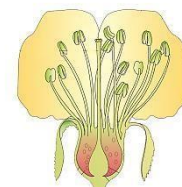


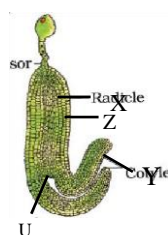
# CHAPTER 1

## SEXUAL REPRODUCTION IN FLOWERING PLANT



### (B) PREVIOUS YEAR QUESTIONS

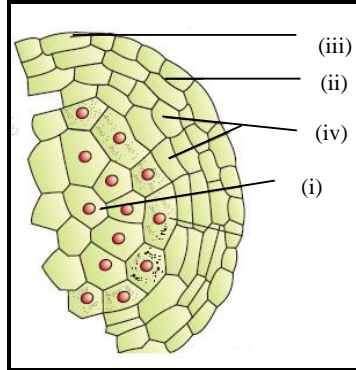
1. Select the option that shows the correctly identified 'U', 'X', 'Y' and 'Z' in a developing dicot embryo. [CBSE 2023]



- (1) X-Plumule (2n), Y-Suspensor (n), Z-Cotyledon (2n), U-Radicle (2n).  
(2) X-Plumule (2n), Y-Suspensor (2n), Z-Radicle (2n), U-Cotyledon (2n).  
(3) X-Suspensor (2n), Y-Cotyledon (2n), Z-Radicle (2n), U-Plumule (2n).  
(4) X-Cotyledon (2n), Y-Radicle (n), Z-Plumule (n), U-Suspensor (n).
2. (i) Explain the monosporic development of embryo sac in the ovule of an angiosperm.  
(ii) Draw a diagram of the mature embryo sac of an angiospermic ovule and label any four parts in it. [CBSE 2023]
3. One of the major approaches of crop improvement programme is Artificial hybridisation. Explain the steps involved in making sure that only the desired pollen grain pollinate the stigma of a bisexual flower by a plant breeder. [CBSE 2023]
4. The hilum in a typical angiospermic ovule represents the junction between:- [CBSE Term-I 2022]

- (1) Integuments and the embryo sac.      (2) Embryo sac and the nucellus  
 (3) Body of the ovule and the funicle      (4) Nucellus and the funicle

5. In the given diagram of a transverse section of a young anther. Choose the labellings showing the correct placement of the wall layers from the table given below. **[CBSE Term-I 2022]**



(i)	(ii)	(ii)	(iii)
(1) Epidermis	Middle layers	Tapetum	Endothecium
(2) Tapetum	Endothecium	Epidermis	Middle layers
(3) Endothecium	Tapetum	Middle layers	Epidermis
(4) Middle layers	Epidermis	Endothecium	Tapetum

6. The term used for the embryo entering into the state of inactivity as the seed mature is:-

**[CBSE Term-I 2022]**

- (1) Quiescent      (2) Parthenogenesis      (3) Parthenocarpy      (4) Dormancy

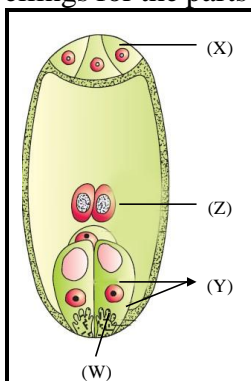
7. The ploidy of the apomictic embryo developed from the integument cells and megaspore mother cell without reduction division respectively will be:-

**[CBSE Term-I 2022]**

- (1)  $2n$  and  $2n$       (2)  $n$  and  $n$       (3)  $2n$  and  $n$       (4)  $3n$  and  $2n$

8. Given below is a diagrammatic representation of a mature embryo sac of a t plant. [CBSE Term-I 2022]

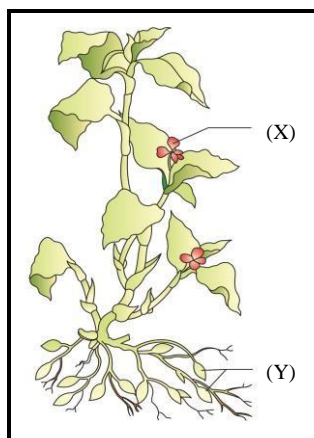
Choose the option showing the correct labellings for the parts W, X, Y and Z from the table given below.



W	X	Y	Z
Micropylar end	Antipodals	Synergids	Central cell
Chalazal end	Antipodals	Central cell	Synergids
Micropylar end	Synergids	Central cell	Antipodals
Chalazal end	Synergids	Central cell	Antipodals

- (1) (2)
- (3)
- (4)

9. Given below is a figure of an angiosperm plant showing two different types of flowers 'X' and 'Y' and the possible type of pollination in them: [CBSE Term-I 2022]



Select the correct option for the flower (X) and flower (Y) and the possible type of pollination from the given table:

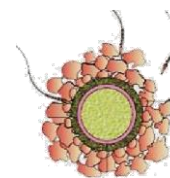
Flower X	Flower Y
Chasmogamous, assured seed set	Cleistogamous, cross pollination
Cleistogamous self/cross pollination	Chasmogamous, assured seed set
Chasmogamous self/cross pollination	Cleistogamous, self-pollination
Cleistogamous self-pollination only	Chasmogamous, cross pollination only

10. An undifferentiated sheath covering the root cap of a monocotyledonous embryo is: [CBSE Term-I 2022]  
 (1) Scutellum (2) Coleorhiza (3) Coleoptile (4) Epiblast
11. Why does endosperm development precede embryo development? [CBSE]
12. How many meiotic divisions are required to produce 76 seeds in a Guava fruit? [CBSE IMP-Question]
13. How does pollination take place in water hyacinth and water lily? [CBSE IMP-Question]
14. Self-pollination is fully ensured if [CBSE 2020]  
 (1) The flower is bisexual. (2) The style is longer than the filament.  
 (3) The flower is cleistogamous. (4) The time of pistil and anther maturity is different.
15. Draw a schematic transverse section of a mature anther of an angiosperm. Label its epidermis, middle layers, tapetum, endothecium, sporogenous tissue and the connective. [CBSE 2018,20]

