



Resonance[®]
Educating for better tomorrow

CBSE

**CENTRAL BOARD SECONDARY
EXAMINATION**

2022

**CLASS
XII**

Questions & Solutions

Date: 30 May, 2022 | TIME : (10.30 a.m. to 12.30 p.m)

Duration: 2 hrs. | Max. Marks: 35






SUBJECT: Biology

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555  7340010333  facebook.com/ResonanceEdu  twitter.com/ResonanceEdu  www.youtube.com/resowatch  blog.resonance.ac.in

This solution was download from Resonance RBSE 2022 Solution portal

Roll No.

--	--	--	--	--	--	--

Candidates must write the Code on the title page of the answer-book

Biology (Theory)

Time allowed: 2 hours

Maximum Marks: 35

- Please check that this question paper contains 12 printed pages.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer book by the candidate.
- Please check that this question paper contains 13 questions.
- Please write down the Serial Number of the question in the answer-book before attempting it.
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 am from 10.15 am to 10.30 am., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

General Instructions:

- This question paper contains 13 questions. All questions are compulsory.
- The question paper has three sections – Section A, B and C.
- Section-A has 6 question of 2 marks each. Section-B has 6 questions of 3 marks each and Section-C has case based question of 5 marks.
- Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION-A

- Name the diseases and their mode of transmission in human by (i) common round worm and (ii) filarial worm. [2]
Sol. (i) Ascariasis is caused by common roundworm (Ascaris) and transmitted by contaminated water, vegetable & fruits etc
 (ii) Elephantiasis or filariasis is caused by worm (Wuchereria bancrofti). The pathogens are transmitted to a healthy person through the bite by the female mosquito vectors.
- (a) (i) Write the Scientific name of the plant from where natural cannabinoids are obtained. [2]
 (ii) Mention the parts of the plant that are used for extracting the drug
 (iii) How does the drug affect human body?
OR
 (b) Epithelial lining of our intestine is considered as secondary lymphoid organ. Justify the statement.
Sol. (a) (i) Cannabis sativa
 (ii) The flower tops, leaves, and the resin of cannabis plant are used in various combinations to produce marijuana, hashish charas and ganja.
 (iii) A drug effects on cardiovascular system of the body.

Or

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555  7340010333  facebook.com/ResonanceEdu  twitter.com/ResonanceEdu  www.youtube.com/resowatch  blog.resonance.ac.in

(b) The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effector cells.

Lymphoid tissue is found beneath most wet epithelial membranes, such as those that line the gastrointestinal tract. In these spaces many cells of the lymphatic system wander and become exposed to invading microorganisms and foreign material. They can establish localized centres of cell production in response to such invasions. These are referred to as nodules. Some nodules become relatively permanent structures, such as the tonsils, appendix, and Peyer's patches, which are in the lining of the small intestine.

Thus, epithelial lining of our intestine is considered as secondary lymphoid organ.

3. A boy developed some allergic reactions when he straight entered into his air conditioned room after a game of football outside his house. Write any two symptoms that could be noticed in such condition. How does our body combat such conditions? [2]

Sol. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.

Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. The use of drugs like anti-histamine adrenalin and steroids quickly reduce the symptoms of allergy.

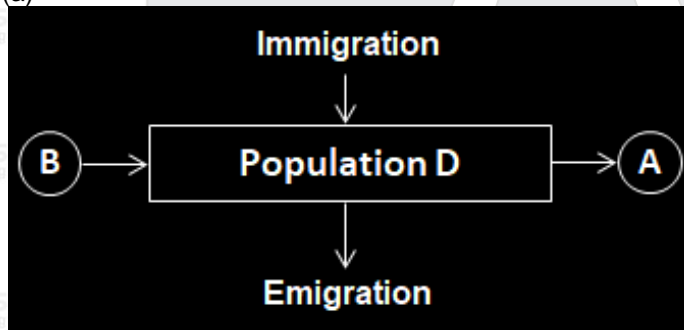
4. Farmers are often suggested to use the following organisms in their crop land so as to improve the soil fertility. [2]

(1) Rhizobium (ii) Anabaena

Sol. (i) Rhizobium is a N_2 fixing symbiotic bacteria that forms a symbiotic association with legumes and fix atmospheric N_2 thus increase soil fertility, plant growth and limit the use of Chemical fertilizers.

(ii) Anabaena - Anabaena is a cyanobacteria that can fix atmospheric N_2 in specialized cells called heterocyst. In paddy fields, cyanobacteria serve as an important biofertiliser. Cyanobacteria also add organic matter to the soil and increase its fertility.

5. (a)

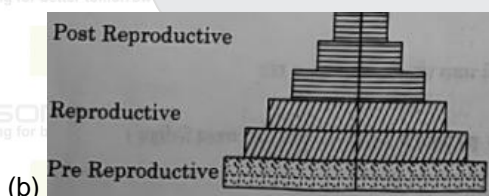


Observe the schematic representation given above and answer the following questions : [2]

(i) Identify A and B.

