

THE VILLAGE INTERNATIONAL SCHOOL THODUPUZHA
SECOND MODEL EXAMINATION (2023-24)
BIOLOGY (044)

Class: XII

Time: 3.00 Hrs

Date: 12/01/2024

Max.Marks: 70

General Instructions:

- There are **33** questions in this question paper with internal choice.
- **SECTION A** consists of **16** multiple-choice questions carrying **1** mark each.
- **SECTION B** consists of 5 very short answer questions carrying **2** marks each. • **SECTION C** consists of 7 short answer questions carrying **3** marks each.
- **SECTION D** consists of 2 case-based questions carrying **4** marks each.
- **SECTION E** consists of 3 long answer questions carrying **5** marks each.
- **All** questions are **compulsory**.
- 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 each question.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION- A

1. For an artificial hybridization experiment in bisexual flowers, which of the following sequences is correct?
 - a) Bagging → Emasculation → Cross pollination → Rebagging
 - b) Emasculation → Bagging → Cross pollination → Rebagging
 - c) Cross pollination → Bagging → Emasculation → Rebagging
 - d) Self-pollination → Bagging → Emasculation → Rebagging
2. Vasa efferentia are the ductules leading from-
 - a) epididymis to urethra
 - b) vas deferens to epididymis
 - c) rete testis to vas deferens
 - d) testicular lobules to rete testis
3. Which of the following statements regarding IUD is correct/
 - a) it suppresses the process of gametogenesis
 - b) they once inserted need not be replaced
 - c) they are generally inserted by the user itself
 - d) It increases phagocytosis of sperms within the uterus.
4. Which one of the following correctly represents the nature of blood in the ABO system of blood groups pertaining to the presence of antigens and antibodies/
 - a) Blood group A-Antibody A and antigen B
 - b) Blood group B-Antigen B and antibody A
 - c) Blood group AB- Both antibodies A and B

d) Blood group O-No antigen and no antibodies

5. Choose the incorrect statement regarding translation

a) The process of translation of mRNA to protein begins only when the small ribosomal subunit encounters mRNA

b) The 23SrRNA acts as a catalyst for the formation of peptide bonds in prokaryotes.

c) The additional sequences of mRNA that are not translated are present only at one end.

d) For initiation, ribosomes bind to the mRNA at the start codon.

6. Which of the following statements are correct

a) Increase in melanized moths after industrialization in Great Britain is a proof for natural selection

b) When more individuals of a population acquire a mean character value it is called disruption.

c) Changes in allelic frequency in a population will lead to Hardy-Weinberg equilibrium

d) Genetic drift changes the existing gene or allelic frequency in future generations.

a) (ii) only

b) (iv) only

c) Both (i) and (iv)

d) Both (i) and (iii)

7. Which of the following is a correct match -

a) Bhang -Analgesic

b) Cocaine - Opiate narcotics

c) Morphine - Hallucinogen

d) Reserpine - Tranquilizer

8. The probability of all possible genotypes of offsprings in a genetic cross can be obtained with the help of-

a) Test cross

b) Back cross

c) Punnett square

d) Linkage cross

9. Which of the following processes is employed to check the progression of restriction enzyme digestion?

a) PCR

b) Gene gun

c) Micro-injection

d) Agarose gel electrophoresis

10. How many varieties of rice have been estimated to be present in India?

a) 2000

b) 20,000

c) 200,000

d) 2,000,000

11. If in a pond there were 20 lotus plants last year and through reproduction 8

new plants are added, taking the current population to 28. The birth rate per year is

- a) 0.2 b) 0.4 c) 0.6 d) 0.8

12. The aquatic plant having long and ribbon like pollen grain is

- a) Vallisneria
b) Hydrilla
c) Eichornia
d) Zostera

DIRECTIONS for the question 13 to 16

In each of the questions given below, there are two statements marked as Assertion(A) and Reason(R). Mark your answer as per the codes provided below:

