Class XII Session 2026-27
Subject - Biology
Sample Question Paper - 9

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. Diameter of the pollen grain generally is **[1]**

   a) 10 to 15 micrometer
   b) 25 to 50 micrometer
   c) 50 to 100 micrometer
   d) 5 to 10 micrometer

2. Large scale industrial production of streptokinase for human welfare is done using the microbe: **[1]**

   a) Streptobacilli
   b) Streptococcus
   c) Streptomyces
   d) Streptopneumoniae

3. Which of the following is correctly matched? **[1]**

   a. Stratification- Population
   b. Aerenchyma - Opuntia
   c. Age pyramid - Biome
   d. Parthenium hysterophorus - Threat to biodiversity

   a) Aerenchyma - Opuntia
   b) Stratification - Population
   c) Parthenium hysterophorus - Threat to biodiversity
   d) Age pyramid - Biome

4. Which of the following samples of DNA in the table given below will give the desired result during polymerase chain reaction? **[1]**

   a)

Sample	Temperature used for Denaturation	Enzyme used for extension

I	High temp./90°C	Heat stable

b)

Sample	Temperature used for Denaturation	Enzyme used for extension
IV	High temp./90°C	Heat unstable

c)

Sample	Temperature used for Denaturation	Enzyme used for extension
III	Low temp./50°C	Heat resistant

d)

Sample	Temperature used for Denaturation	Enzyme used for extension
II	Low temp./50°C	Heat stable

5. Main cause of extinction of species from tropics is: **[1]**

a) Pollution
b) Soil erosion
c) Deforestation
d) Afforestation

6. Which one of the following statements is wrong: **[1]**

a. Sucrose is a disaccharide
b. Cellulose is a polysaccharide
c. Uracil is a pyrimidine
d. Glycine is a sulphur containing amino acid

a) Statement b is wrong
b) Statement a is wrong
c) Statement d is wrong
d) Statement c is wrong

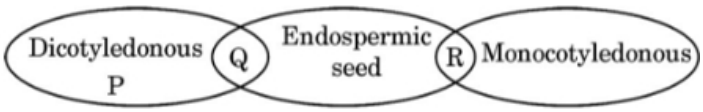
7. Signal of parturition originate from: **[1]**

a) Placenta only
b) Foetus only
c) Oxytocin released from mother pituitary gland
d) Placenta and fully developed foetus

8. **Cry' protein** coded by gene Cry IAb controls **[1]**

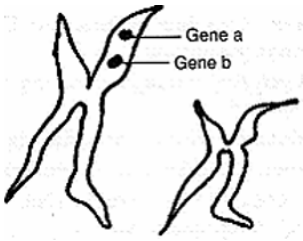
a) Cotton bollworm
b) Mosquito
c) Corn borer
d) Tobacco budworm

9. Refer to the Venn diagram given below. Select the option with correct examples P, Q, and R: **[1]**



a) P: Pea, Q: Gram, R: Barley
b) P: Castor, Q: Onion, R: Wheat
c) P: Coconut, Q: Rubber, R: Groundnut
d) P: Bean, Q: Castor, R: Maize

10. Given below is a highly simplified representation of human sex chromosomes from a karyotype. The genes a and b could be of: **[1]**



a) Attached ear lobe and Rh blood group

b) Haemophilia and red green colour blindness

c) Colour blindness and body height

d) Phenylketonuria and haemophilia.

11. The mutation in germ cells **[1]**

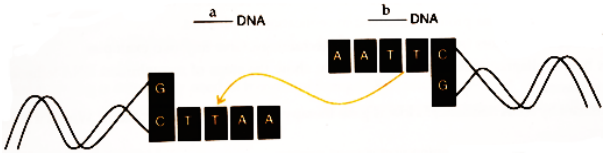
a) can be detected in the same generation of an individual

b) can be detected only in the next generation

c) are more deleterious

d) are less deleterious

12. Study the linking of DNA fragments shown below and name the 'a' DNA and 'b' DNA: **[1]**



a) a - Foreign DNA, b - Vector DNA

b) Vector DNA, b - Vector DNA

c) Foreign DNA, b - Foreign DNA

d) a - Vector DNA, b - Foreign DNA

13. **Assertion (A):** Progeny of pure line is heterozygous. **[1]**
Reason (R): Pure lines are not the progeny of homozygous organisms.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) If both A and R are false.

