

**Sample Question Paper - 4**  
**Biology (044)**  
**Class- XII, Session: 2021-22**  
**TERM II**

Time allowed : 2 hours

Maximum marks : 35

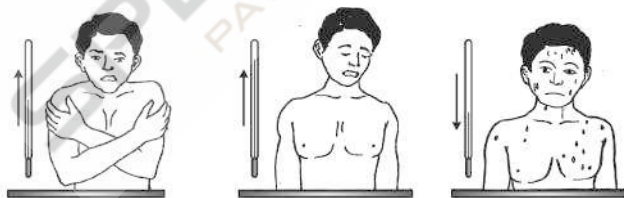
**General Instructions :**

- (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**

(2 Marks Each)

1. Name one airborne and a waterborne disease in humans. List one specific symptom of each one of them.
2. The given diagram shows the typical signs of malarial disease. [AI]

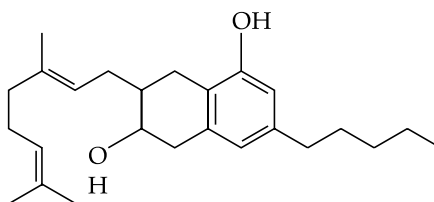


Give the scientific name of the parasite that causes malaria in humans. What causes chills in humans during malarial attack.

**OR**

Name any two secondary lymphoid organs in a human body and state the function of any of them.

3. Study the given chemical structure and identify the name. From which part of the plant it is obtained?



4. Medically it is advised to all the young mothers that breast-feeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.
5. Plants that inhabit a rain-forest are not found in a wetland. Give reason.
6. What will happen to a well growing herbaceous plant in the forest if it is transplanted outside the forest in a park?

OR

Of the four major causes for the loss of biodiversity (Alien species invasion, habitat loss and fragmentation, over-exploitation and co-extinctions), which according to you is the major cause for the loss of biodiversity? Give reason in support.

### Section - B

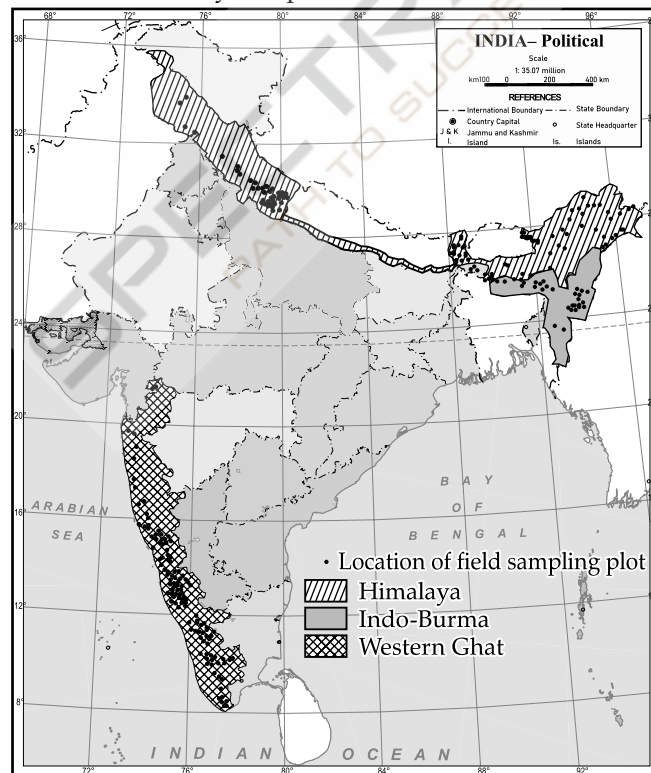
(3 Marks Each)

7. Explain with the help of sketch the action of HIV in the body.

OR

"Prevention is better than cure". Comment.

