Biology

SET-1

Marking Scheme

M.M.35 **Time :2 hours**

SECTION-A

Ans1: Sneezing, running nose; By releasing IgE antibodies

Ans2: (a) (i) Cannabis sativa.

(ii) Inflorescence.

(iii) Affects cardiovascular system

OR

(b) Provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effector cells.

Ans3: : i. Rhizobium- fix atmospheric nitrogen in root nodules of leguminous plants, which function as nutrients.

ii. Anabaena- in paddy fields serve as biofertilizer and increase soil fertility.

Ans 4. Trichoderma are free living fungi of root ecosystem used as biocontrol agents for several plant pathogens.

Baculovirus are pathogens which attack insects and other arthropods. They are used in species specific, narrow spectrum insecticidal applications.

Ans 5. Smaller the surface area, larger the body volume, thus tend to lose more heat.

Ans 6. (a) (i) A: Mortality, B: Natality

(ii) $N_t = N_o \times (1+r)^t$

$2000000 = 1000000 \times (1+r)^1$

$r = 2-1 = 1$

Since value of r is 1, this means growth has been 100%.

OR

(b) Expanding, pre reproductive more than the reproductive phase, shape is upright pyramid.

SECTION-B

Ans 7. (a) Enzyme linked ImmonoSorbent assay; Antigen-antibody interaction.

(b) RNA

Ans 8. (a) E. 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) Eat covered food and drink clean and covered water.

Ans 9: Crystal proteins which are toxic to certain insects. the Bt toxin protein exist as inactive protoxins but once an insect ingest the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilise the crystals. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of the insect.

Ans 10: a. Alexander von Humboldt observed that within a region species richness increased with increasing explored area, but only up to a limit.

The relation between species richness and area for a wide variety of taxa such as angiosperm plants, birds, bats, freshwater fishes turns out to be a rectangular hyperbola.

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.

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

Eg. When a host fish become extinct, it's unique assemblage of parasites also become extinct.

Eg. When pollinator become extinct plant having mutual relationship will also extinct.

OR

i. Narrowly utilitarian – forest provide food, fibre, firewood, medicines, etc.
ii. Broadly utilitarian- forest provide glucose and oxygen through photosynthesis, pollination and aesthetic pleasure

Ethical -Intrinsic value of each species of forest

Ans 12: (a) (i) S (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. The DNA fragments purified in this way are used in constructing recombinant DNA by joining them with cloning vectors.

SECTION- C

Ans 13: (a) (i) use of a thermostable Taq polymeerase (isolated from a bacterium, Thermus aquaticus), which remain active during the high temperature induced denaturation of double stranded DNA.

(ii) Primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA). Helps in extension of the newly formed strand.

(iii) If the process of replication of DNA is repeated many times, the segment of DNA can be amplified to approximately billion times, i.e., 1 billion copies are made. Thus any pathogen can be detected at the molecular level.

(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.

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