14. **Assertion (A):** Most **evolutionary trees** place information about pattern of relationship on horizontal axis and time on vertical axis. **[1]**
Reason (R): An **evolutionary tree** depicts pattern of relationship among parents and offsprings.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

15. **Assertion (A):** One of the property of genetic code is degeneracy. **[1]**
Reason (R): Some amino acids can be coded by more than one codon.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

16. **Assertion (A):** Mast cells in the human body release excessive amounts of inflammatory chemicals, which cause allergic reactions. **[1]**

Reason (R): Allergens in the environment on reaching the human body stimulate mast cells in certain individuals.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

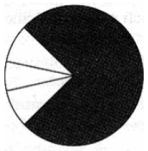
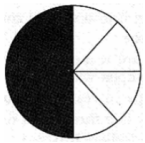
Section B

17. A patient who has undergone an organ transplant is put on **immunosuppressant**. Name the **immunosuppressant** and its source organism. **[2]**

OR

Common yeast is known as Baker's yeast and also as Brewer's yeast. Justify.

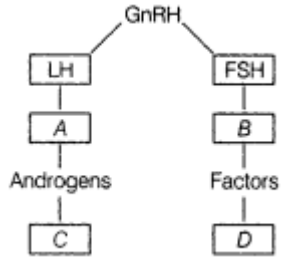
18. In the pie chart (a) and (b) drawn below to show the global animal diversity, which group of animals would you name and write on the areas shaded back in (a) and (b). In which kind of habitat would you find these groups of animals? **[2]**

1.  2. 

19. (A) bacterial cell is shown in the figure given below. Label the part (A) and (B). Also mention the use of part 'A' in rDNA technology. **[2]**



20. Identify A, B, C and D with reference to gametogenesis in humans, in the flow chart given below. **[2]**



OR

a. Mother's milk is considered very essential for the new born infant. Justify.

b. What is a **vaccine**? Explain the principle on which it works.

21. Explain the logistic growth pattern of a population. Why do population growth patterns of all organisms ultimately follow it? **[2]**

OR

What does S-shaped pattern of population growth represent? How is T-shaped pattern different from it and why?

Section C

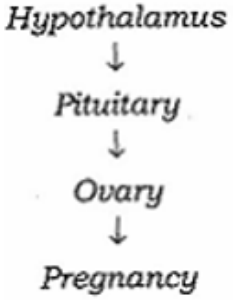
22. a. Match the microbes listed under Column-A with the products mentioned under Column-B. **[3]**

Column –A	**Column –B**

(H) Penicillium notatum	(i) Statin
(I) Trichoderma polysporum	(ii) ethanol
(J) Monascus purpureus	(iii) antibiotic
(K) Saccharomyces cerevisiae	(iv) Cyclosporin-A

b. Why does **Swiss Cheese** develop large holes?

23. Study the following flow chart and answer the following question: **[3]**



i. Name the hormones involved in each state.

ii. Explain the functions of hormones involved in each state.

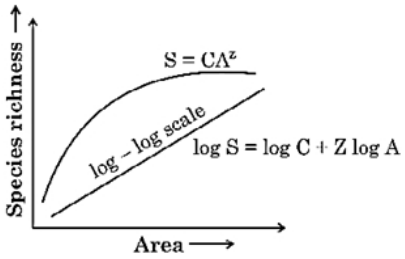
iii. Write the name of the placental hormone.

24. i. Compare the mechanism of sex determination in humans with that of honey bees, with respect to chromosome number. **[3]**

ii. How is the gamete formation comparable in the above two cases?

25. a. Write the inference drawn by Alexander von Humboldt after his extensive explorations of South Americal jungle. **[3]**

b. Study the graph given below:



As per Alexander von Humboldt, what do the symbols S, A, Z and C in the graph stand for, in respect of a species and area relationship?

26. What is Hydrophily? Name any hydrophilous plant and give its three important characters which help in pollination. **[3]**

27. In ecosystem the movement of nutrients is called cycling while the term 'flow' used for energy. Why? **[3]**

28. i. Explain the mode of action of Cu^{++} releasing IUDs as a good contraceptive. How is hormone-releasing IUD different from it? **[3]**

ii. Why is 'Saheli' a preferred contraceptive by women (any two reasons)?