16. Differentiate between the wind pollinated and insect pollinated flowers.
17. Some flowers, selected for artificial hybridization, do not require emasculation b essential for them. Give a reason. [CBSE 2019]
18. Write any two ways by which apomictic seeds may be developed in angiosperms. [CBSE 2019]
19. Draw a labeled diagram of a mature male gametophyte of an angiosperm. [CBSE 2019]
20. Draw a diagram of L.S. of an embryo of grass and label any six parts. [CBSE 2019]
20. (a) Draw a diagram of Pistil showing pollen tube growth in angiosperm and label (i) Stigma (ii) male gametes (iii) micropyle and (iv) Ovule.  
(b) Write the function of micropyle. [CBSE 2018]
21. State one difference and one similarity between geitonogamy and xenogamy. [CBSE 2018]
22. Explain any three devices developed in flowering plants to discourage self pollination and encourage cross pollination. [CBSE 2018]
23. Write one advantage and one disadvantage of cleistogamy to flowering plants. [CBSE 2018]
24. If the meiocyte of a maize plant contains 20 chromosomes, write the number of chromosomes in the endosperm and embryo of the maize grain and give reasons in support of your answer. [CBSE 2018]
25. (a) Describe the process of microsporogenesis upto the formation of a microspore.
26. Write the function of 'germ pore' in a pollen grain of an angiosperm. [CBSE 2018]

# CHAPTER 2

## HUMAN REPRODUCTION



### PREVIOUS YEAR QUESTIONS

1. Given below are structural details of a human mammary gland :

[CBSE 2023]

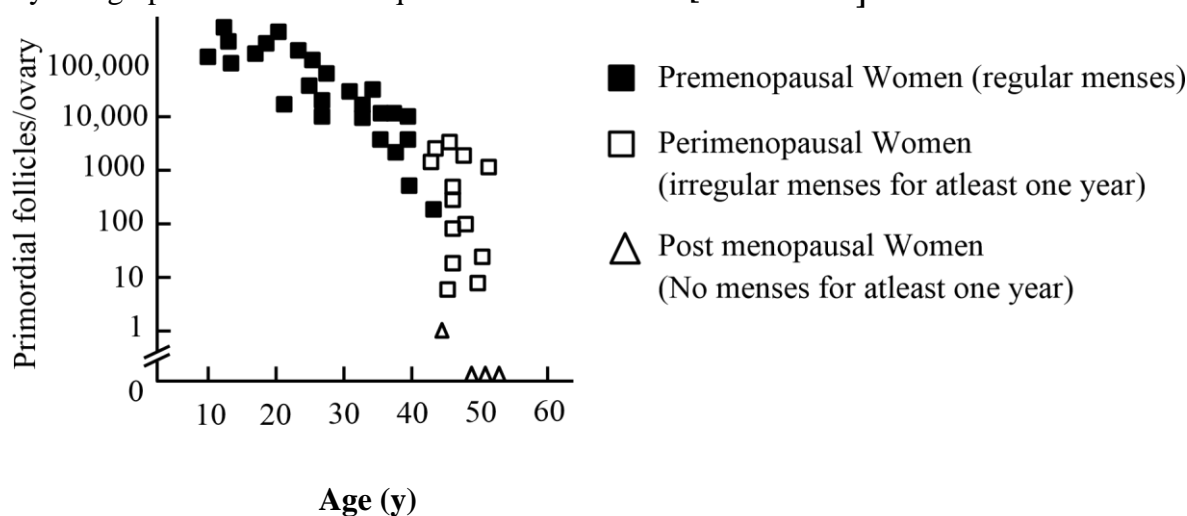
- (i) The glandular tissue in the breast has 15-20 clusters of cells called alveoli.
- (ii) The milk is stored in the lumen of alveoli.
- (iii) The alveoli join to form the mammary ducts.
- (iv) Mammary ampulla is connected to lactiferous ducts.

Choose the option that gives the correct detail of human mammary gland.

- (1) (i) and (ii)      (2) (ii) and (iii)      (3) (ii) and (iv)      (4) (i) and (iii)

2. The graph given below shows the number of primordial follicles per ovary in women at different ages.

Study the graph and answer the questions that follow. [CBSE 2023]



**(ii) Draw a diagram showing human foetus within the uterus and label any four parts in its. [CBSE 2023]**

**4. Breast-feeding the baby acts as a natural contraceptive for the mother because it prevents:**

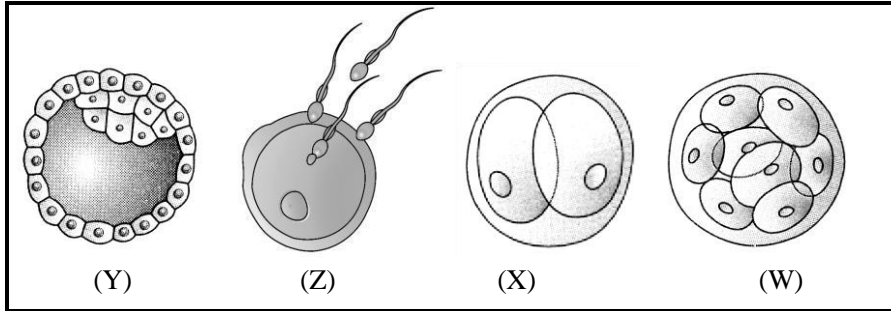
**[CBSE Term-I 2022]**

- (i) Ovulation                      (ii) Menstruation                      (iii) Insemination                      (iv) Fertilisation

- (1) (ii) and (iv)    (2) (i) and (iii)                      (3) (i) and (iv)    (4) (i) and (ii)

**5. The given figure shows the different stages of human embryo**

**[CBSE Term-I 2022]**



Identify the correct labelings for W, X, Y and Z and choose the correct option from the table below.

W	X	Y	Z
Cleavage	Blastocyst	Morula	Fertilisation
Blastocyst	Morula	Cleavage	Fertilisation
Morula	Cleavage	Blastocyst	Fertilisation
Morula	Blastocyst	Cleavage	Fertilisation

- (1)  
(2)  
(3)  
(4)

**6. During human embryonic development the external genital organs are well developed in the foetus by the end of – [CBSE Term-I 2022]**

- (1) 6 weeks of pregnancy                      (2) 12 weeks of pregnancy  
(3) 18 weeks of pregnancy                      (4) 24 weeks of pregnancy

**7. The accessory ducts in the human male reproductive system consists of [CBSE Term – I 2022]**

- (1) Epididymis, Prostate, Rete testis                      (2) Rete testis, Vas efferentia, Seminal vesicles  
(3) Vas efferentia, Bulbourethral, Epididymis                      (4) Rete testis, epididymis, Vas deferens

8. The source of gonadotropin LH and its corresponding function is: [CBSE Term-I 2022]

- (1) Anterior pituitary, ovulation (2) Anterior pituitary, Graafian follicle formation  
(3) Hypothalamus, Ovulation (4) Hypothalamus, Graafian follicle formation

### CASE BASED QUESTIONS

9. A women of 35 years age with a married life of eight years and having normal reproductive cycles visits a doctor along with her husband for consultation for infertility. They were not using any contraceptive methods. They have no child. The doctor advises them after a detailed physical examination of both of them to undergo following investigations:

