Class XII Session 2025-26
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. Triploid tissue in angiosperms is: **[1]**

   a) Endothecium b) Nucellus

   c) Tapetum d) Endosperm

2. A bacterium that is genetically modified to control pollution is: **[1]**

   a) Rhizobium b) Pseudomonas

   c) Nitrosomonas d) Nitrobacter

3. A biologist studied the population of rats in a barn. He found that average natality was 250 , average mortality 240 , immigration 20 and emigration 30. The net increase in population is: **[1]**

   a) 15 b) 05

   c) Zero d) 10

4. In hybridoma technology: **[1]**

   a) T-cells are fused with myeloma cells. b) B-cells are fused with myeloma cells.

   c) C-cells are fused with T-cells. d) B-cells are fused with T-cells.

5. _____ is not generally seen in biodiversity hotspots. **[1]**

   a) Lesser interspecific competition b) Species richness

   c) Loss of diversity d) Endemism

6. Grey crescent is present in: **[1]**

   a) Eye of frog b) Fertilized egg of frog

c) Brain of rabbit

d) Retina of cockroach

7. A technology which has found immense use in solving cases of disputed parentage is: **[1]**

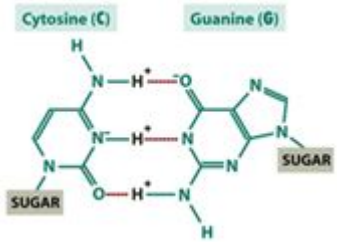
a) Recombinant DNA technology

b) Polymerase chain reaction

c) Monoclonal antibody production

d) DNA fingerprinting

8. H-bonds between Cytosine and Guanine are **[1]**



a) 2

b) 3

c) 4

d) 1

9. Which of these is a condition that makes flowers invariably autogamous? **[1]**

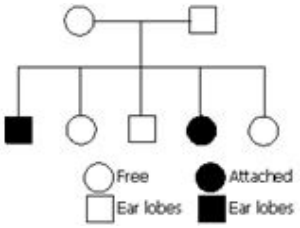
a) Xenogamy

b) Self-incompatibility

c) Dioecy

d) Cleistogamy

10. Given below is a pedigree chart of a family with five children. It shows the inheritance of attached ear lobes as opposed to the free ones. The squares represent the male individuals and circles the female individuals. Which one of the following conclusions drawn is correct? **[1]**



a) The parents are homozygous dominant

b) The parents are heterozygous

c) The parents are homozygous recessive

d) The trait is Y-linked

11. In lac operon, lactose is the substrate for enzyme beta-galactocidase and its regulates: **[1]**

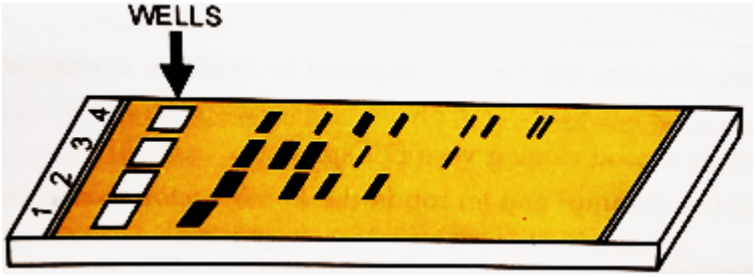
a) Only switching ON of the operon

b) Neither switching ON or OFF of operon

c) Only switching of OFF of the operon

d) Switching ON and OFF of the operon

12. In gel Electrophoresis, DNA bands are separated on the basis of **[1]**



a) Molecular size

b) Molecular weight

c) Charge

d) Molecular size and Molecular weight

13. **Assertion (A):** Mutations are discontinuous variations. **[1]**

Reason (R): Mutations occur suddenly.

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.

14. **Assertion:** Sometimes the change in allele frequency is so different in the new sample of the population that they become a different species. **[1]**

Reason: When the migration of a section of the population to another place occurs by chance, it is called genetic drift.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

15. **Assertion:** DNA is more stable than RNA. **[1]**

Reason: DNA being double stranded and having complementary strand further resists changes by evolving a process of repair.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

16. **Assertion (A):** Health is not only mean 'absence of disease' or 'physical fitness'. **[1]**

Reason (R): It is a state of complete physical, mental, and social well-being.