Section D

29. **Read the following passage and answer the questions that follow:** **[4]**

The process of copying genetic information from template strand of DNA into RNA is called transcription. It is mediated by RNA polymerase. Transcription takes place in

the nucleus of eukaryotic cells. In transcription, only a segment of DNA and only one of the strands is copied into RNA.

a. Why is the strand of DNA with $3' \longrightarrow 5'$ polarity transcribed and not the other strand of $5' \longrightarrow 3'$ polarity? **(1)**

b. i. Why is hnRNA required to undergo splicing? **(1)**

OR

ii. Mention the two additional processes which hnRNA needs to undergo after splicing to become functional. **(1)**

c. Why is only one strand of the DNA transcribed? Give two reasons. **(2)**

30. **Read the following text carefully and answer the questions that follow:** **[4]**

Ryan is suffered from Adenosine Deaminase deficiency is a hereditary disease. His parents consulted a doctor. The doctor prescribed treatment through gene therapy?

i. What is gene therapy? (1)

ii. What is the function of adenosine Deaminase enzyme? (1)

iii. In which year the first clinical gene therapy was given? (2)

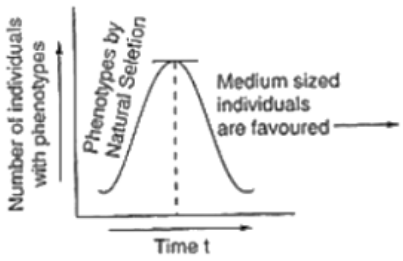
OR

Which tissue is obtained from the ADA patient for gene therapy? (2)

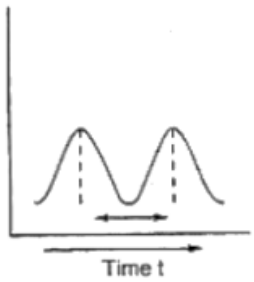
Section E

31. Study the figure (a) and (b) given below and answer the questions given after the graphs. **[5]**

a.



b.



i. Under the influence of which type of Natural selection would graph (a) become like a graph.

ii. What could be the likely reasons of new variations arising in the population?

iii. Who suggested Natural Selection as a mechanism of evolution?

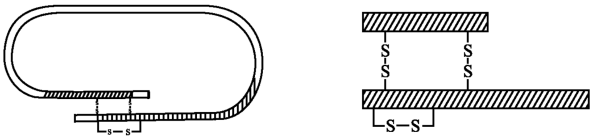
OR

Write the Oparin and Haldane's hypothesis about the origin of life on Earth. How does meteorite analysis favour this hypothesis?

32. Peptide hormones or protein hormones are hormones whose molecules are **peptides** **[5]**

or proteins, respectively. These hormones have an effect on the endocrine system of animals, including humans.

In the given figure, Form (A) and Form (B) represents different forms of a proteinaceous hormone secreted by pancreas in mammals.



Form (A) Form (B)

i. Name the hormone. What type of bonding is present between chains of this hormone?

ii. What are these form (A) and form (B)? How these forms differ from each other?

iii. Explain how was this hormone produced by Eli Lilly, an American company, using rDNA technology.

OR

i. **EcoRI** has played very significant role in r-DNA technology.

I. Explain the convention for naming EcoRI.

II. Write the recognition site and the cleavage sites of this restriction endonuclease.

ii. What are the protruding and hanging stretches of DNA produced by these restriction enzymes called? Describe their role in formation of r-DNA.

33. A 30 year old man was admitted to a hospital with recurrent infections, weight loss, prolonged fever. His blood report showed a decline in count of T-Lymphocytes thus affecting immune system. **[5]**

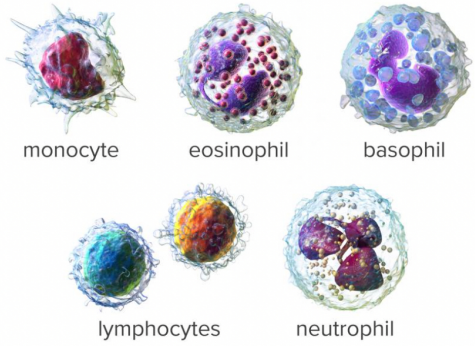
i. Identify the disease and its causative agent.

ii. How did the pathogen affect the immune system once it entered the body? Explain.

iii. Mention two major modes of its transmission.

OR

A lymphocyte is **a type of white blood cell**. Enlarge. Blood cells. Blood contains many types of cells: white blood cells (monocytes, lymphocytes, neutrophils, eosinophils, basophils, and macrophages), red blood cells (erythrocytes), and platelets. Blood circulates through the body in the arteries and veins.



a. Why are the antigens called antibody-generating chemicals?

b. Which two types of lymphocytes are involved in immunity?

c. Give the common site of formation of two types of lymphocytes. **OR**

d. What is the site of differentiation of two types of lymphocytes?