- Seminal analysis of the husband.
- Follicular study of the wife.
- Blood test for follicle Stimulating Hormone (FSH) estimation for both

With your basic knowledge of human embryology and the case given above, answer the following questions:

(i) Seminal analysis of the husband was done for determining [CBSE Term-I 2022]

- (i) Sperm morphology  
(ii) Quantity and pH of semen  
(iii) Rate of sperm release into the Vagina

(1) (i) only (2) (i) and (ii) (3) (ii) and (iii) (4) (ii) only

(ii) An ultrasound – guided follicular study was done for the wife for determining the size and physical appearance of the [CBSE Term-I 2022]

- (1) Ovary (2) Oogonia (3) Antral follicles (4) Corpus Luteum

(iii) The blood test report of the wife showed low FSH value, which is indicative of –

[CBSE Term-I 2022]

- (1) low rate of formation of ovarian follicles (2) high rate of formation of ovarian follicles  
(3) low rate maturation of ovarian follicles (4) high rate of maturation of ovarian follicles

(iv) In the above case if the husband is found to have sperm count of less than 20 million/mL and the wife is diagnosed with blockage in the oviduct, the couple would be advised for:

[CBSE Term-I 2022]

- (i) ZIFT (ii) AI (iii) IVF (iv) ICSI

(1) (i) and (iii) (2) (ii) and (iii) (3) (iii) and (iv) (4) (i) and (iv)

(v) The high level of which gonadotropin/ovarian hormone in the blood sample of the wife taken on day 20 of her reproductive (menstrual) cycle would indicate the letual phase of the ovarian cycle?

[CBSE Term-I 2022]

- (1) FSH (2) LH (3) Estrogens (4) Progesterone



(vi) In which phase of the menstrual cycle is the blood sample of a woman taken that shows high levels of L.H. and estrogen? [CBSE Term-I 2022]

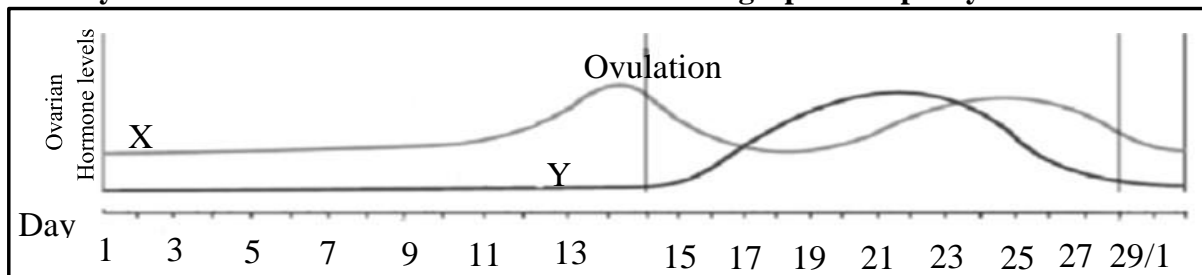
(1) Ovulatory phase (2) Menstrual phase (3) Secretory phase (4) Follicular phase

10. Name the glands that contribute to human seminal plasma. [CBSE IMP-Question]

11. A fully developed foetus initiates its delivery from the mother's womb. Justify the statement. [CBSE IMP-Question]

12. Study the graph given below related with menstrual cycle in females:[CBSE IMP-Question]

a. Identify ovarian hormones X and Y mentioned in the graph and specify their source.



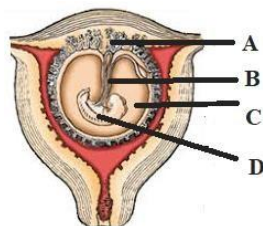
b. Correlate and describe the uterine events that take place according to the ovarian hormone levels X and Y mentioned in the graph on -

i. 6 – 15 days

ii. 16 – 25 days

iii. 26 – 28 days (when ovum is not fertilized)

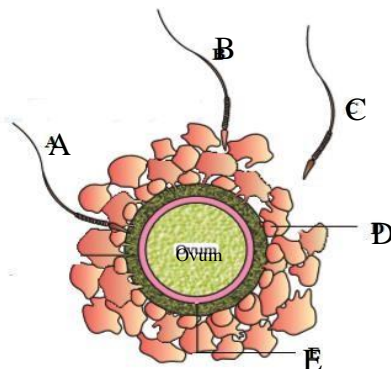
The following figure shows a foetus within the uterus. On the basis of the given figure, answer the questions that follow: [CBSE IMP-Question]



- c. In the above figure, choose and name the correct part (A, B, C or D) that act as a temporary endocrine gland and substantiate your answer. Why is it also called the functional junction?
- d. Mention the role of B in the development of the embryo.
- e. Name the fluid surrounding the developing embryo. How is it misused for sex determination?
13. Study the given diagram where A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females. [CBSE 2020]



- a. Identify A, B and its parts C and D.
- b. Write the name of cavity present in the stage B. e fate of C and D in the course of embryonic development in human.
14. Given below is the diagram of a human ovum surrounded by a few sperms. Study the diagram and answer the following questions: [CBSE 2019]



- a. Which one of the sperms would reach the ovum earlier?
- b. Identify 'D' and 'E'.
- c. Mention what helps the entry of sperm into the ovum and write the changes occurring in the ovum during the process.
- d. Name the specific region in the female reproductive system where the event represented in the diagram takes place.
15. Medically it is advised to all young mothers that breast feeding is the best for their newborn babies. Do you agree ? Give reasons in support of your answer. [CBSE 2018]
16. State from where do the signals for parturition originate in human females. [CBSE 2017]

## PREVIOUS YEAR QUESTIONS

1. Given below are four aspects of Reproductive Health in Column A and their related information in Column B : [CBSE 2023]

Column - A		Column - B	
S. No.	Terms used in Reproductive Health	S. No.	Significant information
(A)	MTP	(i)	Analysing fetal cells from amniotic fluid of the foetus
(B)	Amniocentesis	(ii)	Legalised in 1971
(C)	Saheli	(iii)	Programme initiated in 1951
(D)	Family Planning	(iv)	Non - steroidal oral contraceptive

Select the correct match from the following options :

- (1) (A) - (iv), B - (ii), (C) - (iii), (D) - (i)      (2) (A) - (ii), B - (i), (C) - (iv), (D) - (iii)  
 (3) (A) - (i), B - (iii), (C) - (ii), (D) - (iv)      (4) (A) - (ii), B - (i), (C) - (iii), (D) - (iv)
2. Given below are Column - A with a list of certain Assisted Reproductive Technologies (ART) and in Column - B the procedures followed during ART : [CBSE 2023]

Column - A		Column - B	
S.No.	Names of ART	S.No.	Procedures
(A)	GIFT	(i)	Transfer of ovum from a donor into the fallopian tube of another female.
(B)	ICSI	(ii)	Transfer of semen from the donor into the vagina of the female.
(C)	ZIFT	(iii)	Injecting sperms directly into the ovum.
(D)	IUI	(iv)	Transfer of early embryos into the fallopian tube.

