

Time : 2 Hours

Maximum Marks : 35

CBSE
Class-12
BIOLOGY

Sample Question Paper

Sample Question Paper (2021-22)

GENERAL INSTRUCTIONS :

- All questions are compulsory.
- The question paper has three sections and 13 questions. All questions are compulsory.
- 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.
- 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.
- Wherever necessary, neat and properly labelled diagrams should be drawn.

Section - A

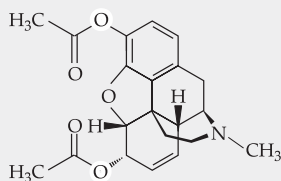
[2 Marks Each]

- Rahul suffered from amoebiasis. Write the symptoms that confirm this infection. Also, identify the causative pathogen. 2
- A bioactive molecule "X" is given to an organ transplant patient. Identify its source organism and the purpose for which it is given to organ transplant patients. 2

OR

Meenal's father, who is a farmer, wants to improve the nitrogen content of the soil to be used for cultivation of a non-leguminous terrestrial crop.

- Recommend two microbes that can enrich the soil with nitrogen. 1
 - "The leguminous crops do not require such enrichment of the soil". Give a reason. 1
- Identify the given chemical compound and its effect on human body. 2



- A locality marked the growth of plenty of algal bloom. What do you think has caused this bloom and how will it affect the quality of water? Suggest a preventive measure. 2
- A population pyramid is a way to visualize two variables: age and sex. They are used by demographers, who study populations. With the help of neat labelled diagrams, illustrate stable and declining age pyramids of human population. 2
- Name the interaction that exists between:
 - Cuscuta* and shoe-flower plant 1
 - Fig and wasp 1



OR

Cryopreservation or cryo conservation is a process where organelles, cells, tissues, extracellular matrix, organs, or any other biological structures are preserved by cooling to very low temperatures, i.e., 196°C in liquid nitrogen. Mention, how it is used in the conversation of biodiversity. 2

Section - B

[3 Marks Each]

7. (a) List the causative agents of pneumonia and common cold. 1
- (b) State the differences in their symptoms? 1
- (c) List any two symptoms that are common to both. 1

OR

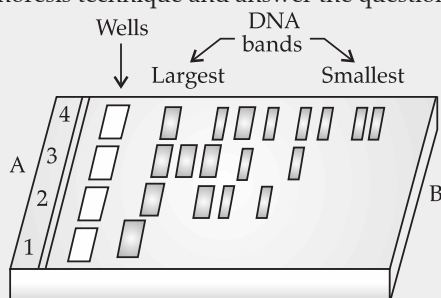
Acquired immunodeficiency syndrome (AIDS) is a chronic, potentially life-threatening condition caused by the human immunodeficiency virus (HIV). By damaging your immune system, HIV interferes with your body's ability to fight infection and disease. How does the HIV breakdown the immune system of the AIDS patients? 3

8. The table lists some factors related to innate immunity. Identify A, B, C, D, E, F. 3

Sl. No.	Type of barrier	Example of the barrier	Function
(i)	A	B	Prevent microbial growth
(ii)	C	Polymorpho nuclear leucocytes	D
(iii)	Cytokine	E	F

3

9. In an experiment, Sohan amplified a 'gene of interest' using PCR technique. It relies on a thermostable DNA polymerase, *Taq* polymerase, and requires DNA primers designed specifically for the DNA region of interest. Explain the technique. 3
10. (a) Define 'Alien species invasion'. 1
- (b) Illustrate its effects on the biodiversity of a given area by giving two examples. 2
11. (a) List differences between *in-situ* and *ex-situ* approaches for conserving biodiversity. 2
- (b) Give example for each. 1
12. Study the diagram given below representing the observations that were made for separating DNA fragments by Gel electrophoresis technique and answer the questions that follow.



- (a) The DNA fragments are seen to be moving in the direction A → B. Why? 1
- (b) Name the medium used to separate DNA fragments here. 1
- (c) Explain how the separated DNA fragments can be visualized for further technical use. 1



Section - C

[5 Marks Each]

13. Around twenty years ago, Bt cotton was introduced in India. This cotton crop is a plant variety of genetically modified cotton. Strains of the bacterium *Bacillus thuringiensis* produce toxins that are harmful for a variety of insects. The aim of introducing Bt cotton to India was to reduce the amount of insecticide needed in farming cotton.

Since, the introduction of this plant, Bt cotton has been adopted widely across India. Today, most cotton growing industries in India uses Bt technology.

- (a) Name the insect that attacks cotton crops and can lead to a lot of damage to the crop. How has Bt cotton plants overcome this problem and saved the crop? Explain. 4
- (b) Explain the role of gene Cry I Ab. 1

OR

The Green Revolution in India began in the mid-1960s marking a transition from traditional agriculture in India and the introduction of high-yielding varieties of seeds and the associated agricultural techniques. The need for introducing the Green Revolution in India arose due to a shortage of food-grains in part due to the legacy of colonial regime. The government of India post-independence wanted to make India self-dependent in terms of food-grain production and these efforts coincided with the development of high-yielding varieties of seeds of wheat developed by Norman Borlaug and his associates in Mexico. These seeds also necessitated changes in farming techniques such as the addition of fertilizers and pesticides and greater use of irrigation. High yielding varieties of seeds were first introduced in India in the states of Punjab, Haryana and parts of western Uttar Pradesh.

