

**CBSE**  
**Class XII Biology**  
**Sample Paper - 1**  
**Term 2 - 2021-22**

**Time: 2 Hours**

**Total Marks: 35**

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**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 labelled diagrams should be drawn.
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**Section A**

- 1. What is the role of histamine in inflammatory response? Name few drugs which reduce the symptoms of allergy. [2]
- 2. The fruit juices we produce at home are often turbid as compared to those obtained from the market. [2]

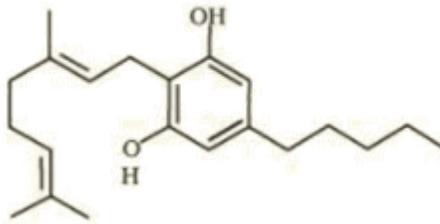


Why is this so? What can be done to clarify the fruit juices?

**OR**

How are the members of the genus *Glomus* useful to organic farmers?

3. Identify the compound whose chemical structure is shown below. State its effect on the body. [2]



4. Water samples, three in number namely river water, sewage water and secondary effluent from STP were subjected to BOD test. They were labelled A, B and C but the laboratory technician did not note the type of sample for A, B and C. The BOD values of the three samples A, B and C were recorded as 30 mg/l, 8 mg/l and 500 mg/l respectively. Which sample of water is most polluted? Can you assign the correct label to each assuming the river water is relatively clear? [2]
5. Suppose the rate of reproduction of phytoplankton in a water body slowed down. What would happen to successive trophic levels in the pyramid of energy? [2]
6. Generally, thermoregulation is energetically expensive for many organisms. So, many smaller animals are rarely found in extreme hot or cold climatic condition. Why? Write two specific reasons. [2]

**OR**

Why do submerged plants receive weaker illuminations than exposed floating plants in a lake?

### **Section B**

7. A person claimed that he has seen sounds, heard colours and smell light. [3]
- (i) What could be the possible reason?
- (ii) Name two chemicals responsible for this condition.
- (iii) Mention any one source for these chemicals.

**OR**

In the metropolitan cities of India, many children are suffering from allergy asthma. What are the main causes of this problem? Give some symptoms of allergic reactions.

8. It was diagnosed by a specialist that the immune System of the body of a patient has been suppressed. Describe the infection and the mechanism of its proliferation in the body. [3]

9. Suppose you want to make a billion copies of a small region of the chromosome in vitro. Which biotechnological mechanism will you prefer? Name the three main steps involved. [3]

10. Since the origin of life on Earth, there have been 5 episodes of mass extinction, but the current rate of extinction is 100-1000 times. What are the main causes of high extinction rate and how is it going to harm human beings? [3]

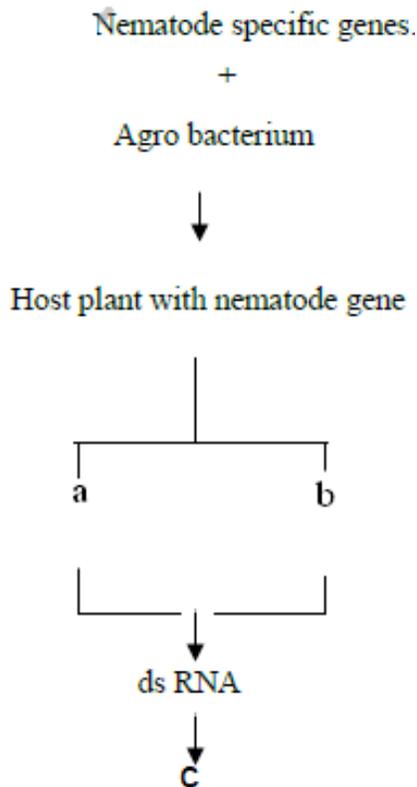
11. What is the El Niño effect? Explain how it accounts for biodiversity loss. [3]

12. [3]

i) What is this technique of pest control called?

ii) Define this technique.

iii) Specify a, b and c in the given chart.



## Section C

13. How is isolation and fragmentation of DNA of interest carried out in recombinant DNA technology? [5]

**OR**

In agriculture, there is a method of controlling pests that relies on natural predation rather than introduced chemicals.

- (i) What are two advantages of Biological control over chemical control?
- (ii) Why are chemical pesticides not preferred by the farmers in controlling pests?
- (iii) Name the main sources of biofertilizers.
- (iv) What are biofertilizers?
- (v) Name the two elements which are made available of biofertilizers.

# Solution

Time: 2 hrs

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## Section A

1. Histamine acts as an allergy-mediator which cause blood vessels to dilate. It is released by mast cells. Antihistamine steroids and adrenaline quickly reduce the symptoms of allergy.
2. The fruit juices produced at home are turbid due to the presence of fibers and pectin. The presence of pulp or plant residues makes the juices turbid. Pectinase is an enzyme which is used in breaking down the polysaccharide pectin which is present in cell walls. This can completely remove the turbidity of the bottled fruit juices. Hence, the bottled fruit juices bought from the market are clearer as compared to those made at home.