Choose the option where ART correctly matches with the procedure.

- (1) (A) - (i), (B) - (ii), (C) - (iii), (D) - (iv)      (2) (A) - (iv), (B) - (i), (C) - (ii), (D) - (iii)  
 (3) (A) - (iv), (B) - (iii), (C) - (i), (D) - (ii)      (4) (A) - (i), (B) - (iii), (C) - (iv), (D) - (ii)
3. Assertion (A): Through Reproductive and Child Health (RCH) programmes in India ; we could bring down the population growth rate.

Reason (R): A rapid increase MMR and IMP were the reasons, along other reasons for this.

[CBSE Term-I 2022]

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

- 
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
  - (3) Assertion is true but Reason is false.
  - (4) Both Assertion and Reason are false.

4. **Assertion (A):** Sterilisation methods are generally advised for male/female partner method to prevent any more pregnancies.

**Reason (R):** These techniques are less effective and have high reversibility. [CBSE Term-I 2022]

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (3) Assertion is true but Reason is false.
- (4) Both Assertion and Reason are false.

5. Select the correct option for Human Chorionic Gonadotropin (hCG) released during embryonic development in humans. [CBSE Term-I 2022]

- (i) Helps in maintenance of pregnancy.
- (ii) Leads to rupture of Graafian follicle.
- (iii) Cause strong uterine contraction during childbirth.
- (iv) Brings metabolic changes in the mother.

- (1) (i) and (ii)      (2) (i) and (iv)      (3) (ii) and (iii)      (4) (ii) and (iv)

6. A specialized procedure to form an embryo in the laboratory in which sperm is directly, injected into the ovum is : [CBSE Term-I 2022]

- (1) IUT      (2) IUI      (3) ICSI      (4) ZIFT

7. Listed below are all reproductive tract infections except [CBSE Term-I 2022]

- (1) Genital herpes      (2) Filariasis      (3) Trichomoniasis      (4) Syphilis

8. **Assertion (A) :** Determining the sex of an unborn child followed by MTP is an illegal practice.

**Reason (R) :** Amniocentesis is a practice to test the presence of genetic disorders also.

[CBSE 2023]

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (3) Assertion is true but Reason is false.
- (4) Both Assertion and Reason are false.

9. Name and explain a surgical contraceptive method that can be adopted by the male partner of a couple. [CBSE 2023]

10. State the composition and principle of oral pills as a contraceptive measure taking the example of Saheli. [CBSE-IMP Question]

11. (a) IUDs are said to be effective contraceptives. Name any two common and write the mode of their actions.

(b) When is sterilisation advised to married couples? How is it carried out in a human male and a female, respectively? [CBSE 2020]

**12. Explain one application of each one of the following :**

**(a) Amniocentesis**

**(b) Lactational amenorrhea**

**(c) ZIFT**

**(d) Prepare a poster for the school programme depicting the objectives of : “Reproductive and Child Health Care Programme”.**

**[CBSE 2019]**

# CHAPTER 4

## PRINCIPLES OF INHERITANCE AND VARIATION

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### PREVIOUS YEAR QUESTIONS

- Assertion (A) :** In Thalassemia an abnormal myoglobin chain is synthesized due to a gene defect.

**Reason (R) :** □□Thalassemia is controlled by genes HBA1 and HBA2 on chromosome 16.

[CBSE 2023]
- By using Punnett square depict the genotypes and phenotypes of test crosses (where green pod colour (G) is dominant over yellow pod colour (g) in Garden pea with unknown genotype.

[CBSE 2023]
- It is sometimes observed that the F<sub>1</sub> progeny has a phenotype that does not resemble either of the two parents and has intermediate phenotype. Explain by taking a suitable example and working out the cross upto F<sub>2</sub> progeny.

[CBSE 2023]
- "It is sometimes observed that the F<sub>1</sub> progeny shows a phenotype that resembles both the parents." Explain this type of inheritance using the example of A,B,O blood groups in human.

[CBSE 2023]

**5.** The chromosome number is fixed for all normal organisms leading to species specification whereas any abnormality in the chromosome number of an organism results into abnormal individuals. For example, in humans 46 is the fixed number of chromosomes both in male and female. In male it is '44 + XY' and in female it is '44 + XX'. Thus the human male is heterogametic, in other words produce two different types of gametes one with '22 + X' chromosomes and the other with '22 + Y' chromosomes respectively. Human female, on the other hand is homogametic i.e. produces only one type of gamete with '22 + X' chromosomes only. Sometimes an error may occur during meiosis of cell cycle, where the sister chromatids fail to segregate called nondisjunction, leading to the production of abnormal gametes with altered chromosome number. On fertilisation such gametes develop into abnormal individuals.

- (a) **State what is aneuploidy.**
- (b) **If during spermatogenesis, the chromatids of sex chromosomes fail to segregate during meiosis, write only the different types of gametes with altered chromosome number that could possibly be produced.**
- (c) **A normal human sperm (22 + Y) fertilises an ovum with karyotype '22 + XX'. Name the disorder the offspring thus produced would suffer from and write any two symptoms of the disorder.** **[CBSE 2023]**

**OR**

(c) **Name a best known and most common autosomal aneuploid abnormality in human and write any two symptoms.**

**6.** The case of Down's syndrome in humans is: **[CBSE Term-I 2022]**

- (1) Extra copy of an autosome      (2) Extra copy of a sex chromosome  
(3) Absence of an autosome    (4) Absence of a sex chromosome

**7.** Which of the following features show the mechanism of sex determination in honey-bee?

**[CBSE Term-I 2022]**

- (1) An offspring formed from the union of a sperm and egg develops as a male.  
(2) Males have half the number of chromosomes than that of female.  
(3) The females are diploid having 32 chromosomes.

(4) Males have father and can produce sons.