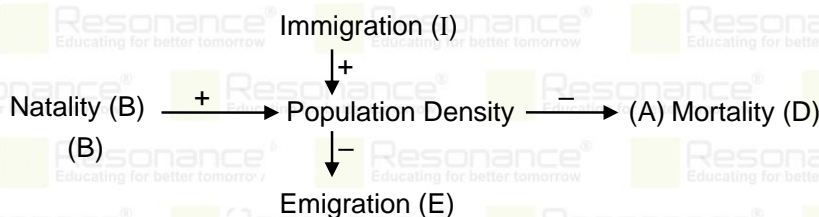
(ii) Calculate the growth rate of bacteria in a curd sample, where 1 million bacteria increased to two million, within a period of one hour. [2]

OR



(b) Identify the type of pyramid given above. Write the identifying feature on the basis of which you identified it.

Sol. (i)



Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

A is mortality i.e. death rate

B is natality i.e. Birth rate

(ii) Present population = 2 million (20,00,000)

Population 1 year ago = 1 million (10,00,000)

$$\frac{dN}{dt} = rN \Rightarrow \frac{20,00,000 - 10,00,000}{10,00,000} \times 100$$

$$= \frac{10,00,000}{10,00,000} \times 100 = 100\%$$

b) The expanding type of pyramid has been given here in which population is growing. It is found in developing countries.

Pre-reproductive population is higher in these type of pyramids.

6. Explain the role of 'B' and T lymphocytes in providing immunity to humans. [2]

Sol. B-lymphocyte produce an army of proteins in response to pathogen into our blood to fight with them and called as antibodies.

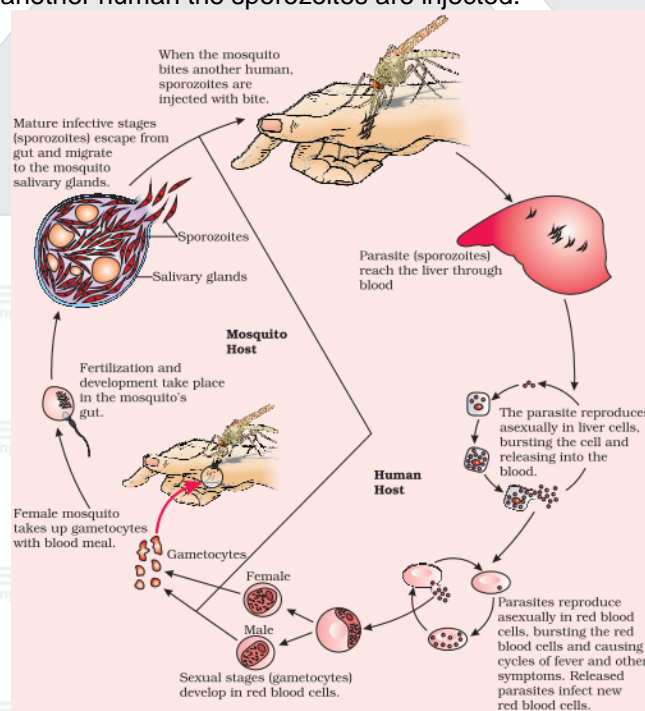
T-lymphocytes (T-cell) do not produce antibodies but help B-cell produce them. These are responsible for humoral immunity.

SECTION-B

7. Plasmodium enters the human body through the bite of infected female Anopheles. Trace its life cycle till the onset of malaria in human. [3]

Sol. Female anopheles mosquito bites a healthy human and injects sporozoites (infective) state with bites.

- The parasite reach the liver by blood start multiplying within the livers cells.
- Parasite then attach the RBC and reproduce asexually in blood cells & rupture the RBC which release a toxic substance called 'Haemozoin' responsible for chill & fever.
- Some of the parasites differentiate into male & female gametocyte which are taken by the mosquito during biting & sucking blood.
- Formation of gametes & fertilization takes place in intestine of mosquito.
- The zygote develops & forms thousands of sporozoites which migrate into salivary glands of mosquito.
- When mosquito bites another human the sporozoites are injected.



Resonance Eduventures Ltd.