8. Why tobacco smoking is associated with rise in blood pressure and low oxygen efficiency?
9. A host cell should be competent enough to take the DNA molecule for the transformation. There are various means by which a competent host is formed for recombinant DNA technology. Why and how bacteria can be made competent ?
10. (a) Give the scientific term for a parasite living on other parasite. 1  
 (b) Name a species which is both a prey and a predator. 1  
 (c) Name an ecto and an endoparasite. 1
11. The map below shows the biodiversity hotspots in India. 1



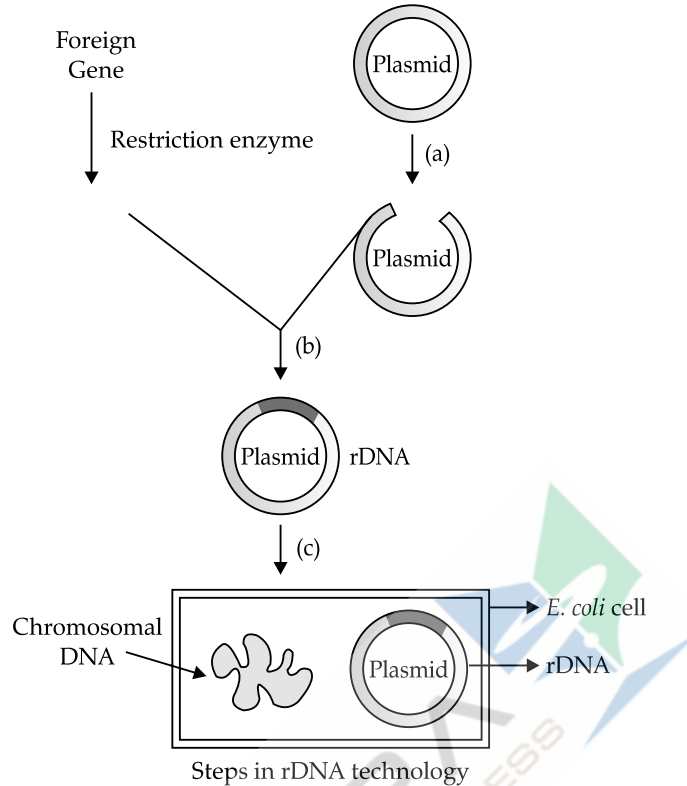
**Biodiversity hotspots in India**

- (a) Explain the importance of biodiversity hotspots and sacred groves.
- (b) Name the type of biodiversity represented by the following:
  - (i) 50,000 different strains of rice in India.
  - (ii) Estuaries and alpine meadows in India.

1½

1½

12. Study the diagram and answer the following questions:



- (i) Name the enzyme (a) and write its functions. 1  
 (ii) Identify the process (b) and name the enzyme used in the process. 1  
 (iii) Identify the step (c) 1

### Section - C

(5 Marks)

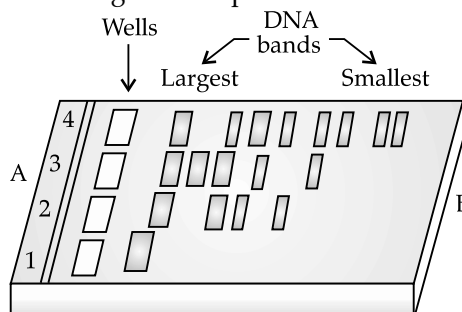
13. Read the following passage and answer the following questions.

Restriction endonuclease was isolated for the first time by W. Aber in 1962 in bacteria. Restriction endonuclease cut the DNA duplex at specific points, therefore they are also called as molecular scissors or biological scissors. Three types of restriction endonuclease are Type I, Type II and Type III. But only Type II restriction endonuclease are used in recombinant DNA technology. Restriction endonuclease EcoRI recognises the base sequence GAATTC in DNA duplex and cut strands between G and A.

- (a) Why only type II restriction enzymes are used in gene manipulation? 1  
 (b) Name the ions used by restriction endonuclease for restriction activity. 1  
 (c) Why are molecular scissors so called? Write their use in biotechnology. 2  
 (d) Restriction enzymes present in the cloning site of a vector should not have more than one recognition site. Comment. 1

OR

Given diagram shows the process of gel electrophoresis.



Gel electrophoresis is performed in a gel matrix so that molecules of similar electric charges can be separated on the basis of their size. Most commonly used matrix in gel electrophoresis is agarose. The fragments are separated under the influence of an electric field. The separated DNA fragments can be seen only after staining the DNA with compound known as ethidium bromide (EtBr) followed by exposure to UV radiation as bright orange band.