**OR**

Many members of the genus *Glomus* form mycorrhizae- symbiotic associations with roots of higher plants. The fungal component of these associations helps in the absorption of phosphorus from soil. It also makes the plant drought-resistant.

3. The given compound is cannabinoid. Cannabinoids are a group of chemicals which interact with receptors principally present in the brain. They are generally inhaled or taken by oral ingestion. They are known for their effects on the cardiovascular system of the body.
4. BOD value – 30 mg/l - Secondary effluent from STP  
BOD value – 8 mg/l – River water  
BOD value – 500 mg/l – Sewage water  
The greater the BOD of the water, the more is its pollution potential.
5. Pyramid of energy is always erect and phytoplanktons form the base of a food chain. If the rate of reproduction of phytoplankton was slowed down, it would cause a reduction in the number of trophic levels because there would be very less energy available to sustain a particular trophic level.
6. When it is cold outside, the animals tend to lose body heat quickly if they have large surface area relative to their volume. They expend more energy to generate body heat by metabolism. Small animals have limited reserves of energy, so they cannot survive.

**OR**

Because light intensities of stronger illuminations are absorbed by the exposed floating plants of the lake/water-bodies, so only the weaker illuminations reach the submerged plants. Some light is reflected at the water surface and a part is absorbed by upper layers of water.

### **Section B**

7.

(i) Hallucination

(ii) LSD, cocaine

(iii) *Erythroxylum coca* / *Atropa belladonna* / *Datura* sps.

**OR**

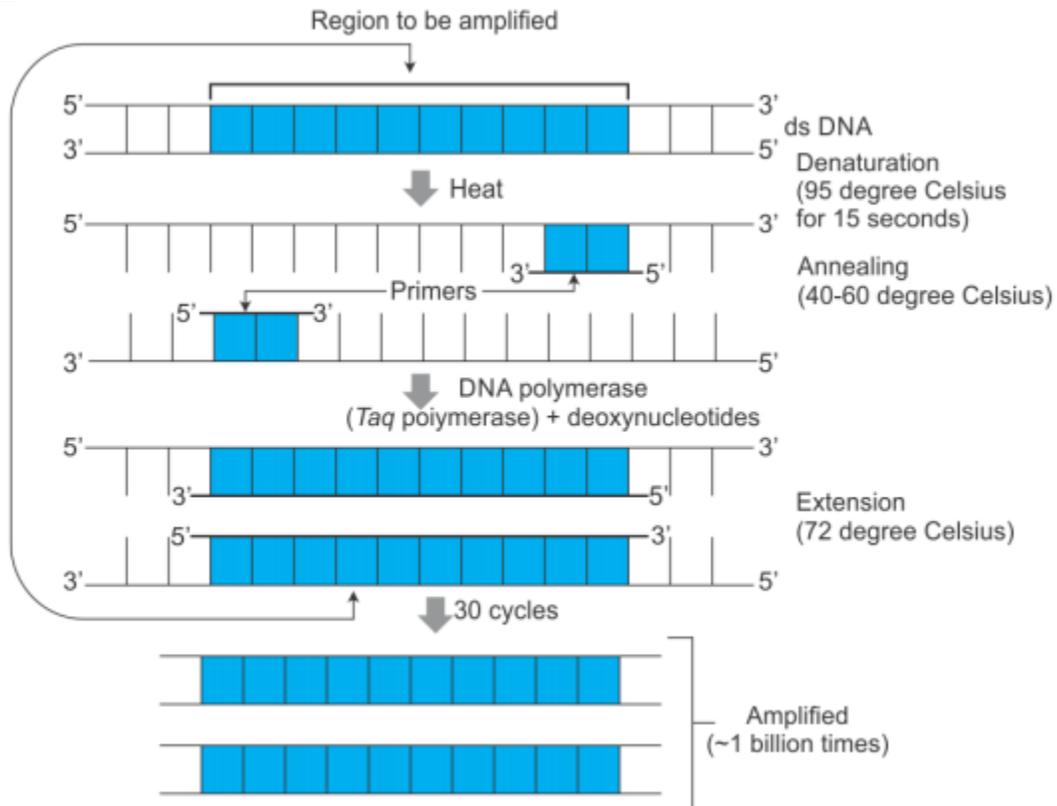
Allergy is the exaggerated (hypersensitive) response of the immune system to certain antigens present in the environment. These antigens are called allergens. Our immune system responds to these allergens by releasing histamines and serotonin from mast cells. Common allergens are mites in the dust, pollen and animal dander. Lifestyle in metro cities including protected environment provided early in life and exposure to high level of pollution makes the children sensitive to allergens. The symptoms of allergy are sneezing, watery eyes, running nose and difficulty in breathing.

