BUDHA DAL PUBLIC SCHOOL, PATIALA
Second Term Examination (8 December 2023)
Class XII (Science)
Subject - Biology
(Set - A)

Time: 3hrs. **M.M. 70**

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

Section - A

Q1. Tetanus antitoxin (tetanus toxoid) when injected into human body, immediately provides.
a) Innate immunity
b) Passive immunity
c) Auto immunity
d) Active immunity

Q2. The cells which function as HIV factory in an infected person are
a) liver cells b) leukocytes c) macrophages d) erythrocytes

Q3. Match the following :

Column A	Column B
a) Lady bird	(i) Methanobacterium
b) Mycorrhiza	(ii) Trichoderma
c) Biological control	(iii) Aphids
d) Biogas	(iv) Glomus

a) a (ii), b (iv), c (iii), d (i) b) a (iii), b (iv), c ((ii), d (i)
c) a (iv), b (i), c (ii), d (iii) d) a (iii), b (ii), c (i), d (iv)

Q4. The bacterium whose plasmid was used in the construction of the first rDNA is
a) Esherichia coli
b) Agrobacterium tumefaciens
c) Salmonella typhimurium
d) Bacillus thuringiensis

Q5. A linear DNA and a circular DNA molecules are cut by the same restriction endonuclease that recognizes four restriction sites in each of these DNA's. How many DNA fragments will be produced in these two cases respectively?
a) four & four b) four & five c) five & four d) five & five

Q6. Which one of the following is used during "RNAi" process to silence the desired gene?
a) ds DNA b) ds RNA c) r DNA d) DNA polymerase

Q7. Who among the following challenged the patent right granted to the University of Mississipi Medical Centre for 'Use of turmeric in wound healing'?
a) Mr. Ajay Phadke b) Dr. Venugopalan c) Ms. Vandana Shiva d) Dr. RA Mashelkar

Sea anemone gets attached to the surface of the hermit crab. The kind or population interaction exhibited in this case is

a) amensalism b) commensalism c) mutualism d) parasitism

Q9. The process of mineralization by micro organisms helps in the release of

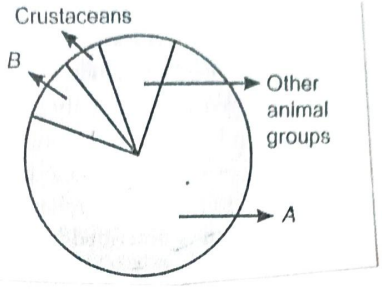
a) Inorganic nutrients from humus

b) Both organic and inorganic nutrients from detritus.

c) Organic nutrients from humus.

d) Inorganic nutrients from detritus and formation of humus.

Q10. The pie diagram given represents the proportionate number of species of major groups of invertebrates. Identify the groups 'A' and 'B'.



a) A Molluscs B. Insects

b) A - Annelids B. Molluscs

c) C - Insects B. Molluscs

d) A - Molluscs B. Arthopods

Q11. Select the option with correctly matched pairs.

A) Pyramid of energy - Always upright
B) Pyramid of number in tree ecosystem - always inverted
C) Pyramid of biomass in pond ecosystem - upright or inverted
D) Pyramid of number in grassland ecosystem - inverted
E) Pyramid of biomass in grassland ecosystem - upright

a) A, B and D b) A, B and E c) B, C and D d) B, C and E

Q12. Significance of 'heat shock' method in bacterial transformation is to facilitate.

a) binding of DNA t o the cell wall
b) uptake DNA through membrane transport proteins.
c) uptake of DNA through transient pores in the bacterial cell wall.
d) Expression of antibiotic resistance gene.

Each of the following questions (Q.No. 13 to Q.No 16) consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:

a) **Both Assertion (A) and Reason (R) true and Reason (R) is the correct explanation of Assertion (A).**
b) **Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).**
c) **Assertion (A) is true but Reason (R) is false.**
d) **Assertion (A) is false but Reason (R) is true.**

Q13. **Assertion :** A high biochemical oxygen demand (BOD) indicates the presence of large number of decomposer microbes in the water body.
Reason : BOD is the measure of oxygen utilized by the microbes to decompose the organic matter wastes in the water body.

Q14. **Assertion :** When DNA from two different sources are cut by the same restriction enzyme, the resultant fragments have different kinds of 'sticky ends'.
Reason : These can be joined end-to-end using DNA ligases.

Q15. **Assertion :** ADA deficiency disorder is caused due to the excessive synthesis of gene for adenosine deaminease.
Reason : It affects the immune system.

Assertion : Any population growing exponentially in habitats with unlimited resources, can reach enormous population densities in a very short period.

Reason : The growth curve of such a population is sigmoid.

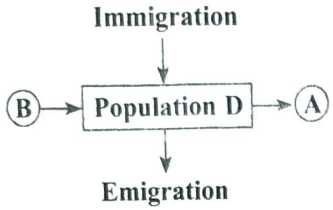
Section - B

17. Humans have innate immunity for protection against pathogens that may enter the gut along with food. What are the two barriers that protect body from such pathogens.

Q18. a) State the principle involved in the separation of DNA fragments using gel electrophoresis.

b) How are DNA fragments visualized once they are separated by gel electrophoresis?

Q19.



Observe the schematic representation given above and answer the following questions:

(*a*) Identify A and B

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

Q20. Name and explain the processes earthworm and bacteria carry on detritus.

