CBSE Class 12 Biology 2022 - Set 57/6/2 - Compartment

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 2 Hours **Maximum Marks: 35**

General Instructions

(i) This question paper consists of 13 questions.
(ii) All questions are compulsory.
(iii) The question paper has three sections Section A, B and C.
(iv) Section A has 6 questions of 2 marks each.
(v) Section B has 6 questions of 3 marks each.
(vi) Section C has a case-based question of 5 marks.
(vii) There is no overall choice in the question paper. However, internal choices have been provided in some questions. Attempt only one of the alternatives in such questions.
(viii) Wherever necessary, neat, proportional and properly labelled diagrams should be drawn.

Section A

1. A farmer was advised to use viruses for species-specific, narrow spectrum insecticidal applications. To which genus do these viruses belong and which specific category of pathogens can they be used for?

2(a). In our country NACO and other Non-Government Organisations (NGOs) are doing a lot to educate people about AIDS. Expand 'NACO'. Enlist any three ways by which transmission of HIV-AIDS infection occurs.

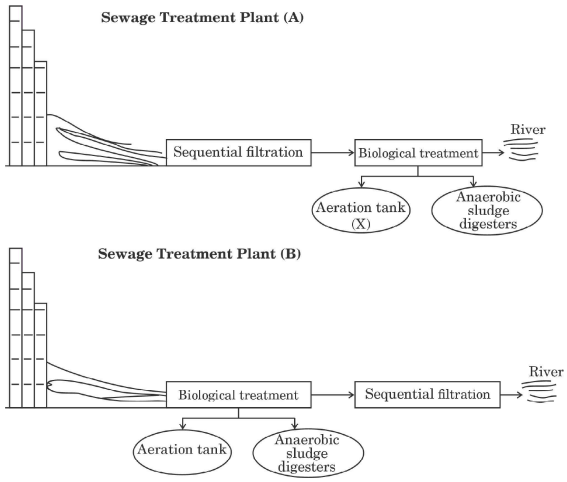
OR

2(b). Write the scientific name of the plant and its part from which opioids are extracted. How does it affect our body functions?

3. Study the given diagrams of Sewage Treatment Plants (STP) and answer the questions that follow:

(a) Which of the two Sewage Treatment Plants, (A) or (B), will be more effective in treating human excreta in the municipal waste?

(b) How is the primary effluent treated in the aeration tanks till there is significant reduction in the BOD of the effluent?

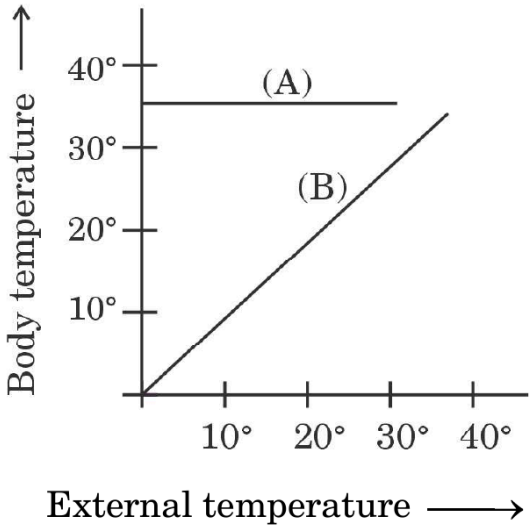


4. A major cause of death among infants is because of Acute Respiratory Infection (ARI) of the lower respiratory tract, which further affects the alveoli. Name the associated disease, a causative bacteria and give any two symptoms of the disease.

5(a). The given graph shows diagrammatic representation of organismic response to abiotic factors:

(i) Which of the two lines, (A) or (B), depicts the relationship of organismic response to temperature in cat and lizard respectively?

(ii) Explain how animal (A) is different from animal (B).



OR

5(b). Given below an equation describing the growth pattern of a population:

$dN/dt = rN$

(i) Mention the type of growth model or growth pattern of population described by the given equation.

(ii) What does 'r' in the equation signify?

(iii) Mention the type of growth curve that will be obtained if the population density (N) is plotted against time (t).

(iv) According to you, will the resource availability be limited or unlimited for this type of growth in a given population?

6. Taking an example of Nile perch, explain how introduction of alien species in a dynamic ecosystem may have a devastating effect on the indigenous species and may lead to loss of biodiversity.

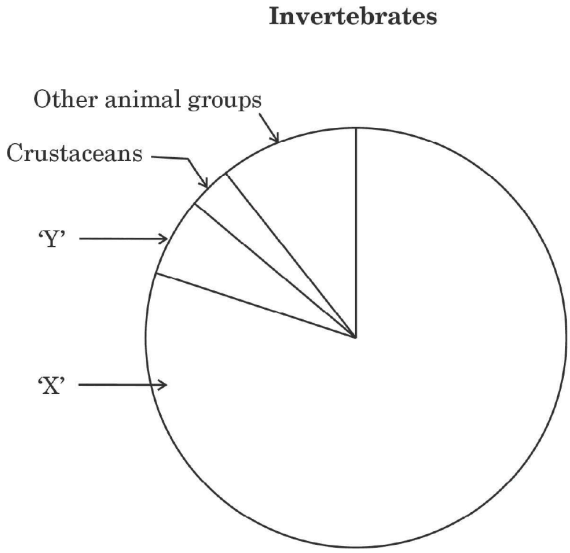
Section B

7. A researcher wants to amplify a desired fragment of DNA to be ligated with a vector for further cloning. Name the technique she would use. Explain the steps of the technique diagrammatically only.