Solution

Section A

1.

(b) 25 to 50 micrometer
Explanation:
25 to 50 micrometer

2.

(b) Streptococcus
Explanation:
Streptococcus

3.

(c) Parthenium hysterophorus - Threat to biodiversity
Explanation:
Parthenium hysterophorus - Threat to biodiversity

4. **(a)**

Sample	Temperature used for Denaturation	Enzyme used for extension
I	High temp./90°C	Heat stable

Explanation:

Sample	Temperature used for Denaturation	Enzyme used for extension
I	High temp./90°C	Heat stable

5.

(c) Deforestation
Explanation:
Deforestation

6.

(c) Statement d is wrong
Explanation:
Statement d is wrong

7.

(d) Placenta and fully developed foetus
Explanation:
The signal of parturition (labour pain) originates from the placenta and movement of the foetus. Some hormones like oxytocin generate ejection reflex for parturition.

8.

(c) Corn borer
Explanation:
Corn borer

9.

(d) P: Bean, Q: Castor, R: Maize
Explanation:
Bean in dicot seed
Castor seed is dicot endospermic seed.
Maize is mocot endospermic seed.

10.

(b) Haemophilia and red green colour blindness
Explanation:
Haemophilia and red-green colour blindness both are a sex-linked recessive gene on X chromosome. Body height is an example of polygenic inheritance. Rhesus blood group is base on the presence or absence of Rh-protein on the surface of RBC, phenylketonuria (PKU) is a recessive autosomal variation.

11.

(b) can be detected only in the next generation
Explanation:
The solution is correct because mutations in germ cells (sperm and egg) are passed on to the next generation. These mutations will not affect the individual in which they occur but can be observed in the offspring. Therefore, the effects of these mutations can only be detected in the next generation, not in the individual that carries the mutation.

12.

(d) a - Vector DNA, b - Foreign DNA
Explanation:
a - Vector DNA, b - Foreign DNA

13.

(d) If both A and R are false.
Explanation:
If both A and R are false.

14.

(c) A is true but R is false.
Explanation:
A is true but R is false.

15. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Both A and R are true and R is the correct explanation of A.

16. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
The IgE-primed mast cell releases granules and powerful chemical mediators, such as histamine, cytokines, granulocyte-macrophage colony-stimulating factor (GM-CSF),

leukotrienes, heparin, and many proteases into the environment. These chemical mediators cause the characteristic symptoms of allergy.

Section B

17. i. Cyclosporin A
    ii. Trichoderma polysporum

    OR

    Common yeast is employed in the fermentation of -
    (i) dough, used for making bread, cakes in bakeries.
    (ii) Fruit juices and malt in breweries for the production of alcoholic beverages,
    hence it is known as both as baker's and brewer's yeast.
18. A - Insects. They are the most species-rich taxonomic group in the animal kingdom, making up more than 70 per cent of the total species found on earth. Insects are found in almost all types of habitats.
    B - Fish. Among the vertebrates, fish form the largest group including both freshwater and seawater fish.
19. (A) - Plasmid, (B) - Nucleoid
    Plasmid is used as vector to transfer the gene of interest in the host cell.
20. A- Leydig's cell
    B- Sertoli cell
    C- Spermatogenesis (Formation of sperms)
    D- Spermiogenesis (Transformation of spermatid into sperm)

    OR

    a. Colostrum (The yellowish fluid) secreted by mother (during the initial days of lactation) has abundant antibodies or IgA to protect the new born baby or to provide passive immunity.
    b. Vaccine is a preparation of antigenic proteins of pathogen or inactivated or weakened pathogen.
    When a person is vaccinated the antibodies are produced in the body against particular antigens would neutralise the pathogenic agents during actual infection, Vaccines also generate memory B and T cells that recognize the pathogen quickly on subsequent exposure, and overwhelm the invaders with a massive production of antibodies.
21. A population growing in a habitat with limited resources, shows a lag phase, followed by phases of acceleration and deceleration and finally an asymptote when the population density reaches the carrying capacity, a plot of population density in relation to time results in sigmoid curve.
    Since resources for growth of most organisms are finite, and become limiting sooner or later the logistic growth pattern is ultimately followed.