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.

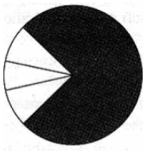
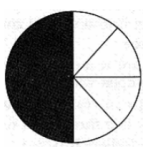
c) A is true but R is false.

d) A is false but R is true.

Section B

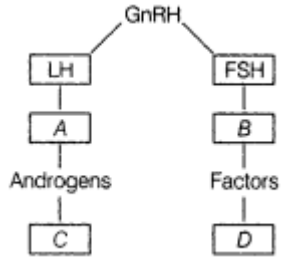
17. Name two acid producing bacteria. **[2]**

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]**



21. Given below an equation describing the growth pattern of a population: **[2]**

dN/dt = rN

a. Mention the type of growth model or growth pattern of population described by the given equation.

b. What does **r** in the equation signify?

c. Mention the type of growth curve that will be obtained if the population density (N) is plotted against time (t).

d. According to you, will the resource availability be limited or unlimited for this type of growth in a given population?

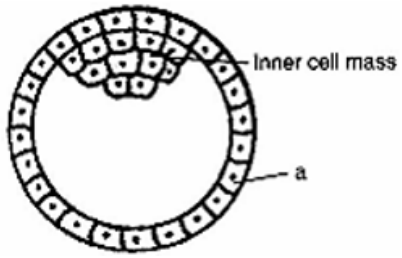
OR

Why are predators considered to be **prudent** in nature? Explain.

Section C

22. What are the drawbacks of use of enzymes in biotechnology as compared to inorganic catalyst? **[3]**

23. Study the below figure and answer the question that follows: **[3]**



i. Identify 'a' and which part of the placenta is formed by 'a'?

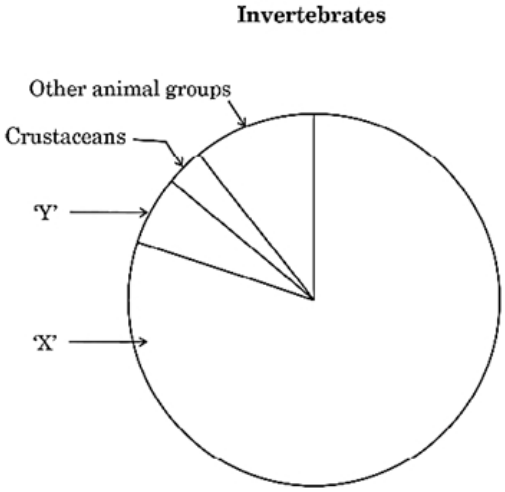
ii. Mention the fate of the inner cell mass after implantation in the uterus.

iii. Where are the stem cells located in this embryo?

24. Brijmohan angrily says to his daughter not to marry Rajiv since their family is known to inherit Haemophilia. The daughter objected to her father's order. Brijmohan was adamant and threatened Rajiv also. Brijmohan's daughter explained the biological interpretation of his fear and convinced her father.a) Rajiv was not haemophilic. Why was Brijmohan so worried?b) What values do you identify from the role played by Brijmohan's daughter?c) What explanation must have convinced Brijmohan?d) Is there any fear of haemophilia if Brijmohan's daughter marries Rajiv? **[3]**

25. Study the pie chart given below, representing the global diversity: **[3]**

proportionate number of species of major taxa and answer the following questions based on it.



a. Identify **X** and **Y** in the given pie chart.

b. Which one of the two, **X** or **Y**, is the most species-rich taxonomic group and by what percentage?

26. Draw a schematic transverse section of a mature anther of an angiosperm. Label its epidermis, middle layers, tapetum, endothecium, sporogenous tissue and the connective. **[3]**

OR

In a developing embryo, analyse the consequences if cell divisions are not followed by cell differentiation.