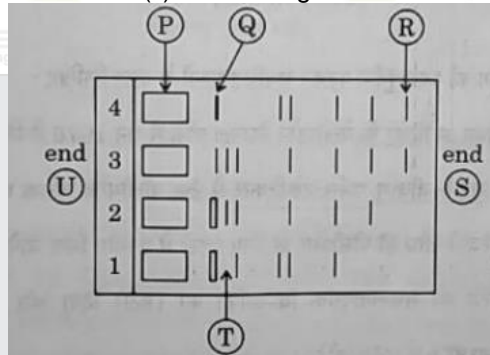
Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | [facebook.com/ResonanceEdu](https://www.facebook.com/ResonanceEdu) | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

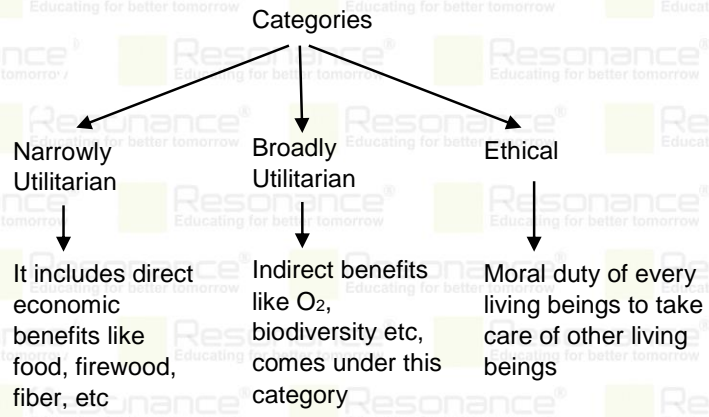
8. (a) Write the complete name of the diagnostic test for AIDS. Explain the principle it works on. [3]
 (b) Name the type of genetic material present in AIDS causing pathogen.
- Sol. (a) AIDS is diagnosed by ELISA (enzyme linked immune sorbent assay), PCR (polymerase chain reaction) and western blotting. It treated with anti-retroviral drugs. ELISA is based on the principle of antigen-antibody interaction. Either the presence of antigen (protein, glycoprotein etc.) are detected or the antibodies produced against the pathogen are detected.
 (b) AIDS is caused by HIV (human immune deficiency virus). HIV is retrovirus having RNA as the genetic material
9. (a) Given below is the stepwise schematic representation of the process of electrophoresis. Identify the alphabets' representing (i) Anode end (ii) smallest/lightest DNA strand in the matrix (iii) Agarose gel [3]



- (b) What is elution ? State the importance of elution in this process.
- Sol. (a) (i) Anode end = S
 (ii) smallest/lightest DNA strand in the matrix = R
 (iii) Agarose gel = T
- [P = wells, Q = large DNA bands, R = small DNA bands, T = agarose gel, U = Cathode, S = Anode]
- (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.

10. (a) Explain the concept of "co-extinction" by taking two examples. [3]
- OR**

- (b) "Forests provide intangible benefits to us." Explain by taking three different areas, how.
- Sol. (a) Co-extinction in the extinction of species and the plant & animals species associated with it in an obligatory way also become extinct
 Eq. (1) Co-extinction of host fish & its parasites
 (2) Co-extinction of co-evolved plant- pollinator mutualism.
 (b) The benefits provided by forests can be divided into 3 categories.



Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005
 Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029
 Toll Free : 1800 258 5555 | [facebook.com/ResonanceEdu](https://www.facebook.com/ResonanceEdu) | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

11. What are cry-proteins ? With the help of a suitable example, explain how it acts as a biological pesticide. [3]
- Sol.** Cry proteins are toxic or poisonous crystal proteins which is encoded by cry gene, it is toxic to certain insects.
Example: Biological pesticide that can be introduced in order to control butterfly caterpillars is the bacteria *Bacillus thuringiensis* (often written as Bt) that forms cry protein. These are available in sachets as dried spores which are mixed with water and sprayed onto vulnerable plants such as brassicas and fruit trees, where these are eaten by the insect larvae. In the gut of the larvae, the toxin (cry protein) is released (gets activated) and the larvae get killed. The bacterial disease will kill the caterpillars, but leave other insects unharmed. Because of the development of methods of genetic engineering in the last decade or so, the scientists have introduced *B. thuringiensis* toxin genes into plants. Such plants are resistant to attack by insect pests.
In this way cry protein of *Bacillus thuringiensis* acts as biological pesticide.

12. (a) "For ethical reasons, biodiversity must be conserved." Do you agree? Write your views in support of your answer.
(b) Write the characteristic features of a specific area on the basis of which it is designated as a "hot spot". Write any one major threat to these areas.
- Sol.** (a) Philosophically or spiritually we need to realize that every species has an intrinsic value, even if it may not be of current or any economic value to us. It is our moral duty to care for the well being of other living organisms and pass on our biological legacy in good order to future generations.
(b) Characteristic features of a specific area on the basis of which it is designated as a "hot spot" are-
- Regions with very high levels of species richness and
 - high degree of endemism (that is, species confined to that region and not found anywhere else).
- One of the major threat to these areas is human activities and loss of habitat.