    OR

    - S-shaped pattern represents logistic growth
    - T-shaped pattern represents unlimited growth
    - The population grows in an exponential or geometric fashion and results in a T-shaped curve

Section C

22. a. Following are the matched pairs:
        - Penicillium notatum- (iii) Antibiotic
        - Trichoderma polysporum- (iv) Cyclosporin -A
        - Monascus pupureus- (i) Statin
        - Saccharomyces cerevisiae- (ii) Ethanol
    b. Large holes in 'Swiss cheese' are developed due to the production of a large amount of carbon dioxide produced by the bacterium named ***Propionibacterium sharmanii.***
23. i. The hormones involved in each stage are as follows:
        a. **Hypothalamus-** Gonadotropin-releasing hormone (GnRH)
        b. **Pituitary-** FSH and LH
        c. **Ovary-** LH
        d. **Pregnancy-** Progesterone and Human chorionic gonadotropin (hCG)

ii. The functions of the hormone involved in each stage are as follows:

a. **Hypothalamus:** It releases gonadotropin-releasing hormone (GnRH), which stimulates pituitary.

b. **Pituitary:** After stimulation, it secretes FSH and LH. FSH regulates the functioning of the ovary during follicular phase by stimulating the growth of an ovarian follicle into mature Graafian follicle and secretion of oestrogens from the follicle cells. LH stimulates the mature follicle to rupture and release the ovum(ovulation).

c. **Ovary:** After ovulation LH stimulates the formation of corpus luteum inside the ruptured follicle.

d. **Pregnancy:** Corpus luteum starts the secretion of progesterone and hCG is secreted from the placenta which is essential for the maintenance of pregnancy.

iii. Human chorionic gonadotropin (hCG) hormone is secreted from the placenta.

24. i. In honeybee union of a sperm and an egg develops as a female, and an unfertilised egg develops as a male by means of parthenogenesis. Whereas the females are diploid and having 32 chromosomes and males are haploid and they have 16 chromosomes but in humans, both the male and female individuals have 23 pair of chromosomes, that is female 44+ XX and males 44+ XY.

ii. In humans gametes are formed by the process of cell division called meiosis and in the honeybee, the process is different in case of female and male:

a. female gametes are formed by meiosis

b. male gametes are formed by mitosis

25. a. Species richness increased with increasing explored area up to a limit.

b. S = Species richness
Z = Slope of the line /regression coefficient
A = Area
C = Y-intercept

26. Hydrophily - It is the transfer of pollen grains from anthers to the stigma through the agency of water.
Vallisneria is a hydrophilous plant. Its important characteristics that help in pollination are:

i. Unisexual flowers are small, colourless, nectarless.

ii. Calyx and corolla and other floral parts are the unwettable. Mature male flowers abscise and float on water.

iii. Female flowers have long stalks. Stigmas are well exposed, long, and sticky.

iv. Pollen grains and stigmas are unwettable. After pollination female flowers are pulled inside the water.

27. Nutrients are required by organisms to sustain their life, which are provided by earth and returned to earth after their death and decay. Thus, there is exchange of nutrients between living and non-living components of biosphere, whereas the energy flow in an ecosystem is always unidirectional, i.e. solar radiations producers herbivores carnivores. There is decrease in the content and flow of energy with the rise in trophic level. Thus, the terms cycling and flow are best suited for nutrients and energy respectively.

28. i. Intra-Uterine Device is inserted by doctors or expert nurses in the uterus through the vagina. These Intra Uterine Devices are presently available as the non-mediated IUDs, copper-releasing IUDs (CuT) and the hormone-releasing IUDs(LNG-20). IUDs increase phagocytosis of sperms within the uterus and the Cu ions released suppress sperm motility and the fertilizing capacity of sperms. The hormone-releasing IUDs, in addition, make the uterus unsuitable for implantation and the cervix hostile to sperms.

ii. 'Saheli' a preferred contraceptive by women because 'Saheli' is a 'Once in a Week' type pill and easy to use.

Section D

29. a. Because RNA polymerase carries out polymerisation in $5' \rightarrow 3'$ direction only.

b. i. Since hnRNA contains both exons or coding sequence and introns or non-coding sequence, it undergoes splicing to remove the introns or non-coding sequence.

OR

ii.
- Capping / addition of $^{m}G_{ppp}$ (Methyl Guanosine Triphosphate) at 5' of hnRNA.
- Tailing / Adenylate residue (200-300) are added at the 3' end in a template strand as poly A tail.

c.
- If a segment of DNA produces two polypeptides the genetic information machinery becomes complicated / two different polypeptides will be formed and one of which may not be useful for the cell.
- The two complementary RNA molecules produced simultaneously will form a double-stranded RNA that will not be translated into polypeptides.