The green revolution did effectively solve India's problem of food-grain shortage after it was introduced in India, although in the second wave of the Green Revolution in the 1980s, there was however, a slight reduction in production as compared to the first wave. Thus, there is a need for another green revolution.

- (a) Name the technique which will help in increasing the yield of crops. 1
- (b) Name any two genetically modified crops. 2
- (c) What is golden Rice? 1
- (d) Name a natural genetic engineer. 1

□□□



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Solution

Solution of Question Paper (2021-22)

Section-A

1. Constipation, abdominal pain, stools with mucous, blood clot.
Causative pathogen : *Entamoeba histolytica*. 1+1
2. Bioactive molecule "X" is : Cyclosporin-A
Source organism – *Trichoderma polysporum*. Purpose – Immunosuppressive agent. 1 + ½ + ½

Commonly Made Error

- Students often write incorrect spellings of causative pathogen of given disease.

Answering Tip

- Learn the biological names of the pathogens of diseases with correct spellings according to the rules of binomial nomenclature.

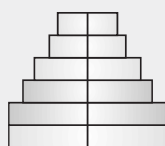
OR

- (a) *Azospirillum*/ *Azotobacter*/ *Anabaena*/ *Nostoc* / *Oscillatoria* / *Frankia* (Any two correct names of microbes). ½+½
- (b) Leguminous crops can fix atmospheric nitrogen, due to presence of *Rhizobium* (N_2 fixing bacteria) in their root nodules. ½ + ½
3. It is the chemical structure of heroin. 1
Heroin depresses breathing and slows down body functions. 1
4. (i) Presence of large amount of nutrients in water causes excessive growth of planktonic (free-floating) algae, called as algal bloom. Algal blooms cause deterioration of water quality and fish mortality. Some bloom forming algae are extremely toxic to human beings and animals. 1
- (ii) Treatment of wastewater before reaching pond by integrated water treatment method is the preventive measure. 1
- 5.

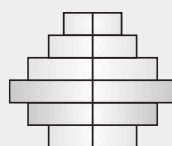
Post reproductive

Reproductive

Pre-reproductive



Stable



Declining

1 + 1



6. (a) The interaction that exists between *Cuscuta* and shoe-flower plant is parasitism. 1
(b) The type of interaction seen between fig and wasps is mutualism. 1

OR

Cryopreservation is an ex-situ method of conservation of biodiversity. By this method, the gametes of threatened species are preserved in viable and fertile conditions for long period of time. These gametes can be used further when required. 1+1

Section-B

7. (a) *Streptococcus pneumoniae*
Causative agent of common cold: Rhinoviruses (½ + ½)

(b) Symptoms are :

Pneumonia	Common cold
Infects alveoli of lungs.	Infects nose & respiratory passage.
Chills	Sore throat
Lips/fingers may turn grey to black.	Hoarseness

- (c) Common symptoms are: (Any two) ½+½
(i) Headache
(ii) Cough

OR

Mechanism of AIDS infection involves :

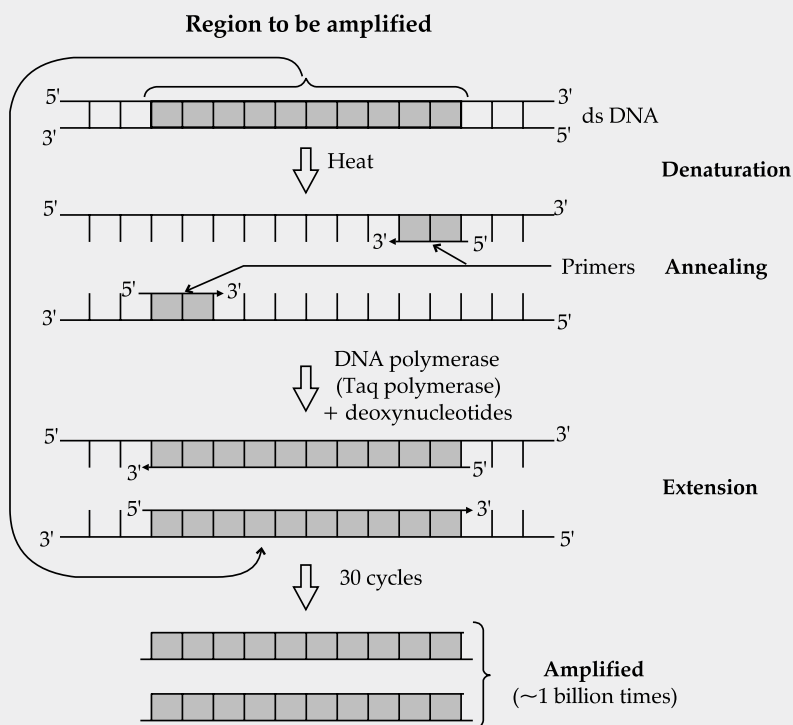
- (i) Entry of virus in the macrophages.
- (ii) RNA genome replicates to form viral DNA with the help of reverse transcriptase.
- (iii) Viral DNA gets incorporated into host's cell DNA to produce virus particles,
- (iv) HIV enters into helper 'T' lymphocytes and produces progeny virus.
- (v) These get released in the blood and attack another helper 'T' lymphocytes.
- (vi) This leads to progressive decrease in number of helper 'T' lymphocytes and the person starts suffering from infections (loss of immunity). ½ × 6 = 3