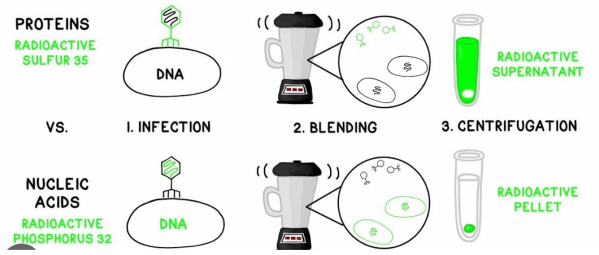
27. Describe the process of decomposition of detritus under the following heads Fragmentation, Leaching, Catabolism, Humification and Mineralization. **[3]**

28. Differentiate between in vitro and in vivo fertilisation. **[3]**

Section D

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

In 1952, Alfred Hershey and Martha Chase took an effort to find the genetic material in organisms. Their experiments **led to an unequivocal proof to DNA as genetic material**.



Hershey and Chases's experiments:

i. Name the kind of virus they worked with and why? (1)

ii. Why did they use two types of culture media to grow viruses in? Explain. (1)

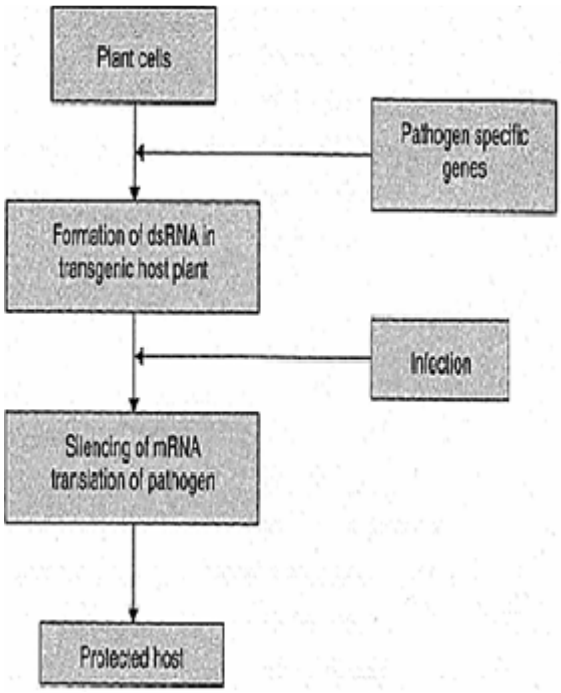
iii. What was the need for using a blender and later a centrifuge during their experiments? (2)

OR

State the conclusion drawn by them after the experiments. (2)

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

Study the given flow chart:



i. Name the defence mechanism used. (i)

ii. In which plant it has been done? (1)

iii. Name the pathogen. (2)

OR

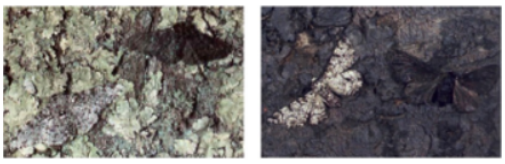
Name the vector used in this technique. (2)

Section E

31. How does industrial melanism support Darwin's theory of natural selection explain? **[5]**

OR

Observe the picture showing the industrial melanism and answer the following questions:



A B

i. What do these pictures A and B illustrate with reference to evolution?

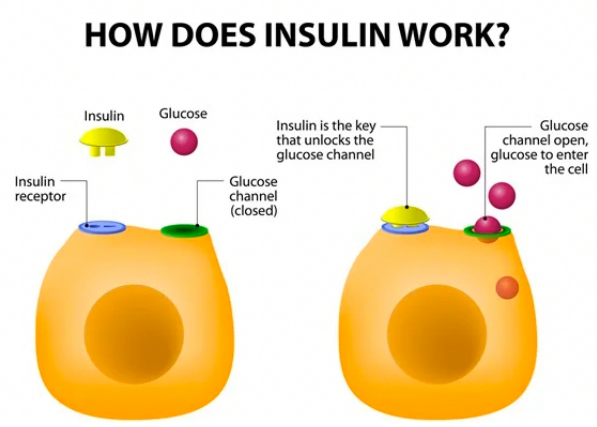
ii. Write the scientific name of the peppered moth.

iii. Picture A and B is a classical example of which type of natural selection?