30. i. Gene therapy is a collection of methods that allow correction of gene defects that have been diagnosed in a child/embryo.

ii. Adenosine deaminase is crucial for the immune system.

iii. In 1990 a four-year girl.

OR

Lymphocytes from the blood of the patient are obtained for gene therapy.

Section E

31. i. When disruptive natural selection operates.

ii. Mutation, gene flow genetic drift, recombination.

iii. Charles Darwin.

OR

Oparin of Russia and Haldane of England proposed the theory that the first form of life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, etc.) and that formation of life was preceded by chemical evolution (the formation of diverse organic molecules from inorganic constituents) under high temperature, volcanic storms and reducing atmosphere containing CH_4, NH_3, etc. In 1953, S.L. Miller created similar conditions on a laboratory scale. He created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapor at 8000 C. He observed the formation of amino acids. In similar experiments others observed, formation of sugars, nitrogen bases, pigment and fats.

Analysis of meteorite content revealed similar compounds which indicated that similar processes are occurring elsewhere in space. It helped in accepting the chemical evolution theory.

32. i. Insulin, Disulphide bonds

ii. Form (A): Proinsulin

Form (B) : Mature insulin.

Proinsulin contains an extra stretch called C - peptide which is absent in mature insulin.

iii. Eli-Lilly company prepared two DNA sequences corresponding to A and B peptide chains of human insulin and introduced them in plasmid *E. coli* to produce insulin chains. Chains A and B were produced separately, extracted and combined by creating disulphide bonds to form insulin.

OR

i. I. Convention for naming EcoRI are E - Genus
co - Species
R - Strain
I - Order of isolation of enzyme

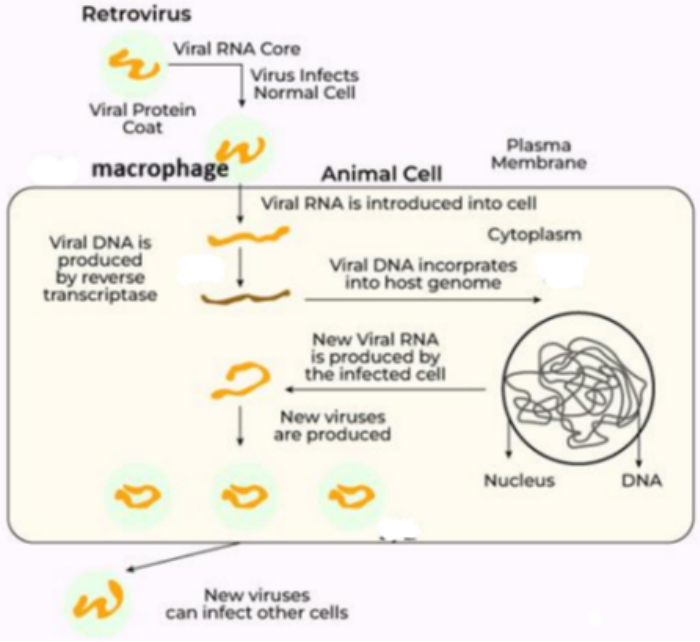
II. Recognition site - 5 'GAATTC 3'
3 'CTTAAG 5'
Cleavage site of restriction endonuclease - Between G and A from both sides

ii. Sticky ends

Sticky ends form hydrogen bonds with their complimentary cut counterparts, this stickiness facilitates the action of the enzyme DNA ligase.

33. i.
- **Disease :** Acquired Immunodeficiency Syndrome (AIDS)
- **Causative Agent :** Human Immunodeficiency Virus (HIV)

ii.
- After getting the entry into the body of the person virus enters macrophages
- RNA genome of the virus replicates to form viral DNA with the help of enzyme reverse transcriptase
- The viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce virus particles.
- Simultaneously HIV enters into helper T-lymphocytes (T_H) and produce progeny viruses which attack other T-lymphocytes leading to weakened immune system.



iii.
- By Sexual contact with infected person.
- Transfusion of contaminated blood and blood products.
- Sharing of infected needles by intravenous drug abusers.
- Infected mother to her child through placenta.

OR

a. The antigens called antibody-generating chemicals because a specific antigen stimulates the production of specific antibody.
b. B-lymphocytes and T-lymphocytes are involved in immunity.
c. Haemocytoblasts or stem cells of bone marrow are the common sites of formation of two types of lymphocytes.
d. B-lymphocytes differentiate in Peyer's patches, tonsils and appendix of mammals and bursa of Fabricius in the birds. T-lymphocytes differentiate in the thymus gland.