SECTION-C (Case Based)

13. (a) Read the paragraph given below and answer the questions that follow: [5]
Enzyme Taq polymerase, is extracted from a eubacterial microorganism *Thermus aquaticus* from Yellowstone National Park in Montana, USA and isolated by Chien et al. (1976). Taq polymerase successfully replaced the DNA polymerase from *E. coli* that was being used in PCR earlier and this shift revolutionised the PCR technique.
(i) Taq polymerase after its discovery replaced *E. coli* DNA polymerase in PCR technique. Explain giving reasons why was the need felt for the change?
(ii) What is a primer and its importance in PCR ?
(iii) Write the importance of PCR as a diagnostic tool.
- OR**
- (b) Read the following paragraph and answer the questions that follow: Biotechnology revolves around the "gene of interest", with an objective to open various avenues for human welfare in health, medicine, pharma, agriculture etc. using different techniques, tools and processes. One of the breakthroughs of biotechnology in medicine is the gene therapy.
(i) Name the human disease for which the gene therapy was used for the first time.
(ii) Explain the steps of gene therapy carried to cure the disease using the lymphocytes of the patient. Why is this therapy not a permanent cure of the disease?
(iii) Write the possible permanent cure of the disease by the gene therapy that is in progress.
- Sol.** (a)
(i) Enzyme Taq Polymerase is found in thermophilic bacteria, Taq Polymerase is highly efficient because it is thermostable enzyme which does not degrade at high temperature. It can tolerate high temperature fluctuations during the PCR.
(ii) Primer is a small segment of DNA that binds to a complementary strand of DNA. It is essential to start the functioning of DNA polymerase enzyme of this enzyme is necessary for PCR.

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555  7340010333  facebook.com/ResonanceEdu  twitter.com/ResonanceEdu  www.youtube.com/resowatch  blog.resonance.ac.in

(iii) PCR act as diagnostic tool because it can diagnose certain infectious disease. It is well developed molecular technique for the critical patient treatment decisions and outcomes.

Or

(b)

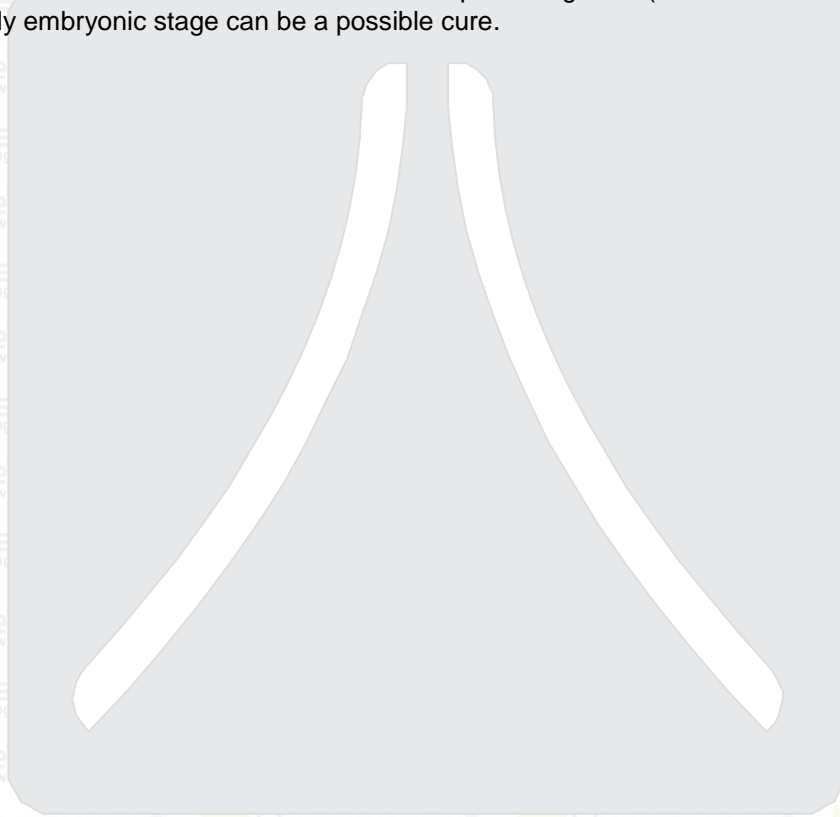
(i) ADA (adenosine deaminase deficiency)

(ii) Steps:-

- Lymphocytes from patient's blood were grown in culture, and functional ADA, cDNA was introduced in these lymphocytes using retroviral vector.
- The lymphocytes were transferred into patient's body. Periodic infusion of such genetically engineered lymphocytes is done because these cells are mortal.

(iii) For permanent cure

- Gene isolated from the bone marrow cells producing ADA (Adenosine deaminase deficiency) at early embryonic stage can be a possible cure.








Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555  7340010333  facebook.com/ResonanceEdu  twitter.com/ResonanceEdu  www.youtube.com/resowatch  blog.resonance.ac.in