[CBSE Marking Scheme, 2015]

8. A - Physiological barrier.
B - Acid in Stomach, Saliva in mouth, Tears.
C - Cellular Barrier.
D - Phagocytose/Destroy microbes.
E - Interferons.
F - Protect non-infected cells from virus attack. (½ × 6 = 3)
9. Polymerase Chain Reaction technique can be used to obtain multiple copies of a gene of interest *in vitro*. The PCR consists of three steps :
- (i) **Denaturation** : The segment of double-stranded DNA of interest is heated to separate the two strands at a high temperature of about 94°C–98°C.



- (ii) **Annealing** : A set of primers (chemically synthesised oligonucleotides that are complementary to the regions of DNA) are annealed to both the separated DNA segments. DNA polymerase (*Taq* polymerase) extends the primer in the 5' to 3' direction.
- (iii) **Extension** : The separated DNA segments act as templates and primer synthesises new strands along the entire length of DNA strands.
- (iv) **Amplification** : The cycle is repeated several times to generate up to one billion identical copies of DNA.



3

Commonly Made Error

- While describing PCR, very few students mention the exact temperatures which cause Denaturation, Annealing and Extension. Many of the students forget to mention the role of *Taq* polymerase in this technique.

Answering Tip

- Understand the significance of temperature at each step of PCR technique and the specific reason for using *Taq* polymerase (temperature resistant).

10. (a) Alien species invasion is the accidental, intentional introduction of foreign species to a particular area. 1
- (b) Introduction of alien species causes decline or extinction of indigenous species due to tough competition for utilization of resources.



Examples : Introduction of Nile perch in Lake Victoria led to extinction of more than 200 species of Cichlid fish / Introduction of African catfish (*Clarias gariepinus*) for aquaculture poses threat to indigenous catfish/ Threat posed to native species by invasive exotic weeds like carrot grass (*Parthenium*) / Lantana and water hyacinth (*Eichhornia*) /Extinction of Abingdon tortoise by introduction of goat on the island because goats have greater browsing efficiency than tortoise.

(Any two examples) 1+1

11. (a) **In-situ conservation :** Threatened /endangered plants and animals are provided with urgent measures to save from extinction within their natural habitat and they are protected and allowed to grow naturally.

Ex-situ conservation : Threatened animals and plants are taken out of their natural habitat and placed in a setting where they can be protected and given special attention and care.

- (b) **Example of in-situ conservation :** Wildlife sanctuaries / national parks / biosphere reserves / sacred groves.

(Any one example)

(½ mark, 1 mark for difference)

Example of ex-situ conservation : Botanical gardens / zoological gardens / seed /pollen /gene banks.

(Any one example)

(½ mark, 1 mark for difference)

Commonly Made Error

- Students often get confused between examples of *in-situ* and *ex-situ* conservation of biodiversity.

Answering Tip

- In-situ* and *ex-situ* method of conservation should be clearly discussed for proper understanding.

12. (a) The DNA fragments more from A → B because, B is the anode end. DNA fragments are negatively charged, thereby moving towards anode which is a positive rod, under the influence of an electric field during gel electrophoresis.
- (b) Most commonly used matrix is agarose. Agarose is a natural polymer extracted from seaweeds.
- (c) Ethidium bromide is used as a stain for DNA, which on exposure to UV-light appear as orange coloured bands.

1 + 1+ 1

Section-C

13. (a) Cotton bollworm is the insect that attacks cotton crops and causes a lot of damage to the crop.

1

Bt cotton plants are GMOs containing the active Cry gene from *Bacillus thuringiensis*, which form protein crystals during a particular phase of their growth. These crystals contain a toxic insecticidal protein. These proteins are present in inactive form called protoxin, but become active toxin in the alkaline pH of the insect gut. The activated



toxin binds to the surface of midgut epithelial cells and creates pores that causes cell swelling and lysis and eventually causes the death of the insect. 3

(b) The protein coded by gene cryI Ab controls corn borer. 1

OR

(a) Genetic engineering (Recombinant DNA technology). 1

(b) (i) Bt cotton

(ii) 'Flavr Savr Tomato' 1+1

(c) Golden rice is a transgenic variety of rice (*Oryza sativa*) that contains good quantities of 3-carotene (provitamin A – inactive state of vitamin). Since, the grains of the rice are yellow in color due to 3-carotene, the rice is called golden rice. 1

(d) *Agrobacterium tumefaciens*. 1