8. If the immune system of the patient is found to be suppressed, the person is found to have been infected from human immunodeficiency virus (HIV). The HIV virus enters the helper T-cells and replicates inside to produce progeny viruses. The replication of virus involves the following cascade of events-

- After viral capsid enters the cell, the enzyme reverse transcriptase copies single stranded RNA into complementary DNA.
- The RNA is degraded by ribonuclease H and the DNA strand is duplicated to form double stranded DNA.
- Proviral DNA is integrated into cells' DNA through a complex sequence of reactions catalysed by the integrase enzyme.
- Once the virus has infected the cell, it becomes active and a large number of virus particles are liberated that can infect other neighbouring cells.

9. It is possible to make a billion copies of a small region of the chromosome in vitro using the biotechnological technique of Polymerase Chain Reaction (PCR). This method is used to synthesise multiple copies of the desired gene in vitro within a short span of time.

Amplification of a gene sample of interest is carried out using PCR in the following three steps:



The cycle of denaturation, annealing and extension is repeated several times to obtain several copies of desired DNA.

10. Human activities are the basic causes of mass extinction.

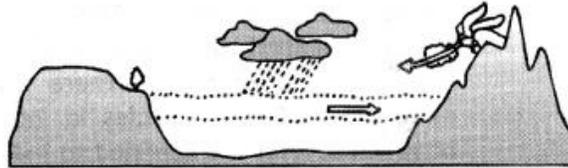
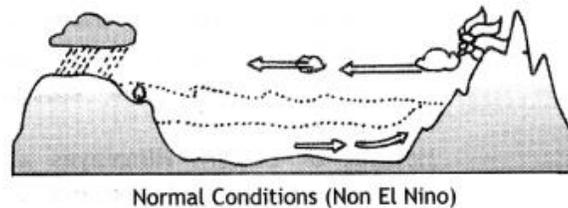
The main causes of high extinction rate are as follows-

- Habitat loss and fragmentation – decline in covered forest area from 14% to 6%.
- Over-exploitation – extinction of Steller’s sea cow
- Alien species invasion – Nile perch introduction into Lake Victoria resulted in extinction of 200 species cichlid fish
- Co-extinction – co-evolved plant pollinator mutualism.

Possible harm for life on Earth:

- Decline in plant production
- Lowered resistance to environmental perturbations like drought
- Increased variability in certain ecosystem processes such as plant productivity and water use.

11. El Nino is an abnormal warming of surface ocean waters in the eastern tropical Pacific. It is called the Southern Oscillation. The Southern Oscillation is the see-saw pattern of reversing surface air pressure between the eastern and western tropical Pacific. When the surface pressure is high in the eastern tropical Pacific it is low in the western tropical Pacific, and vice versa. Because ocean warming and pressure reversals are, for the most part, simultaneous, scientists call this phenomenon the El Nino/Southern Oscillation or ENSO for short.



El Nino Effect:

Unfortunately not all El Ninos are the same nor does the atmosphere always react in the same way from one El Nino to another. This is why NASA's Earth scientists continue to take part in international efforts to understand El Nino events. Hopefully, one day scientists will be able to provide sufficient warning so that we can be better prepared to deal with the damages and changes that El Nino causes in the weather.

12.

- i) RNA interference
- ii) The process of RNA interference (RNAi) involves silencing of a specific mRNA due to a complementary dsRNA (double stranded RNA) molecule that binds to and prevents translation of the mRNA, also referred as RNA silencing.
- iii) a – sense RNA, b – anti-sense RNA, c – silencing m RNA

## Section C

### 13. Fragmentation of DNA:

Fragmentation of DNA is carried out by incubating the purified DNA molecules with suitable restriction enzymes at optimal conditions of temperature and pH.

#### Isolation of DNA (gene) of Interest:

- (a) The fragments of DNA are separated by a technique called gel electrophoresis.
- (b) The DNA is cut into fragments by restriction endonucleases.
- (c) These fragments are separated by a technique called gel electrophoresis.
- (d) Agarose, the natural polymer obtained from seaweeds, is used as the matrix.
- (e) DNA fragments being negatively charged are separated by forcing them to move through the matrix towards the anode under an electric field.
- (f) The DNA fragments separate/ resolve according to their size.
- (g) The separated molecules are stained by ethidium bromide and visualised by exposure to UV radiation, as bright orange coloured bands.
- (h) The separated bands of DNA (on the gel) are cut from the gel and extracted from the gel piece (elution).
- (i) Such DNA fragments are purified and used for constructing recombinant DNA by joining them with cloning vectors.

**OR**

#### (i) Advantages of biological control over chemical control:

- a. Biological control is self-perpetuating and no manufacturing is required for the synthesis of pathogen or beneficial organisms.
- b. The pests are unable to develop resistance against the pathogens of biological control.

#### (ii) Chemical pesticides are not preferred by the farmers in controlling pests because:

- a. Their production pollutes the environment.
- b. Most of the chemical pesticide are washed away with the rain water and pollute the soil and water resources.

(iii) The main sources of biofertilizers are bacteria, fungi and cyanobacteria.

(iv) Biofertilizers are the organisms which can bring about soil nutrient enrichment.

(v) Nitrogen and phosphorous are added to the soil by biofertilizers.