Q21. a) What are cry genes? In which organism are they present?

b) Name the respective target pests of the genes (i) cry1 Ab (ii) cry1 Ac

Section - C

Q22. a) At what stage plasmodium picked up by the female anopheles? Describe the life cycle of the parasite in insect.

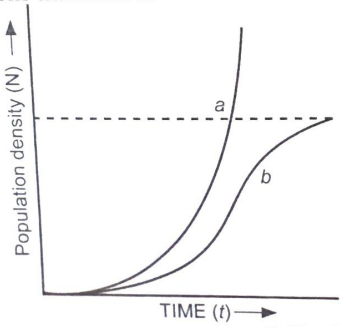
b) State what happens in the human body when malarial parasites infected RBCs burst to release the parasites in the blood.

Q23. Treatment of waste water is done in a sewage treatment plant to make it less polluting. Explain the following with reference to this treatment process :

a) Primary sludge b) Activated sludge c) Anaerobic sludge digester

Q24. With the help of a schematic diagram only, show in three steps, the formation of recombinant DNA by the action of restriction endnuclease, EcoRI and DNA ligage.

Q25. **Study the graph given below and answer the questions that follow:**



(*i*) Write the status of food and space in the curves (*a*) and (*b*).

(*ii*) In the absence of predators, which one of the two curves would appropriately depict the prey population?

(*iii*) Time has been shown on X-axis and there is a parallel dotted line above it. Give the significance of this dotted line.

Q26. Given below is an equation describing the species area relationship between species and area for a wide variety of taxa as angiosperm plants, birds, bats etc.

S = CA2

a) Give a geographical representation of the given equation showing species area relationship.

b) What does 'S' represent in the given equation

c) What the value of 'Z' (regression coefficient) for frugivorous birds and mammals in the tropical forests of different continents?

Q27. a) Explain the property of contact inhibition and its effect on normal human cells and cancerous cells.

b) Why are biological modifiers like an interferon required for cancer treatment? How do they act to treat the disease?

Q28. a) Give schematic representation (diagrammatically) of the transformation of pro insulin into insulin.

b) Name the technique, the American company, Eli Lilly used for the commercial production of human insulin.

OR

Describe the roles of heat, primers and the bacterium Thermus aquaticses in the process of PCR.

Section - D

Case Based Questions:

Q29. **Read the following passage and answer the following questions on the basis of the same:**

Population is a group of individuals of a single species living in a given area. It includes spatial arrangement, genetic variation and the dynamics including natality, mortality, biotic potential, carrying capacity, etc. Population structure includes features such as density, abundance, spacing, genetic variations. The genetic structure reveals genetic variations and population size.

Q1. Explain death rate in a population by taking a suitable example.

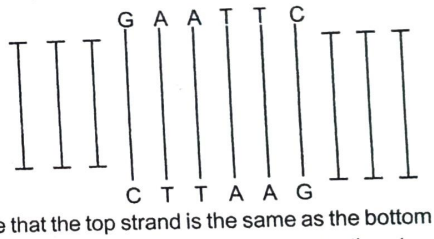
Q2. Write any two characteristics, which only a population shows but an individual cannot.

Q3. List any two ways of measuring population density of a habitat.

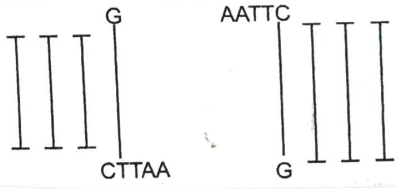
Q4. Mention the essential information that can be obtained by studying the population density of an organism.

Q30. **Read the following passage and answer the questions that follow:**

Restriction enzymes, also known as 'molecular scissors', belong to a major class of enzymes, called nucleases. They are of two types exonucleases and endonucleases. Each restriction endonuclease recognises a specific symmetrical nucleotide sequence. A restriction enzyme function by 'inspecting' the length of a DNA sequence. Once it finds its specific recognition sequence, it will bind to the DNA and cut each of the two strands of the double helix at specific points in their sugar-phosphate backbones.



Notice that the top strand is the same as the bottom strand, but reads backward. When the enzyme cuts the strand between G and A, it leaves overhanging chains as shown below:



A-

Answer the following questions based on the above.

(*a*) What is a palindrome in DNA?

(*b*) Name the restriction enzyme that cuts the strands between the bases G and A shown in the figure. Also, name the bond that is broken.

(*c*) What are the overhanging stretches called? How are they formed? Mention their significance?

Or

(*c*) Why are restriction enzymes known as molecular scissors? Name two restriction enzymes other than EcoRI.

Section – E

Q31. a) What is the chemical name of 'smack'? Why is the consumption of smack considered as an abuse?

b) Name the source plant and one effect of each of the following drugs on the human body:

(i) Marijuana (ii) Cocaine (iii) Morphine

OR

a) Name the genus to which baculorivuses belong. Describe their role in integrated pest management programmes.

b) Cattle excrete is an important source for producing a domestic fuel. Name the fuel and write the main components. Also write the biological process involved.

Q32. a) Draw a well labelled diagram of cloning vector (plasmid pBR322)

b) Explain the role of selectable marker and restriction endonuclease.

OR

Explain the three steps carried out in the formation of recombinant DNA using the enzyme EcoRI. Draw flow chart also.

Q33. a) What is brood parasitism? Give an example.

b) 'The size of a population for any species is not a static parameter.' Justify the statement with specific reference to fluctuations in the population density of a region in a given period of time.

OR

a) Draw the pyramid of biomass in sea and in forest. Explain giving reason why are the two pyramids different.

b) With the help of suitable diagram describe the logistic population growth curve.