8. Select the pair that is incorrect:

[CBSE Term-I 2022]

(1) Sickle-cell anaemia : Autosome liked recessive

(2) Haemophilia : Autosome linked recessive trait

(3) Colour blindness : Sex linked recessive trait

(4)Thalassemia : Autosome linked recessive trait

9. An example of a human trait where a single gene can exhibit multiple phenotypic expression is :-

[CBSE Term-I  
2022]

(1) Phenylketonuria

(2) Cystic fibrosis

(3) Thalassemia

(4) Haemophilia

10. Life cycle of *Drosophila melanogaster* is completed in :-

[CBSE Term-I  
2022]

(1) 7 days

(2) 14 days

(3) 21 days

(4) 28 days

11. How many types of gametes would develop by an organism with genotype AaBBCcDD?

[CBSE Term-I 2022]

(1) 1 (2) 2 (3) 3 (4) 4



12. In *Pisum sativum* the flower colour may be Violet (V) or White (v). What is the offsprings in a cross of  $VV \times vv$  would be expected to be violet? [CBSE Term-I 2022]

- (1) 25% (2) 50% (3) 75% (4) 100%

13. Which one of the gene pair is expected to give a ratio of 1 : 1 : 1 : 1 in the progeny of a Mendelian Dihybrid cross? [CBSE Term-I 2022]

- (1)  $AaBb \times AbBb$  (2)  $AABB \times AaBb$   
 (3)  $AaBb \times aabb$  (4)  $AABB \times aabb$

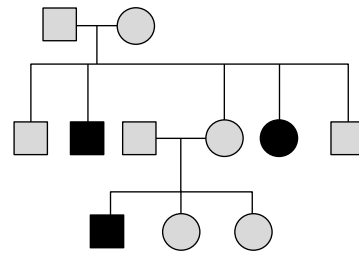
14. The progeny of a cross between two snapdragon plants heterozygous for flower colour, bearing different coloured flower would be: [CBSE Term-I 2022]

- (1) 50% pink, 50% white (2) 25% red, 50% pink, 25% white  
 (3) 50% red, 50% white (4) 75% red, 25% white

15. Study the given pedigree of a family and select the trait that shows this pattern of inheritance

[CBSE Term-I 2022]

- (1) Autosomal recessive, Phenylketonuria  
 (2) Sex-linked recessive, Colour blindness  
 (3) Autosomal dominant, Myotonic dystrophy  
 (4) Sex-linked dominant, Vitamin D resistant rickets



	Father	Mother	Child
(1)	$I^A i$	$I^B i$	$I^A i$
(2)	$I^A I^B$	$I^A i$	$I^A I^A$
(3)	$I^B i$	$I^A I^B$	$I^A i$
(4)	$I^B I^B$	$I^A I^B$	$I^A I^A$

16. A child with blood group A has father with blood group B and mother with blood group AB. What would be the possible genotypes of parents and the child? Choose the correct option:  
[CBSE Term-I 2022]

17. In a dihybrid Mendelian cross, garden pea plants heterozygous for violet flowers are crossed with homozygous white flowers and wrinkled seeds. The genotypic and phenotypic ratio of F<sub>1</sub> progeny would be: [CBSE Term-I 2022]

- (1) 9 : 3 : 3 : 1 (2) 1 : 2 : 2 : 1 (3) 1 : 1 : 1 : 1 (4) 3 : 1

18. Colour blindness is a sex linked recessive trait in humans. A man with normal colour vision marries a woman who is colourblind. What would be the possible genotypes of the parents, the son and the daughter of this couple? [CBSE Term-I 2022]

	Mother	Father	Daughter	Son
(1)	XX	X <sup>C</sup> Y	X <sup>C</sup> X	XY
(2)	X <sup>C</sup> X <sup>C</sup>	X <sup>C</sup> Y	X <sup>C</sup> X <sup>C</sup>	X <sup>C</sup> Y
(3)	X <sup>C</sup> X	X <sup>C</sup> Y	X <sup>C</sup> X	XY
(4)	X <sup>C</sup> X <sup>C</sup>	X <sup>C</sup> Y	X <sup>C</sup> X	X <sup>C</sup> Y

19. How many types of gametes can be produced in a diploid organism which is heterozygous for 4 loci? [CBSE Term-I 2022]

- (1) 4 (2) 8 (3) 16 (4) 32

20. The recombinant Frequency between the four linked genes is as follows:

- (i) between X and Y is 40%. (ii) between Y and Z is 30%.  
(iii) between Z and W is 10%. (iv) between W and X is 20%.

Select the option that shows the correct order of the position of W, X, Y and Z genes on the chromosome:  
[CBSE Term-I 2022]

- (1) Y – X – Z – W (2) Y – W – Z – X (3) X – Y – Z – W (4) Z – X – Y – W

21. A snapdragon plant with violet flowers was crossed with another such plant with white flowers. The F<sub>1</sub> progeny obtained had pink flowers. Explain, in brief, the inheritance pattern

seen in offsprings of F<sub>1</sub> generation? [CBSE IMP Question]

22. Karyotype of a child shows trisomy of chromosome number 21. Identify the disorder and state the symptoms which are likely to be exhibited in this case. [CBSE IMP Question]

23. How would you find out the genotype of a pea plant with violet flowers? With the help of Punnett's square showing crosses. [CBSE IMP Question]

24. What is aneuploidy? Name a chromosomal disorder in humans caused due to (a) gain of an autosome, and (b) loss of a sex chromosome in females. [CBSE 2020]
25. A normal couple has their first child, who is haemophilic. Work out a cross to show how it is possible. State the possibility of the normal and the haemophilic children, along with their sexes, that can be born to them. [CBSE 2020]
26. State Mendel's Law of Independent Assortment.
27. Write one example each of organisms exhibiting (i) male heterogamety, and (ii) female heterogamety. [CBSE 2019]
28. Why is the frequency of red-green colour blindness more in human males than in females? Explain. [CBSE 2019]
29. How is polygenic inheritance different from pleiotropy? Give one example of each. [CBSE 2019]
30. Write the sex of a human having XXY chromosomes with 22 pairs of autosomes. Name the disorder this human suffers from. [CBSE 2018]

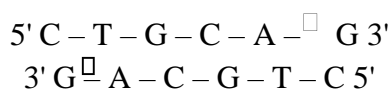
# CHAPTER 5

## MOLECULAR BASIS OF INHERITANCE



### PREVIOUS YEAR QUESTIONS

1. Given below is the restriction site of a restriction endonuclease Pst-I and the cleavage sites on a DNA molecule. [CBSE 2023]



Choose the option that gives the correct resultant fragments by the action of the enzyme Pst-I.