8. Study the pie chart given below, representing the global diversity: proportionate number of species of major taxa and answer the following questions based on it.

(a) Identify 'X' and 'Y' in the given pie chart.

(b) Which one of the two, 'X' or 'Y', is the most species-rich taxonomic group and by what percentage?



9. Name any two techniques which can be used to generate a three-dimensional image to detect cancers of the internal organs and explain any one of the techniques.

10. How have the following factors affected the biodiversity of an area? Explain.

(a) Habitat loss and fragmentation

(b) Over-exploitation

11. In humans there is a primary lymphoid organ which is quite large at the time of birth and keeps reducing in size with age and by the time puberty is attained it reduces to a very small size.

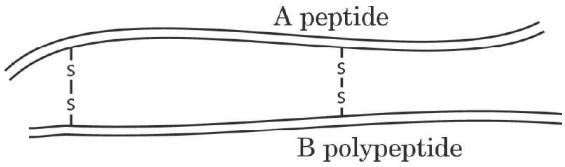
(a) Name the organ, give its exact location and state its functions.

(b) Name any other primary lymphoid organ in humans.

12(a). One of the potential uses of genetic engineering is in correction of a gene defect that has been diagnosed in a child/embryo. Explain how gene therapy is of help in ADA deficiency.

OR

12(b). A schematic diagram of matured human insulin is given below:



How is the process of its formation naturally in the human body different from that of its formation by rDNA technology? Explain.

Section C

13(a). Restriction endonucleases are a class of bacterial enzymes that recognize a specific short sequence of nucleotides within a double-stranded DNA molecule. The natural purpose of these enzymes is to protect bacteria from pathogens, notably bacteriophages. There are different classes of restriction enzymes, but type-II restriction enzymes are widely used in manipulating DNA as they recognize short sequence nucleotides that are typically palindromes.

(i) Name a specific restriction endonuclease and write the palindromic nucleotide sequence in the DNA recognised by this enzyme. Also, indicate the site at which it makes the cut.

(ii) A piece of DNA is cut by a restriction enzyme. The fragments are then separated by gel electrophoresis and stained by ethidium bromide. Write the principle on which gel electrophoresis works.

OR

13(b). RNA interference (RNAi) holds great potential as a therapeutic agent for the treatment of human diseases and as a biocontrol agent for controlling pests in the field of agriculture.

The graph given below illustrates the use of 'RNAi' for the potential treatment of disorders of cholesterol metabolism. Some people possess genetic mutations with elevated levels of 'ApoB' gene which predisposes them to coronary artery diseases.

Lowering the amount of 'ApoB' can reduce the number of lipoproteins and lower the blood cholesterol.

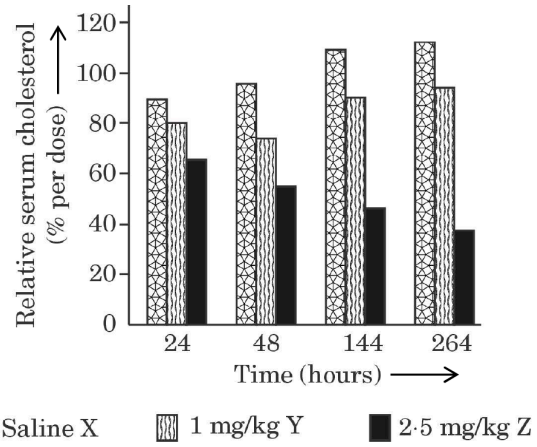
Tracy Zimmerman and her colleagues used RNAi in 2006 to reduce the level of 'ApoB' in non-human primates Cynomolgus monkeys. One group of monkeys were given RNAi treatment (Small interfering RNAs, SiRNAs) (doses 1 mg/kg SiRNAs), a second group of monkeys were given RNAi treatment (doses 2.5 mg/kg SiRNAs) and a third group of monkeys were injected with saline as control.

The results of the experiments are illustrated in the graph given below:

13(b). (continued)

(i) Write your interpretation from the bars 'X' and 'Z' obtained after 264 hours of treatment of monkeys with saline and 2.5 mg/kg SiRNAs treatment respectively, in comparison to the bars obtained after 24 hours of treatment with saline and 2.5 mg/kg SiRNAs.

(ii) A tobacco plant made transgenic using RNA interference is protected from the parasite Meloidogyne incognitia. How is the transgenic tobacco plant able to prevent itself from infestation by the nematode? Explain briefly.



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