32. Who was the first patient who was given gene therapy? Why was the given treatment recurrent in nature? **[5]**

OR

Insulin is a hormone created by your pancreas that controls the amount of glucose in your bloodstream at any given moment. It also helps store glucose in your liver, fat, and muscles. Finally, it regulates your body's metabolism of carbohydrates, fats, and proteins. Sound important? That's because it is.



i. Name the source from which insulin was extracted earlier. Why is this insulin no more in use by diabetic people?

ii. Explain the process of synthesis of insulin by Eli Lilly company. Name the technique used by the company.

iii. How is the insulin produced by human body different from the insulin produced by the above-mentioned company?

33. i. How do normal cells become cancerous? **[5]**

ii. Cancer can be treated successfully only if detected at an early stage. How do the following help in detecting cancer?

a. Biopsy

b. Histopathology

c. MRI

iii. Name any two methods that can possibly cure cancer.

OR

What is tumour or neoplasm? Describe the different types of tumours.

Solution

Section A

1.

(d) Endosperm
Explanation:
Endosperm

2.

(b) Pseudomonas
Explanation:
Pseudomonas

3.

(c) Zero
Explanation:
Zero

4.

(b) B-cells are fused with myeloma cells.
Explanation:
B-cells are fused with myeloma cells.

5. **(a)** Lesser interspecific competition
Explanation:
Lesser interspecific competition is not generally seen in biodiversity hotspots.

6.

(b) Fertilized egg of frog
Explanation:
Fertilized egg of frog

7.

(d) DNA fingerprinting
Explanation:
DNA fingerprinting

8.

(b) 3
Explanation:
In DNA molecules nitrogenous base of complementary strands binds with hydrogen bonds. In cytosine and guanine there are 3 hydrogen bonds and in adenine and thymine, the number of hydrogen bond is 2.

9.

(d) Cleistogamy
Explanation:
Cleistogamy

10.

(b) The parents are heterozygous

Explanation:

A diploid organism is heterozygous at a gene locus when its cells contain two different alleles of a gene.

Pedigree chart of a family shows that both male and female children carry the traits for free and attached ear lobes. Hence, the parents are heterozygous for the above-given trait.

11.

(d) Switching ON and OFF of the operon

Explanation:

In lac operon, lactose is the substrate for enzyme beta-galactocidase and it regulates switching ON and OFF of the operon. Hence, lactose is called the inducer.

12.

(d) Molecular size and Molecular weight

Explanation:

Molecular size and Molecular weight

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

Explanation:

Mutations are sudden unpredictable inheritable departures from the normal type without any intermediate stage. Discontinuous variations form the basis of the mutation theory of evolution which was proposed by De Vries (1902).

14.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Explanation:

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

15. **(a)** Assertion and reason both are correct statements and reason is correct explanation for assertion.

Explanation:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

16. **(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.

Section B

17. (i) Acetobacter aceti species is used for the mass production of Acetic Acid, the main component in vinegar. During the fermentation process of vinegar production, the bacteria, Acetobacter aceti is used to act on wines and ciders resulting in vinegar with Acetic acid.

(ii) Clostridium butylicum produces butyric acid

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)

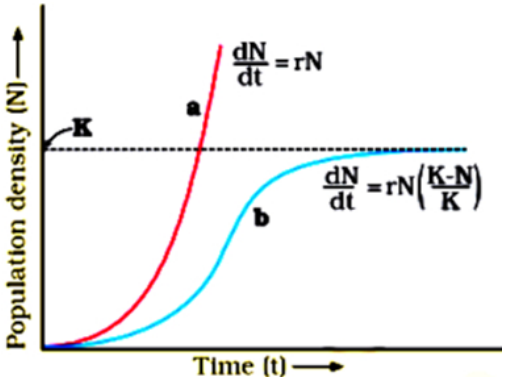
21. a. The above equation describes the exponential or geometric growth pattern of a population (Figure) and results in a J-shaped curve when we plot N in relation to time.

b. r = intrinsic rate of natural increase

c. Population growth curve a

i. When responses are not limiting the growth, plot is exponential,

ii. When responses are limiting the growth, plot is logistic, K is carrying capacity



d. The resource, availability will be unlimited for this type of growth in a given population.

OR

Predators are prudent in nature because predators over exploit its prey then the later might become extinct and following it the predators will also get extinct.