- (1)  $5' \text{ C - T - G C - A - G } 3'$   
 $3' \text{ G - A - C - G - T } \text{ C } 5'$
- (2)  $5' \text{ C - T G - C - A - G } 3'$   
 $3' \text{ G - A - G - C T - C } 5'$
- (3)  $5' \text{ C - T - G - C A - G } 3'$   
 $3' \text{ G - A - C - G T - C } 5'$
- (4)  $5' \text{ C - T - G - C - A G } 3'$   
 $3' \text{ G A - C - G - T - C } 5'$

2. Given below is a sequence of bases in mRNA of a bacterial cell. Identify the amino acid that would be incorporated at codon position 3 and codon position 5 during the process of its translation. [CBSE 2023]



- (1) Phenylalanine, Methionine                      (2) Cysteine, Glycine
- (3) Alanine, Proline                                      (4) Serine, Valine
3. **Human Genome Project (HGP) was a mega project launched in the year 1990 with some important goals. [CBSE 2023]**
- (a) **Enlist any four prime goals of HGP.**
- (b) **Name any one common non - human animal model organism which has also been sequenced thereafter.**
- 4.(a) (i) **How and why is charging of tRNA essential in the process of transition**

(ii) State the function of ribosome as a catalyst in bacteria during the process of translation (iii) Explain the process of binding of ribosomal units to mRNA during protein synthesis.

[CBSE 2023]

OR

(b) (i) Describe the dihybrid cross upto F<sub>2</sub> generation as conducted by Gregor Mendel using pure lines of Garden Pea for characters seed shape and seed colour. [CBSE 2023]

5. (a) Name and describe the steps involved in the technique widely used in forensics that serves as the basis of paternity testing in case of disputes. [CBSE 2023]
6. (i) Explain the process of aminoacylation of tRNA and its role in the process of translation.  
(ii) How does initiation of the translation process occur in prokaryotes? Explain.  
(iii) Where are the untranslated regions located on mRNA and why? [CBSE 2023]
7. Given below are the observations drawn in HGP. Select the options that shows the correct observations. [CBSE Term – I 2022]  
(i) The human genome contains 3164.7 billion base pairs.  
(ii) The average gene consists of 3000 bases.  
(iii) Less than 2% of the genome codes for proteins.  
(iv) Chromosome one has most genes (2698)  
(1) (i) and (ii)      (2) (ii) and (iii)      (3) (iii) and (iv)      (4) (i) and (iii)
8. The phosphoester linkage in the formation of a nucleotide involves the bonding [CBSE Term – I 2022]  
(1) Phosphate group and OH of 3'C of a nucleoside  
(2) Phosphate group and OH of 5'C of a nucleoside  
(3) Phosphate group and H of 3'C of a nucleoside  
(4) Phosphate group and H of 5'C of a nucleoside
9. The switching 'on' and 'off' of the lac operon in prokaryotes is regulated by [CBSE Term – I 2022]  
(1) Glucose    (2) Galactose    (3) Lactose    (4) Fructose
10. For 'in-vitro' DNA replication, which one of the following substrates need to be added along with the necessary enzymes the DNA template and specific conditions? [CBSE Term – I 2022]  
(1) Ribonucleotide triphosphate      (2) Deoxyribonucleoside triphosphate  
(3) Deoxyribonucleotide triphosphate      (4) Ribonucleoside triphosphate
11. Which one of the following factor will associate transiently with RNA polymerase to terminate transcription in prokaryotes? [CBSE Term – I 2022]  
(1) sigma factor      (2) RHO factor      (3) delta factor      (4) theta factor
12. Choose the correct pair of codon with its corresponding amino acid from the following list: [CBSE Term – I 2022]  
(1) UAG : Glycine      (2) AUG : Arginine      (3) UUU : Phenylalanine      (4) UGA : Methionine



16. A templated strand in a bacterial DNA has the following base sequence :

5' – TTTAACGAGG – 3'

[CBSE Term – I 2022]

(1) 5' – AAATTGCTCC – 3'      (2) 3' – AATTGCTCC – 5'

(3) 3' – AAAUUGCUC – 3'

(4) 5' – CCUCGUUAAA – 5'

17. tRNA has an \_\_\_\_\_ that has bases complementary to the codon. Its actual structure is a compact molecule which looks like \_\_\_\_\_.

[CBSE Term – I 2022]

Select the option that has correct choices for the two 'blanks'

(1) amino acid acceptor end, clover-leaf      (2) anticodon loop, clover-leaf

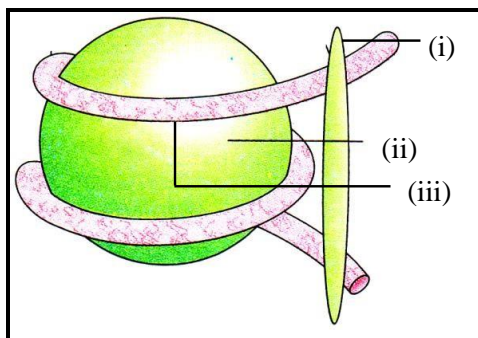
(3) amino acid acceptor end, inverted L      (4) anticodon loop, inverted L

18. Which type of RNA is correctly paired with its function?      [CBSE Term – I 2022]

(1) small nuclear RNA Processes rRNA      (2) transfer RNA : attaches to amino acid

(3) ribosomal RNA : involved in transcription      (4) micro RNA : involved in translation

19. The figure given below has labellings (i), (ii) and (iii), which two labellings in the given figure are components of a nucleosome? Select the correct option.      [CBSE Term – I 2022]



(1) (i) – HI histone, (ii) – DNA

(2) (i) – DNA, (ii) – Histone Octamer

(3) (ii) – DNA, (iii) – HI Histone

(4) (ii) – Histone octamer, (ii) – DNA

20. In molecular biology who proposed that genetic information flows in one direction?

[CBSE Term – I 2022]

(1) Har gobind Khorana

(2) Francis Crick

(3) Watson and Crick

(4) Marshall  
Nirenberg

21. Predict the effect if, the codon UAU coding for an amino acid at the 25<sup>th</sup> position of a polypeptide of 50 amino acids, is mutated to UAA.      [CBSE IMP. Question]

22. Assertion (A) : Primary transcripts in eukaryotes are nonfunctional.      [CBSE ]

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

(1) Both assertion and reason are true, and reason is the correct explanation of assertion.

(2) Both assertion and reason are true, but reason is not the correct explanation of assertion.



- (3) Assertion is true but reason is false.  
(4) Both assertion and reason are false.

