

Sample Question Paper - 13
Biology (044)
Class- XII, Session: 2021-22
TERM II

Time allowed : 2 hours

Maximum marks : 35

General Instructions :

- (i) All questions are compulsory.
- (ii) The question paper has three sections and 13 questions. All questions are compulsory.
- (iii) Section–A has 6 questions of 2 marks each; Section–B has 6 questions of 3 marks each; and Section–C has a case-based question of 5 marks.
- (iv) 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.
- (v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

- 1. List the symptoms of ascariasis. How does a healthy person acquire this infection?
- 2. Why is a little curd added to milk to set it into curd? Explain.

OR

Name the source of cyclosporin-A. How does this bioactive molecule function in our body?

- 3. Name the source of the DNA polymerase used in PCR technique. Mention why it is used.
- 4. Why is making cells competent essential for biotechnology experiments? List any two ways by which this can be achieved.
- 5. Some organisms suspend their metabolic activities to survive in unfavourable conditions. Explain with the help of any four examples.
- 6. How is recombinant DNA technology helping in detecting the presence of mutated gene in cancer patients?

OR

Mention any four benefits derived from transgenic animals.

SECTION - B

- 7. Water is very essential for life. Write any three features for plants which enable them to survive in water scarce environment.

OR

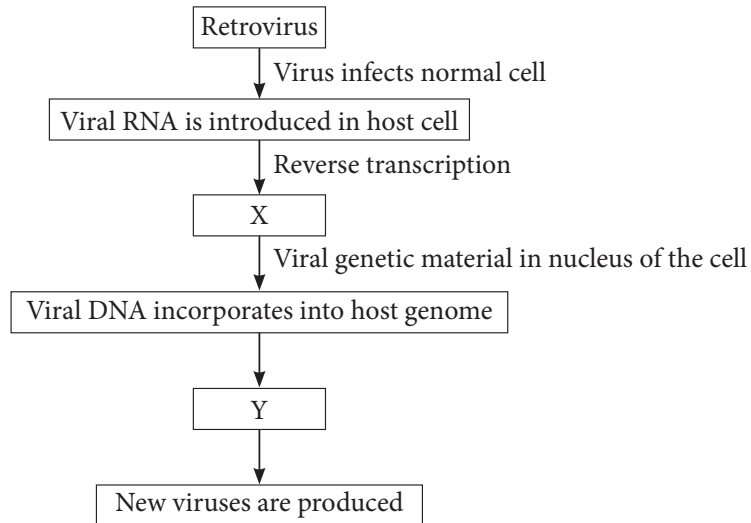
Explain mutualism with the help of an example.

- 8. Conservation of biodiversity is protection, uplift and scientific management of biodiversity so as to maintain it at its optimum level and derive sustainable benefits for the present as well as future generation. There are two types of conservation strategies : Conservation in natural habitat and conservation outside natural habitat. Differentiate between two types of conservation strategies.

9. (a) Explain the concept of endemism.
(b) Name four regions in and around our country that are considered hotspots.
10. Biopiracy should be prevented. State why and how?
11. Describe the characteristics a cloning vector must possess.
12. Do you support 'Dope' test being conducted on sportspersons participating in a prestigious athletic meet? Give three reasons in support of your answer.

SECTION - C

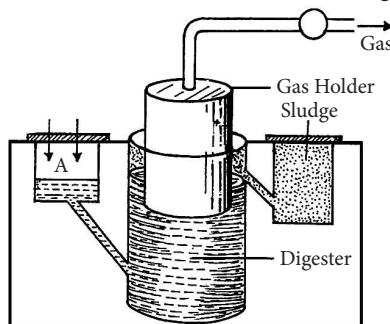
13. In the given flow chart, the replication of retrovirus in a host cell is shown. Study the flow chart and answer the following questions.



- (a) Identify X and Y.
(b) Can infected cell survive while viruses are being replicated and released?
(c) What are the symptoms of HIV infection?

OR

Study the picture of biogas plant given below and answer the following questions.



- (a) Name the components gaining entry from A into the chamber.
(b) Mention the group of bacteria and the condition in which they act on the component that entered from A in the digester.
(c) Name the components that get collected in gas holder.

Solution

BIOLOGY - 044

Class 12 - Biology

1. Ascariasis is caused by the common round worm *Ascaris lumbricoides*, a giant intestinal worm. Symptoms of this disease include internal bleeding, muscular pain, fever, anemia and blockage of the intestinal passage. A healthy person acquires infection through contaminated water, vegetables, fruits, etc.

2. For the production of curd, a small amount of curd is added to fresh milk at suitable temperature. Curd contains millions of lactic acid bacteria (LAB). These bacteria grow in milk and convert the lactose sugar of milk in lactic acid. Lactic acid coagulates and partially digests milk protein casein. This causes curdling of milk and it changes to curd, which also improves its nutritional quality by increasing vitamin B₁₂ content.

OR

Cyclosporin A is an eleven membered cyclic oligopeptide obtained through fermentive activity of fungus *Trichoderma polysporum*. It has antifungal, anti-inflammatory and immunosuppressive properties. It inhibits activation of T cells and therefore prevents rejection reactions in organ transplantation.

3. *Taq* DNA polymerase is isolated from thermophilic bacterium *Thermus aquaticus*. It is used to synthesise the segment of DNA between the primers (extension) in polymerase chain reaction at high temperatures.

4. Competent host is essential for biotechnology experiment. Since DNA is a hydrophilic molecule, it cannot pass through membranes, so the bacterial cells must be made capable to take up DNA i.e., made competent.

This can be achieved by :

(i) Treatment of DNA with divalent cation of CaCl_2 or rubidium chloride : Treating them with a specific concentration of a divalent cation, increases the efficiency with which DNA enters the bacterium through pores in its cell wall.