(a) What is the principle of gel electrophoresis? 3

(b) Why EtBr is used in gel electrophoresis inspite of it being highly carcinogenic? 2

□□□



## Solution

BIOLOGY - 044

Class 12 - Biology

### Section - A

(2 Marks Each)

1. **Air-borne diseases** : Tuberculosis (TB), Influenza. (Any one)  $\frac{1}{2}$   
**Symptoms** : Pain and difficulty in breathing/ coughing.  $\frac{1}{2}$   
**Water-borne diseases** : Diarrhoea, Typhoid. (Any one)  $\frac{1}{2}$   
**Symptoms** : Loose motions/ Watery stool.  $\frac{1}{2}$
2. *Plasmodium falciparum*. The haemozoin released in blood plasma induces high fever and shivering. 1+1

OR

Spleen, lymph nodes, tonsils, Peyer's patches of small intestine, vermiform appendix.

(Any two)  $\frac{1}{2} + \frac{1}{2}$

**Function of Spleen** : Trap blood-borne microorganisms and worn out RBCs, thus filters blood.

**Lymph nodes** : Trap the microorganisms / antigens (which happen to get into the lymph and tissue fluid). The trapped antigens activate lymphocytes and cause immune response. 1

[CBSE Marking Scheme, 2016]

#### Commonly Made Error

- Students often write incorrect names of secondary lymphoid organs. It seems they are confused between primary and secondary lymphoid organs.

#### Answering Tip

- Charts and interactive boards can be used to learn the names and functions of primary and secondary lymphoid organs.

3. It is the chemical structure of a cannabinoid molecule. Cannabinoids are obtained from the inflorescence of the plant *Cannabis sativa*. 2

4. Yes  
Provides nutrition (calcium, fats, lactose) / provides (passive) immunity / provides antibodies / Ig A. (Any two) 1  
[CBSE Marking Scheme, 2018]

**Breast feeding is recommended during the initial period of an infant's growth as :**

- (i) It provides passive immunity to the baby through colostrum.  
(ii) It provides a balanced nutrition to the baby.  
(iii) Also, it protects the baby from allergens. (Any two) 1

5. Plants that inhabit a rain forest are not adapted to survive in aquatic conditions / wetlands.  
Plants are conformers / stenothermal / cannot maintain constant internal environment / temperature / osmotic concentration of the body fluids affects kinetics of enzymes through basal metabolism / activity and other physiological functions of the organisms (Any one) 2  
[CBSE Marking Scheme, 2016]

6. In forest ecosystem, tall trees of forest plants controls the light condition, that is, intensity, duration and quality of light at the ground. A well growing herbaceous plant in forest receive less intensity duration and quality of light, but when it is transplanted in a park outside its natural habitat, the light will be received uninterrupted. So, due to change in its microclimate, it may not survive. 2

OR

Loss of habitat and fragmentation occur due to clearing and over-exploitation of forest areas for agriculture, urbanization and industrialization. **It is the major cause for the loss of biodiversity because :**

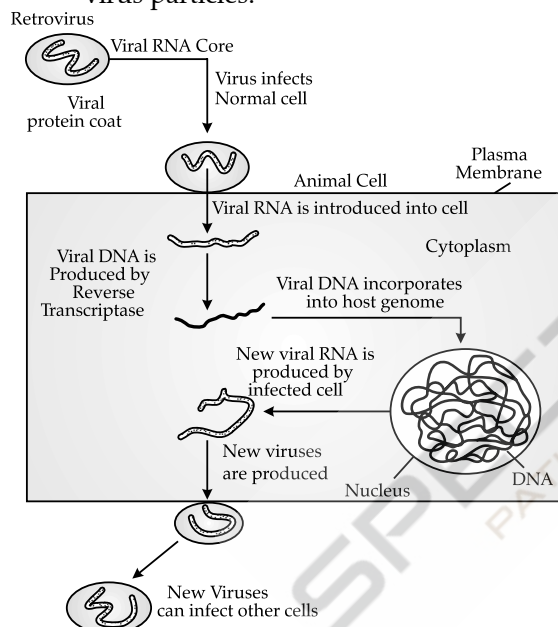
- (a) It results in destruction of natural habitats.
- (b) Large habitats are broken up into small fragments, due to which mammals and birds which require large territories and migratory habits are badly affected, leading to decline in population. **1+1**

## Section - B

(3 Marks Each)

### 7. Action of HIV in the human body :

- After entering the human body, the HIV virus attacks and enters the macrophages. Inside the macrophages, the RNA of the virus replicates with the help of enzyme reverse transcriptase and give rise to viral DNA.
- Then, this viral DNA incorporates into the host DNA and directs the synthesis of virus particles.