**OR**

**Assertion (A) :** An organism with lethal mutation may not even develop beyond the zygote stage.

**Reason (R) :** All types of gene mutations are lethal. [CBSE IMP. Question]

- (1) Both assertion and reason are true, and the reason is the correct explanation of the assertion.  
(2) Both assertion and reason are true, but the reason is not the correct explanation of the assertion.  
(3) Assertion is true but reason is false.  
(4) Both assertion and reason are false

**23. Evaluate the suitability of DNA and RNA as genetic material and justify the suitability of the one that is preferred as an ideal genetic material.** [CBSE IMP. Question]

**OR**

**Explain the mechanism of DNA replication as suggested by Watson and Crick.**

[CBSE IMP. Question]

**24. Give below is one the strands of a DNA segment:** [CBSE 2020]

3' □□□□□□□□□□□□□□□□ TACGTACGTACGTACG 5'

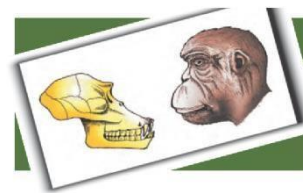
- (a) Write its complementary strand  
(b) Write a Possible RNA strands that can be transcribed from the above DNA molecule formed.
- 25. Explain the role of regulatory gene in a *lac* operon. Why is regulation of *lac* operon called as negative regulation?** [CBSE 2019]
- 26. Compare the processes of DNA replication and transcription in prokaryotes.** [CBSE 2019]
- 27. (a) Explain Griffith's 'transforming principle' experiment.**  
**(b) In the above experiment, "heat which killed one type of bacteria, did not destroy the properties of genetic material." Justify.** [CBSE 2019]
- 28. What is an operon ? Explain the functioning of *lac* operon when in an open state.** [CBSE 2018]
- 29. (a) Hershey and Chase carried their experiment in three steps : infection, blending, centrifugation. Explain each step.**  
**(b) Write the conclusion and interpretation of the result they obtained.** [CBSE 2017]

# CHAPTER 6

## EVOLUTION

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### PREVIOUS YEAR QUESTIONS

1. At which stage during evolution did human use hides to protect their bodies and buried their dead?  
[CBSE-2023]  
(1) *Homo habilis*      (2) Neanderthal man      (3) Java man      (4) *Homo erectus*
2. Mention Darwin's observations made on finches during his visit to Galapagos Islands. Write the explanation given by Darwin on his observations. [CBSE 2023]
3. Industrial melanism in England after 1850 is an excellent example of Natural selection. Explain how? [CBSE 2023]
4. How would the gene flow or genetic drift affect the population in which either of them happen to take place? [CBSE 2019]
5. According to Darwinian theory of natural selection the rate of appearance of new forms is linked to the life-cycle or the life-span of an organism. Explain with the help of an example. [CBSE 2019]
6. Describe S.L. Miller's experiment. Comment on the observations he made and his contribution towards the origin of life on Earth. [CBSE 2019]
7. "Appearance of melanized moths post-industrialization in England is a classic example of evolution by natural selection." Explain. [CBSE 2019]
8. According to the Hardy-Weinberg principle, the allele frequency of a population remains constant. How do you interpret the change of frequency of alleles in a population? [CBSE 2019] (a) How does the Hardy-Weinberg equation explain genetic equilibrium?  
(b) Describe how this equilibrium is disturbed that may lead to founder effect. [CBSE 2019]
9. Charles Darwin during his famous sea voyage around the world in a ship (HMS Beagle), concluded that there has been gradual evolution of life. Answer the following questions:  
(a) What is his theory known as ? Explain the silent features of his theory.  
(b) Name a scientist who arrived at a similar conclusion as that of Charles Darwin. [CBSE 2019]
10. Write the names of the following : (a) A 15 mya primate that was ape-like (b) A 2 mya primate that lived in East African grasslands [CBSE 2018]
11. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations ? [CBSE 2018]

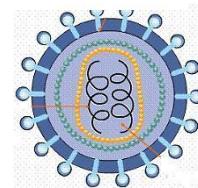
- 12. (a) Differentiate between analogous and homologous structures.**  
**(b) Select and write analogous structures from the list given below :**
- (i) Wings of butterfly and birds**
  - (ii) Vertebrate hearts**
  - (iii) Tendrils of bougainvillea and cucurbita**
  - (iv) Tubers of sweet potato and potato** **[CBSE 2018]**
- 13. State two postulates of Oparin and Haldane with reference to origin of life.** **[CBSE 2017]**
- 14. Write the characteristics of Ramapithecus, Dryopithecus and Neanderthal man.** **[CBSE 2017]**

# CHAPTER 7

## HUMAN HEALTH AND DISEASE

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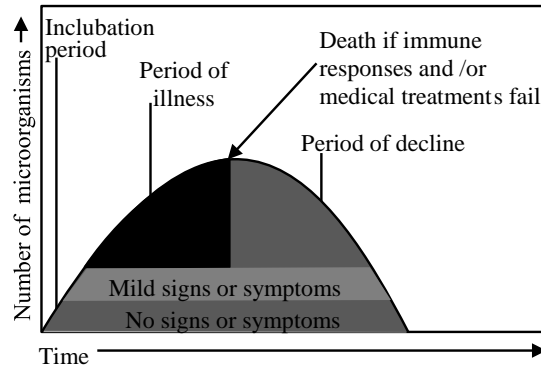
### PREVIOUS YEAR QUESTIONS

1. Tetanus antitoxin (Tetanus toxoid) when injected into the human body it immediately provides: [CBSE 2023]
  - (a) Innate immunity
  - (b) Passive immunity
  - (c) Auto immunity
  - (d) Active immunity
2. Select the pathogen mismatched with the symptoms of disease caused by it from the list given below : [CBSE 2023]
  - (a) *Entamoeba histolytica* : Constipation, abdominal pain.
  - (b) *Epidermophyton* : Dry scaly lesions on nail.
  - (c) *Wuchereria bancrofti* : Chronic inflammation of lymphatic vessels of lower limb.
  - (d) *Haemophilus influenzae* : Blockage of the intestinal passage.
3. Interferons are proteins. In humans they are secreted by : [CBSE 2023]
  - (a) Thymus gland
  - (b) B-lymphocytes
  - (c) Viral infected cells
  - (d) Tonsils
4. The decrease in the T - lymphocytes count in human blood will result in : [CBSE 2023]
  - (a) Decrease in antigens
  - (b) Decrease in antibodies
  - (c) Increase in antibodies
  - (d) Increase in antigens
5. **Immunotherapy these days is one of the most efficient way of treatment of cancer. The therapy involved activates the immune system and destroys the tumour.**
  - (i) Write an example of one such biological response modifier used in immunotherapy.
  - (ii) Why do patients need such substances if immune system is already working in body?
  - (iii) State what is 'Contact inhibition'. [CBSE 2023]
5. (a) "*Plasmodium* protozoan needs both a mosquito and human host for its continuity. "Explain.