(ii) Heat shock treatment of DNA : Recombinant DNA (rDNA) can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 42°C (heat shock) and then putting them back on ice. This enables the bacteria to take up the recombinant DNA.

5. To tide over unfavourable conditions, some organisms suspend their metabolic activities. These are discussed as follows :

(i) Bacteria, fungi and lower plants develop thick walled spores, which germinate during suitable conditions.

(ii) Polar bears go into hibernation during winter season to escape cold.

(iii) Some snails and fish undergo aestivation to avoid summer related problems like heat and dessication.

(iv) During unfavourable conditions, zooplanktons in lakes and ponds are known to enter diapause, i.e., stage of suspended development.

6. PCR is used to detect mutations in gene in suspected cancer patient. A single stranded DNA or RNA joined with a radioactive molecule (probe) is allowed to hybridise to its complementary DNA in a clone of cells. It is followed by detection using autoradiography. The clones having the mutated gene will not appear on the photographic film, because the probe will not have the complementarity with the mutated gene.

OR

Benefits derived from transgenic animals are as follows:

(i) They are specially made to serve as models for human diseases, so that investigation of new treatments for diseases is made possible.

(ii) They produce useful biological products, that can be created by introduction of portion of gene, which codes for a particular product such as human protein (α -1- antitrypsin) used to treat emphysema.

(iii) Transgenic mice are being developed for use in testing the safety of vaccine before they are used in humans.

(iv) They carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to toxic substance and the effects are studied.

7. Water is very essential for life. Plants and animals show various adaptations to cope up with water scarcity in the area where they are found. Some of the adaptations seen in plants which enable them to survive in water scarce environment are as follows:

– Some plants have deep tap root system which is capable of absorbing water from deep soil e.g., *Prosopis*, *Acacia*, etc.

- Cacti and succulents, have fleshy leaves and stems to store water.
- Many tropical plants, which grow in hot and arid climates possess C_4 pathway of photosynthesis. So, these plants perform better in low soil water environments. Such plants, use less water to achieve higher rates of photosynthesis.

OR

Mutualism is an interaction between two organisms of different species where both the partners are benefitted and none of the two are capable of living separately. *E.g.*, lichen is a composite entity which is formed jointly by an alga (phycobiont) and a fungus (mycobiont). The main body of the lichen is formed of fungus. The fungus also provides fixation, water, minerals and shelter to the alga. The alga manufactures food not only for itself but also for the fungus. This interaction or relationship allows the lichen to grow in highly hostile environment like bare rock.

8. Differences between conservation in natural habitat (*In situ* conservation) and outside natural habitat (*Ex-situ* conservation) are:

	<i>In-situ</i> Conservation	<i>Ex-situ</i> Conservation
(i)	The endangered species are protected from predators.	The endangered species are protected from all adverse factors.
(ii)	The depleting resources are augmented.	They are kept under human supervision and provided all the essentials.
(iii)	The population recovers in natural environment.	Offspring produced in captive breeding are released in natural habitat for acclimatisation.

9. (a) Endemism is the ecological state of a species being unique to a defined geographical location such as an island, nation, country or other defined zone. *E.g.*, The Tasmanian Devil is the largest carnivorous marsupial in the world and found only on the Australian island state of Tasmania.

(b) Western Ghats and Sri Lanka, Indo-Burma and Himalayas are hotspots in India. Others include mountains of southwest China, Caribbean Island hotspot, etc.

10. Some multinational companies of industrialised nations have a good economic status but are poor in biodiversity and are exploiting biodiversity of developing and underdeveloped countries without authorisation and proper compensation.

There has been growing realisation of the injustice, inadequate compensation and benefit sharing between developed and developing countries. Therefore,

some nations are developing laws to prevent such unauthorised exploitation of their bio-resources and traditional knowledge.

11. A cloning vector must possess the following characteristics:

- Origin of replication (*Ori*) : *Ori* is a sequence from where replication starts and is also responsible for controlling the copy number of the linked DNA.
- Selectable marker : Selectable markers help in selecting transformant host cell from non-transformant ones.
- Cloning sites : A vector must have unique recognition site to link foreign DNA. Presence of a particular cloning/recognition site enables the particular enzyme to cut the vector DNA.

12. Yes, Dope test should be conducted on sportspersons participating in athletic meet because:

- Athletes intake cannabinoids to increase their muscle tone and to have better performance.
- Intake of cocaine alters cardiovascular functions, increases heartbeat and blood pressure.
- Cocaine delays fatigue and helps to enhance performance.

13. (a) X-Viral DNA is produced by reverse transcriptase.

Y - New viral RNA is produced by infected cell.

(b) Yes, infected cell can survive while viruses are being replicated and released.

(c) The symptoms of HIV infection include fever, lethargy, pharyngitis, nausea, headache, rashes, etc.

OR

(a) Dung and water enter the digester chamber from A.

(b) The scientific names of various methanogenic bacteria are *Methanococcus*, *Methanogenium*, *Methanlobus*, *Methanosaeta*, etc.

Methanogens are a group of anaerobic bacteria which obtain their energy by reducing carbon dioxide and oxidising hydrogen with the production of methane. They are found in oxygen deficient environment such as marshes, swamps, sludge and digestive systems of ruminant animals like cow, buffalo, etc. These microorganisms are present in anaerobic sludge digester where they digest organic mass as well as aerobic microbes of the sludge to produce mixture of gases containing methane, H_2S and CO_2 called biogas.

(c) Biogas is a methane rich fuel gas produced by anaerobic breakdown of biomass with the help of methanogenic bacteria. It is made up of methane (50-70%), carbon dioxide (30-40%) with traces of nitrogen, hydrogen sulphide and hydrogen.