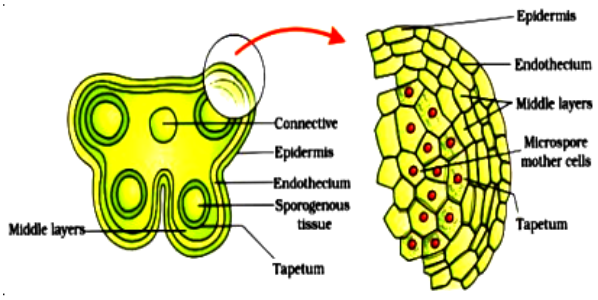
Section C

22. Drawbacks of use of enzymes in Biotechnology:
    i. Extraction and purification of enzymes are not only laborious but also highly expensive.
    ii. Enzymes are not stable and are quite fragile.
    iii. Enzymes are denatured at a slightly higher temperature than room temperature.
    iv. Changes in pH deactivate the enzymes.
    v. Enzymes are influenced by a number of organic solvents, exposure to air or protein poisons. However, there is no alternative to enzymes.

23. i. 'a' is Trophoblast. It forms chorionic villi and foetal part of the placenta.
    ii. It gets differentiated into ectoderm and endoderm.
    iii. In the inner cell mass.

24. **a)** Brijmohan was not aware of the inheritance pattern for haemophilia. He thought that the disease shall be expressed among his grandchildren.
    b) Scientific attitude, deep understanding and practical application of the subject. She was focussed having convincing ability.
    c) Haemophilia is a sex linked recessive inherited disease. The gene is located on the X chromosome. Human male has only one sex chromosome (44A + XY). Rajiv is not haemophilic since he does not have the gene on his X chromosome. There remains no chance for him to pass on any haemophilic gene to the next generation.
    d) No there remains no fear if they are married, provided the girl is not a carrier of haemophilia. If the girl is a carrier, then the chance for the son to be haemophilic is 50%.

25. a. X - Insects
    Y - Molluscs
    b. X - makes most species rich taxonomic group
    More than 70% of the total

26. 

OR

Cell divisions increase the number of cells in the developing embryo, while cell differentiation helps a group of cells to undergo certain modifications to form specialised tissues and organs to form an organism.
At many stages of embryogenesis, if cell differentiation does not occur, the embryo cannot develop into a new organism. It will only remain like a mass of cells.

27. **Decomposition:** It is a process in which decomposers break down complex organic matter into inorganic substances like carbon dioxide, water and nutrients and the process is called decomposition. Dead plant remains such as leaves, bark flower and raw material of animals, including fecal matter, constitute detritus, which is the raw material for decomposition.
The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralization.
(a) Fragmentation: Detritivorus like earthworm breakdown detritus into smaller particles. This process is called fragmentation.
(b) Leaching : By this process water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.
(c) Catabolism : Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called as catabolism.
(d) Humification : It leads to accumulation of a dark coloured amorphous substance called humus which is highly resistant to microbial action and undergoes decomposition at an extremely slow rate. Being colloidal in nature it serves as a reservoir of nutrients.
(e) Mineralization: The humus is further degraded by some microbes and release of inorganic nutrients occur by the process of mineralization.

28. **In vitro fertilisation (IVF):** It is the fertilisation of the egg outside the body of female in almost, similar conditions as that in the body.
In vivo fertilisation: It is the method of sexual reproduction in which the fusion of gametes takes place within the body of the female. Sperms are deposited by natural coitus or by artificial insemination.

Section D

29. i. They worked with bacteriophage, i.e. viruses that infect bacteria. These viruses were used because during infection they transfer their genetic material into bacteria.
ii. They used two types of culture media, containing ^{35}S and ^{32}P, so as to compare that which one out of DNA and proteins gets transferred from virus to bacteria and act as genetic material.
iii. A blender and centrifuge were used to open up the bacterial cells and viral particles, so, that genetic material could be visualised.
OR
They concluded that DNA is the genetic material that is passed from virus to bacteria.

30. i. RNA interference (RNAi)
ii. Tobacco plant
iii. Meloidegyne imcognitia (nematode)
OR
Agrobacterium tumefacines vector.