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

13. Assertion-Primary endosperm nucleus is diploid.

Reason-It is the product of double fertilization

14 Assertion-Ribosomal RNA is synthesized in the nucleus of the cell.

Reason-It is translated with the enzyme RNA polymeraseIII

15 Assertion-Smoking can raise blood pressure and increase heart rate.

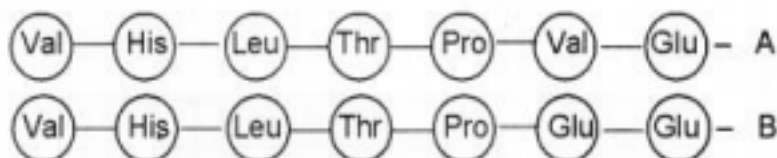
Reason- Nicotine stimulates adrenal glands to release adrenaline and non-adrenalin into blood circulation both of which raise blood pressure and increase heart rate.

16. Assertion-Cross of F1 individual with recessive homozygous parent is test cross.

Reason-No recessive individuals are obtained in the monohybrid test cross progeny.

SECTION B

17. Polypeptide chains of two hemoglobin molecules are shown below. One of the chains shows an abnormality. Observe the diagram and answer the following questions.



- a) Which of the polypeptide chains in hemoglobin is abnormal leading to a disease?
- b) What is the reason for this abnormality?
- c) What will be the effect of this change in the polypeptide chain?

18. While studying nucleotide sequence. Raj found the following sequence which can be recognized by some enzymes.

5'- GAATTC - 3'

3'- CTTAAG - 5'

- a) Give salient features of this sequence.
- b) Write names of enzymes which recognize such sequences.
- c) Elaborate importance of this enzyme in Genetic engineering.

19. Some bioactive molecules, their source and their medical importance are given in the table below. Fill up the missing parts.

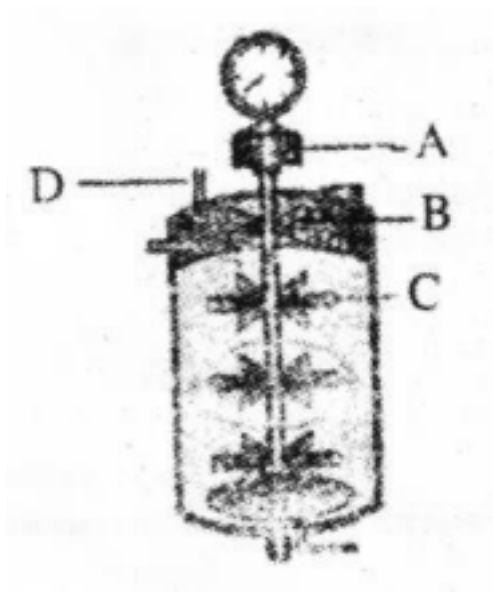
Bioactive molecule	source	Medical importance
a	Streptococcus	Remove clot from blood vessels
Cyclosporin-A	b	c
d	Monascus purpureus	Blood cholesterol lowering agent

or

“BOD is commonly calculated as an index of water pollution”.

- a) Do you agree with this statement? Why?
- b) Expand and define BOD.

20. Observe the sketch of a stirred-tank bioreactor and label the parts



A,B,C and D.

21. Rate of biomass production is called productivity and can be divided into GPP and NPP:

- a) Expand and define GPP and NPP.
- b) How can we relate GPP and NPP?

SECTION C

22. Using genetically modified crops, farmers can minimize use of insecticides and pesticides during cultivation.

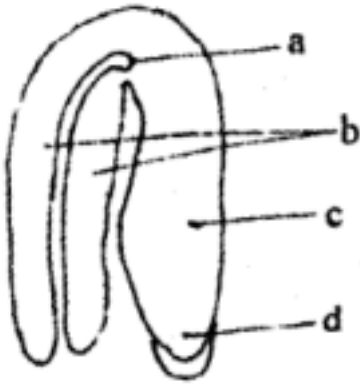
- a) Give the name of one such genetically modified pest resistant crop.
- b) Which gene is used for its production?
- c) Name the source of pest resistant genes.
- d) Write about its mode of action

or

Mention any three vector-less methods that are used to introduce recombinant DNA into a competent host cell.

