac operon.  
(iii) Draw a labelled diagram of the Lac operon.

[1+ 1½+1½= 4]

(i) Sickle cell anemia.

(ii) Lac operon- The elucidation of the lac operon was also a result of a close association between a geneticist, Francois Jacob and a biochemist, Jacques Monod. They were the first to elucidate a transcriptionally regulated system. In lac operon (here lac refers to lactose), a polycistronic structural gene is regulated by a common promoter and regulatory genes. Such arrangement is very common in bacteria and is referred to as operon. To name few such examples, lac operon, trp operon, ara operon, his operon, val operon, etc.

The lac operon consists of one regulatory gene (the i gene – here the term i does not refer to inducer, rather it is derived from the word inhibitor) and three structural genes (z, y, and a).

The i gene codes for the repressor of the lac operon.

The z gene codes for beta-galactosidase (®-gal), which is primarily responsible for the hydrolysis of the disaccharide, lactose into its monomeric units, galactose and glucose.

The y gene codes for permease, which increases permeability of the cell to ®-galactosides.

The a gene encodes a transacetylase.

Hence, all the three gene products in lac operon are required for metabolism of lactose. In most other operons as well, the genes present in the operon are needed together to function in the same or related metabolic pathway.

Lactose is the substrate for the enzyme beta-galactosidase and it regulates switching on and off of the operon. Hence, it is termed as inducer. In the absence of a preferred carbon source such as glucose, if lactose is provided in the growth medium of the bacteria, the lactose is transported into the cells through the action of permease (Remember, a very low level of expression of lac operon has to be present in the cell all the time, otherwise lactose cannot enter the cells). The lactose then induces the operon in the following manner. The repressor of the operon is synthesised (all-the-time – constitutively)

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from the *i* gene. The repressor protein binds to the operator region of the operon and prevents RNA polymerase from transcribing the operon. In the presence of an inducer, such as lactose or allolactose, the repressor is inactivated by interaction with the inducer. This allows RNA polymerase access to the promoter and transcription proceeds. Essentially, regulation of lac operon can also be visualised as regulation of enzyme synthesis by its substrate. Regulation of lac operon by repressor is referred to as negative regulation.

(iii)

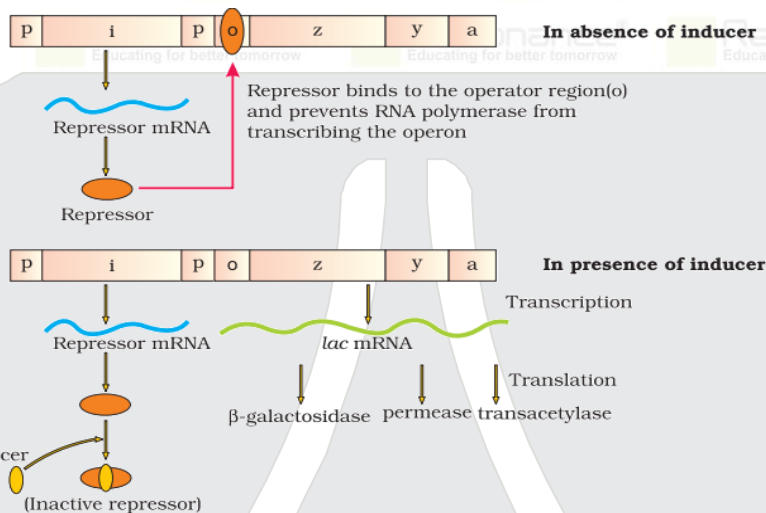


Figure 6.14 The lac Operon

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# CUET (UG)

## 2023

### Common University Entrance Test



#### About CUET (UG)

Common University Entrance Test (CUET) is the program that provides equal opportunity to all students from different Boards & different region.

- CUET, known as Common Universities Entrance Test (CUET), is a Computer Based All - India Test for admission to various Undergraduate Programmes in 44 Central Universities and other State Private + Deemed Universities of India.
- CUET (UG) is organized by National Testing Agency (NTA).
- Official Website: <www.samarth.cuet.ac.in> OR <www.cuet.nta.ac.in>

#### Points to Remember: CUET (UG) 2023

- Candidates can choose any Language/Domain Specific Subjects/General Test or a combination as per the requirements of the course in the specific University.
- The choice of Tests/Subjects depend on the course/s chosen by the candidate and the University/ies where admission is sought.
- A Candidate can take a maximum of **10 tests**.



S.No.	SECTION	NO. OF QUESTIONS	QUESTIONS TO ATTEMPT	DURATION
1.	SECTION-I (A+B)	50	40	45 Minutes
2.	SECTION-II	50/45	40/35	45 Minutes*
3.	SECTION-III	60	50	45 Minutes*

\*Not yet announced by NTA.

#### • Section IA – 13 Languages (As a medium and “Language”)

**Assamese | Bengali | English | Gujarati | Hindi | Kannada | Malayalam | Marathi | Odia | Punjabi | Tamil | Telugu | Urdu**

#### • Section IB – 20 Languages

**Arabic | Bodo | Chinese | Dogri | French | German | Persian | Russian | Sindhi | Tibetan | Italian | Japanese | Kashmiri | Konkani | Maithili | Manipuri | Nepali | Santhali | Spanish | Sanskrit**

#### • Section II – 27 Domain-Specific Subjects

There are 27 Domains specific Subjects being offered under this Section. Candidate may choose a maximum of Six (06) Domains as desired by the applicable University/Universities.

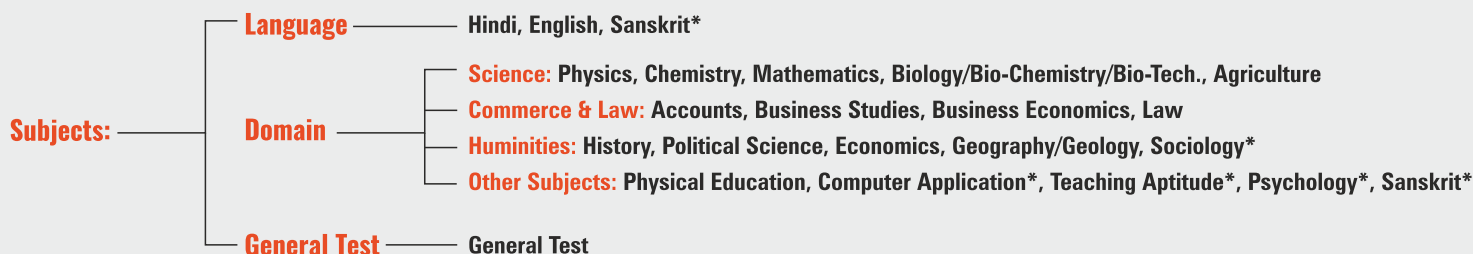
#### • Section III – General Test

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- Candidates have to fulfil the age criteria if it is specified by a Particular University to which the candidate wishes to apply.

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