Section E

31. Industrial Melanism is an adaptation, where the moths living in the industrial area developed melanin pigments to match their body to the tree trunk that were covered with black soot. Before industrialization, in Great Britain, it was observed that there were more white winged moths. However, after industrialization the white coloured lichen covered the tree trunks. In that background the white winged moths survived but the dark coloured moths were eaten by predators. During the post industrialization periods the tree trunks became dark due to industrial smoke and soots. Under such conditions, the white winged moths did not survive due to predators and dark winged moths survived. In areas where industrialization did not occur, the count of moths were low. Thus, industrial melanism supports evolution by natural selection.

OR

i. In picture A there is a melanic moth and a white-winged moth on a tree trunk in an unpolluted area that is before industrialization. In picture B there is a melanic moth and a white-winged moth on a tree trunk in a polluted area that is after industrialization.
ii. *Biston betularia*
iii. Directional or progressive selection.

32. Gene therapy is a collection of methods that allows the correction of a gene defect that has been diagnosed in a child/embryo. Here genes are inserted into a person's cells and tissues to treat a disease.
The first clinical gene therapy was given in 1990 to a 4 -year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. The disorder is caused due to the deletion of the gene for adenosine deaminase. In some children ADA deficiency can be cured by bone marrow transplantation: in others, it can be treated by enzyme replacement therapy, in which functional ADA is given to the patient by injection. But the problem with both of these approaches that they are

not completely curative. As a first step towards gene therapy, Lymphocytes from the blood of the patient are grown in a culture outside the body. A functional ADA cDNA (using a retroviral vector) is then introduced into these lymphocytes, which are subsequently returned to the patient. However, as these cells are not immortal, the patient requires "periodic infusion of such genetically engineered Lymphocytes. However, if the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.

OR

i. Insulin was extracted earlier from the pancreas of slaughtered pigs and cattle animals Insulin obtained from these sources caused some allergy or some other reactions to the foreign protein.

ii. Steps involved in insulin production by the Eli Lilly company are as follows:

a. DNA sequences corresponding to the two polypeptide, A and B-chains of insulin were synthesized in vitro.
b. They were introduced into plasmid DNA of E colt.
c. This bacterium was cloned under suitable conditions.
d. The transgene was expressed in the form of polypeptides A and B, secreted into the medium.
e. They were extracted and combined by creating disulphide bridge to form human insulin.

iii. Differences between insulin produced by rDNA and insulin produced by pancreas are as follows:

Insulin produced by rDNA	**Insulin produced by the pancreas**
It has A and B polypeptides.	It has three polypeptides. A, B and C-chains before maturing called the prohormone.
It directly synthesizes the mature hormone.	It undergoes processing to form mature and functional hormone.

33. i. A normal cell has the ability to contact inhibition which inhibits its division after contact with other cells. When this ability is lost in a cell, it becomes cancerous.

ii. a. Biopsy: It's a piece of the suspected tissue is cut into thin section stained and studied.
b. Histopathology: It's a piece of suspected tissue is examined under a microscope by a pathologist.
c. MRI: It uses strong magnetic fields and non-ionising radiations, accurately detect pathological and physiological changes in the tissues.

iii. Two method that are possibly cure cancer are radiotherapy and chemotherapy.

OR

A tumor is the uncontrolled and unregulated proliferation of cancerous cells to form masses of cells which can expand irregularly. Tumors are of two types:

i. **Benign tumor (Non-malignant tumor)**: They normally remain confined to their original location and do not spread to other parts of the body thus causing little damage. Most tumors are of this type and do not give rise to cancer i.e. non-cancerous.

ii. **Cancerous tumor (Malignant tumor)**: These are a mass of neoplastic proliferating cells. It begins as a small tumor growth at first, grows slowly in the start and more rapidly later on. The tumor ultimately spreads to the adjacent tissues. Later on, cancerous cells separate from the original site and migrate through the blood to the other sites and where they divide and redivide to form a **secondary tumor**. As these cells actively divide and grow, they also starve the normal cells by competing for vital nutrients. Cells sloughed from such tumors reach distant sites through blood, and wherever they get lodged in the body, they start a new tumor there. This property called metastasis is the most damaging property of malignant tumors.