OR

- (b) We all must work towards maintaining good health because 'health is wealth' Enlist any six ways of achieving good health. [CBSE 2023]

6. When a microorganism invades a host, a definite sequence of events usually occur leading to infection and disease, causing suffering to the host. This process is called pathogenesis. Once a microorganism overcomes the defense system of the host, development of the disease follows a certain sequence of events as shown in the graph. Study the graph given below for the sequence of events leading to appearance of a disease and answer the questions that follow :



- (a) In which period, according to the graph there are maximum chances of a person transmitting a disease/infection and why?
- (b) Study the graph and write what is an incubation period. Name a sexually transmitted disease that can be easily transmitted during this period. Name the specific type of lymphocytes that are attacked by the pathogen of this disease. [CBSE 2023]

OR

- (b) Draw a schematic labelled diagram of an antibody.
- (c) In which period, the number of immune cells forming antibodies will be the highest in a person suffering from pneumonia? Name the immune cells that produce antibodies.

[CBSE 2023]

8. Why a malignant tumour considered to be more damaging than a benign tumour? Explain. [CBSE 2023]
9. A boy developed some allergic reactions when he straight entered into his air conditioned room after a game of football outside his house. Write any two symptoms that could be noticed in such condition. How does our body combat such conditions? [CBSE Term – II 2022]
- 10.(a) (i) Write the Scientific name of the plant from where natural cannabinoids are obtained. (ii) Mention the parts of the plant that are used for extracting the drug. [3] (iii) How does the drug affect human body ?

OR

- (b) Epithelial lining of our intestine is considered as secondary lymphoid organ. Justify the statement. [CBSE Term – II 2022]

11. (a) Write the complete name of the diagnostic test for AIDS. Explain the principle it works on. (b) Name the type of genetic material present in AIDS causing pathogen.

[CBSE Term – II 2022]

A patient complains of suffering from constipation, stomach ache, stool with blood clots and excess mucous. The physician diagnosed it as amoebiasis, after stool test.

(a) Write the scientific name of the microbe identified in the stool sample.

(b) How do you think, the patient must have contracted it? [CBSE Term – II 2022]

(c) Write your suggestions to the patient to avoid infection in future.

12. Identify and name the disease in which the patient's cells lose the property of contact inhibition. State its possible causes and explain any three methods to accurately detect the pathological and physiological changes that take place due to the disease in living tissues.

[CBSE Imp. Question]

OR

A patient had tested positive to ELISA Test. Identify the disease and the pathogen responsible, give reasons for the reduced/ weak immunity of the patient and trace the path, spread and effects of this pathogen in the human body. [CBSE Imp. Question]

OR

It is often observed that the chances of a person suffering from measles in his or her lifetime are low, if he or she has suffered from the disease in their early childhood. Justify the statement. [CBSE 2020]

14. A student on a field trip suddenly felt breathlessness and started to sneeze very badly. Nature this response and explain what it is due to. [CBSE 2019]

15. Mention one application for each of the following: [CBSE 2018]

(a) Passive immunization

(b) Antihistamine

(c) Colostrum

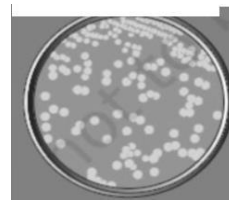
(d) Cytokinin-barrier

16. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter. [CBSE 2018]

17. Explain the relationship between B-lymphocytes and T-lymphocytes in developing an immune respons. [CBSE 2017]

# CHAPTER 8

## MICROBES IN HUMAN WELFARE



### PREVIOUS YEAR QUESTIONS

1. Given below are the list of the commercially important products and their source organisms. Select the option that gives the correct matches. [CBSE 2023]

List-A		List-B	
S. No.	Bioactive Products	S. No.	Microbes (Source Organism)
(A)	Cyclosporin A	(i)	<i>Streptococcus</i>
(B)	Statins	(ii)	<i>Trichoderma polysporum</i>
(C)	Streptokinase	(iii)	<i>Penicillium notatum</i>
(D)	Penicillin	(iv)	<i>Monascus Purpureus</i>

**Options :**

- (a) (A)-(i) (B)-(ii), (C)-(iii), (D)-(iv)                      (b) (A)-(iii) (B)-(iv), (C)-(ii), (D)-(i)  
(c) (A)-(iv) (B)-(iii), (C)-(ii), (D)-(i)                      (d) (A)-(ii) (B)-(iv), (C)-(i), (D)-(iii)
2. Certain specific bacterial spores are mixed in water and sprayed over *Brassica* crop to control butterfly caterpillars. [CBSE 2023]  
Name this bacterium and its mode of action on the butterfly caterpillars.
3. (a) (i) Give an example of a genus of fungi that forms mycorrhizal association with plants.  
(ii) How does the plant derive benefits from this association? [CBSE 2023]
4. On spraying *Bacillus thuringiensis* on an infected cotton crop field the pests are killed by the toxin, however the toxin although produced by the bacteria does not affect it. Explain giving reason? [CBSE 2023]
5. Farmers are often suggested to use the following organisms in their crop land so as to improve the soil fertility. Explain. [CBSE Term – II 2022]
6. Organic farmer use *Trichoderma* and *Baculovirus* as biological control agents [CBSE Term – II 2022]  
Explain four advantages of mycorrhizal association to plants. [CBSE IMP Question]
7. A farmer noticed that nematode infection in tobacco plants has resulted in the reduction in the yield. Suggest a strategy which provides cellular defense for providing resistance to this pest. Explain the technique. [CBSE IMP Question]
8. Name the genus of baculovirus that acts as a biological control agent in spite of being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job. [CBSE 2020]
9. What are 'flocs', formed during secondary treatment of sewage?

10. Write any two places where methanogens can be found. [CBSE 2019]
11. Briefly describe the process of secondary treatment given to municipal waste water (sewage) before it can be released into fresh water bodies. Mention another benefit provided by this process. [CBSE 2019]
13. Baculoviruses are good example of biocontrol agents. Justify giving three reasons. [CBSE 2018]
- 14(a) Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify.
- (b) Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents. [CBSE 2018]
14. Secondary treatment of the sewage is also called Biological treatment. Justify this statement and explain the process. [CBSE 2017]
15. How does the application of the fungal genus, *Glomus*, to the agricultural farm increase the farm output? [CBSE 2017]
16. Describe how do 'flocs' and 'activated sludge' help in Sewage Treatment. [CBSE 2017]
17. List the events that reduce the Biological Oxygen Demand (BOD) of a primary effluent during sewage treatment. [CBSE 2017]