- At the same time, HIV enters the helper T-lymphocytes. It replicates and produces viral progeny here. These newly formed progeny viruses get released into the blood, attacking healthier helper T-lymphocytes in the body.
- As a result, the number of T-lymphocytes in the body of an infected person decreases progressively, thereby decreasing the immunity of the body. **3**

OR

Prevention is always better than cure because some diseases cause extensive damage to the body tissues or organs. They also have a:

- (a) negative effect on their capacity to function.
- (b) permanent or long-term debilitating effect.
- (c) negative mental and psychological effect.
- (d) financial burden.

Prevention, therefore is easier and effective, than cure of a disease. **3**

- 8. Addiction of tobacco is due to the presence of nicotine. Nicotine, which is present in tobacco stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raises blood pressure and increases the heart rate. Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haem bound oxygen. This causes oxygen deficiency in the body. **3**

### 9. Bacteria can be made 'competent' by :

- (i) Using divalent cations: Bacteria are treated with  $\text{Ca}^{2+}$ , etc., so that DNA enters the bacterium through pores in its cell wall.
- (ii) Heat shock: Cells can be incubated on ice and then at  $42^\circ\text{C}$  for a heat shock and then again kept on ice.
- (iii) Microinjection: Recombinant DNA is directly injected into the nucleus of an animal cell. **1+1+1**

### 10. (a) Hyperparasite

- (b) Frog
- (c) Lice and *Taenia* respectively **1+1+1**

### 11. (a) Hotspots—region with high level of species richness, high degree of endemism.

- (b) Sacred groves—tracts of forest containing tree/wild life were venerated and given total protection//to protect last refuges for a large number of rare, and threatened plants

**1 ½ + 1½**

#### Commonly Made Error

- Students usually get confused with the terms. For e.g., to define Hotspots, they write the place where temperature is very high.

#### Answering Tip

- Learn all the terms correctly.

- 12. (i) The name of the enzyme (a) is Restriction endonuclease. Restriction enzymes serve as chemical knives also called molecular

scissors to cut genes (= DNA) at specific sites into defined fragments. These may then be used to determine the order of genes on chromosomes and to analyze the chemical structure of genes and regions of DNA which regulate the functions of gene.

- (ii) The process (b) is known as ligation. Ligation is an enzymatic action that joins two biomolecules with a covalent bond. When, the same restriction enzyme cuts

the DNA molecules, the resultant DNA fragments have the same kind of "sticky-ends", and these can be joined together using DNA ligase enzyme.

- (iii) The step (c) shows the activity of *E.coli*, introduction of rDNA into *Escherichia coli* cell. *E.coli* is preferred as host for gene cloning due to the high efficiency of introduction of DNA molecules into cells.

1+1+1

### Section - C

(5 Marks)

13. (a) Type II enzymes are simpler and don't require ATP as an energy source, unlike Type I, it makes cleavage or cut in the DNA sequence within or in close proximity of the recognition site. 1
- (b) The restriction endonuclease binds with two magnesium ions. One of these ions, binds to the phosphate group where the cleavage occurs and is required for catalysis. 1
- (c) The restriction enzymes are known as molecular scissors as they cut the DNA at specific sites or locations. They help (in genetic engineering) to form recombinant molecules of DNA, which are composed of DNA from different genomes. 2

- (d) If the restriction enzymes have more than one recognition site in a vector, then the vector itself will get fragmented on treatment with the restriction enzymes. 1

OR

- (a) Gel electrophoresis is a technique used for the separation and analysis of macro molecules (DNA, RNA and proteins) and their fragments, based on their size and charge. 3
- (b) Ethidium bromide (EtBr) exchanges its visible range of wavelength with the invisible wavelength of DNA to make it visible under UV light. 2