CBSE QUESTIONS PAPER SOLUTION – 2022 (57-3-2)

SUBJECT: BIOLOGY

TERM-II

SOLUTION

SECTION - A

1. (i) A- Mortality B- Natality

(ii) 100 %

OR

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

2. 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.

3. (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 per cent of the lymphoid tissue in human body.

4. Flocs: During secondary treatment of effluent, excessive growth of aerobic bacteria and fungi form a mass of mesh like structure called flocs. Microbes consume the major part of the organic matter in the effluent. This significantly reduces the BOD (biochemical oxygen demand) of the effluent.

5. *In-situ* conservation means conserving all the living species, especially all the wild and endangered species, in their natural habitats and environment.

Ex-situ conservation means conserving all the living species in the man-made / artificial habitats that are similar to their natural living habitats.

6. (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.

SECTION – B

7. Foreign DNA Vector DNA (Plasmid)

⇩ ⇩

Same restriction enzyme cutting both foreign DNA and vector DNA at specific point

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Ligases join foreign DNA to plasmid

⇩

Recombinant DNA

8. **(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

9. (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.

10. (a) In our body, cell growth and differentiation is highly controlled and regulated. In cancer cells, there is breakdown of these regulatory mechanisms. Normal cells show a property called contact inhibition by virtue of which contact with other cells inhibits their uncontrolled growth.

(b) α Interferon is biological response modifies, which activates the immune system and helps in destroying tumour.

11. 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 *cryllAb* control the cotton bollworms, The *cryIAb* controls corn borer.

12. (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.

13. (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

(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.