

**CBSE QUESTIONS PAPER SOLUTION – 2022 (57-3-1)****SUBJECT: BIOLOGY****TERM-II****SOLUTION****SECTION - A**

1. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Immune system overreacts by producing antibodies called Immunoglobulin E (IgE). These antibodies travel to cells that release chemicals, causing an allergic reaction.
  2. (a) (i) *Cannabis sativa*  
(ii) Cannabinoids are obtained from the inflorescence of the plant .  
(iii) These drugs affect cardiovascular system of the body. They affect brain areas that influence pleasure, memory, thinking, concentration, movement and coordination.
- OR
- (b) There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosal- associated lymphoid tissue (MALT). It constitutes about 50 percent of the lymphoid tissue in human body.
  3. (i) *Rhizobium* is a bacterium found in soil that helps in fixing nitrogen in leguminous plants. It attaches to the roots of the leguminous plant and produces nodules. These nodules fix atmospheric nitrogen and convert it into ammonia that can be used by the plant for its growth and development.  
(ii) *Anabaena* plays a significant role in farming where it is used as a biofertilizer and soil stabilizer.
  4. *Trichoderma* species are free-living fungi that are very common in the root ecosystems. They are effective biocontrol agents of several plant pathogens.  
Baculoviruses are pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents are in the genus *Nucleopolyhedrovirus*. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications. They have been shown to have no negative impacts on plants, mammals, birds, fish or even on non-target insects.
  5. This is particularly true for small animals like shrews and humming birds. Heat loss or heat gain is a function of surface area. Since small animals have a larger surface area relative to their volume, they tend to lose body heat very fast when it is cold outside; then they have to expend much energy to generate body heat through metabolism. This is the main reason why very small animals are rarely found in polar regions.

6. (a) (i) A- Mortality B- Natality  
(ii) 100 %

OR

(b) The given pyramid is expanding. The population of pre- reproductive is higher than the post reproductive population, which make the expanding pyramid of population.

**SECTION - B**

7. (a) ELISA – Enzyme Linked Immuno Sorbent Assay . It is based on the principle of antigen-antibody interaction where a pathogen can be detected by the presence of antibodies (proteins, glycoproteins, etc.) on it.  
(b) HIV is a retrovirus, which means it carries single-stranded RNA as its genetic material rather than the double-stranded DNA human cells carry.
8. (a) *Entamoeba histolytica*  
(b) Houseflies act as mechanical carriers and serve to transmit the parasite from faeces of infected person to food and food products, thereby contaminating them. Drinking water and food contaminated by the faecal matter are the main source of infection.  
(c) Perform hand hygiene frequently, especially before handling food or eating, and after using the toilet or handling faecal matter. Wash hands with liquid soap and water, and rub for at least 20 seconds.
9. Cry Protein: The insecticidal protein which is produced by soil bacterium named *Bacillus thuringiensis* is called cry protein.  
For example- The proteins encoded by the genes *cryIAc* and *cryIIAb* control the cotton bollworms, The *cryIAb* controls corn borer.
10. (a) German naturalist and geographer Alexander von Humboldt observed that within a region species richness increased with increasing explored area, but only up to a limit.  
(b) On a logarithmic scale, the relationship is a straight line described by the equation

$$\log S = \log C + Z \log A$$

where

S= Species richness

A= Area

Z = Slope of the line (regression coefficient)

C = Y- intercept

11. (a) When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.

**Example:**

When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate. Another example is the case of a coevolved plant-pollinator mutualism where extinction of one invariably leads to the extinction of the other.

OR

(b) Intangible benefits from forests derived from forests, in other words influences of forests on environment are described below:

Improvement of climate: Forests ameliorate climate influencing temperature, rainfall, humidity, wind

etc. Forests regulate temperature range balance in the atmosphere and water cycle.

12. (a) (i) Anode- S end (ii) R (iii) T

(b) The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution.

**Importance:-** The DNA fragments purified in this way are used in constructing recombinant DNA by joining them with cloning vectors.

### SECTION - C

13.(a)(i) Thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*), which remain active during the high temperature induced denaturation of double stranded DNA.

(ii) primer is a small segment of DNA that binds to a complementary strand of DNA. Primers are necessary to start the functioning of DNA polymerase enzyme and therefore are necessary in polymerase chain reaction.

(iii) PCR is important because it can generate several copies of a DNA sequence in a very short time period. It is also important in forensic science as a tool for genetic engineering. It helps in analyzing the gene expression

OR

(b)(i) ADA deficiency

(ii) 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.

(iii) if the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.