23 a) Identify the following parts of a dicot embryo .

b) Mention how a monocot embryo differs from a dicot embryo.



24.(i) Name the kind of diseases/disorders that are likely to occur in humans if

(a) mutation in the gene that codes for an enzyme phenylalanine hydroxylase occurs

(b) there is an extra copy of chromosome 21,

(c) the karyotype is XXY.

(d) Mention any one symptom of the diseases/disorders named above.

25. Two children, A and B aged 4 and 5 years respectively visited a hospital with similar genetic disorder. The girl A was provided with enzyme replacement therapy and was advised to revisit periodically for further treatment. Girl B was, however, given a therapy that did not require revisiting for further treatment.

a) Name the ailment the two girls were suffering from.

b) Why did the treatment provided to girl A required repeated visits?

c) How was girl B cured permanently?

26. During the reproductive cycle of a human female when, where and how does placenta develop? What is the function of placenta during pregnancy and embryo development?

27. Name the genus of baculovirus that acts as a biological control agent in spite of being a pathogen. Justify by giving three reasons.

28. In a marine ecosystem, a population of phytoplankton (150,000) supports a standing crop of fishes (40,000).

- a) Draw the pyramid of biomass and
- b) The pyramid of numbers in this ecosystem,

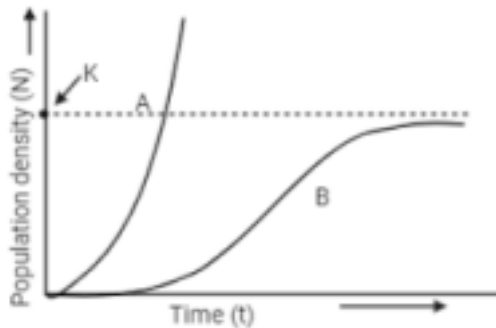
Section-D

29. Darwin showed that even a slow-growing animal like an elephant could reach enormous numbers in absence of checks. With the help of your understanding of growth models

- a) Explain when this is possible.
- b) Why is this notion unrealistic?
- c) What is meant by carrying capacity?

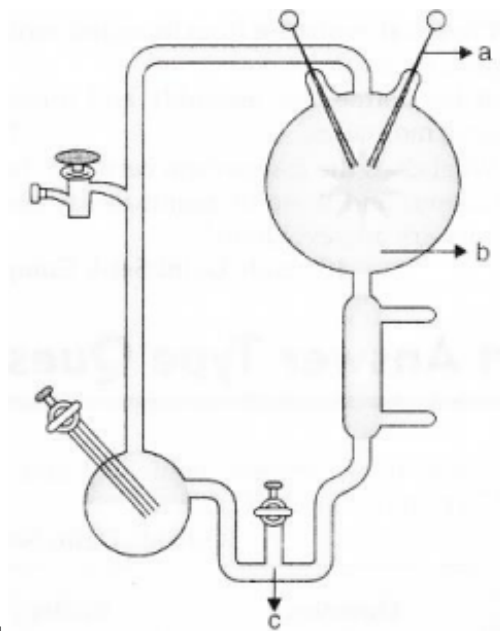
or

In the adjacent population growth curve: -



- (i) What is the name given to curves (A) & (B)?
- (ii) What is the status of food & space in the curve (A) & (B)?
- (iii) In absence of predators, which curve "A" or "B" would appropriately depict the prey population? (iv) When does curve 'B' change into curve 'A'?

30. Based on the given experimental setup, answer the



following questions. .

(a) State the hypothesis which S.L. Miller tried to prove in the laboratory with the help of the set up given above.

(b) Name the organic compound observed by him in the liquid water after running the above experiment.

(c) A scientist simulated a similar setup and added CH_4 , NH_3 and water vapor at 800°C . Which important component is missing in his experiment?

(d) Label the parts a, b and c.

or

a) What was the hypothesis proposed by Oparin and Haldane?

b). What are the two main postulates of Oparin and Haldane?

c). Explain the most accepted theory of the origin of life?

Section-E

31. After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique).

Name the 'ART' and the procedure involved that you can suggest to them to help them bear a child.

State any five methods to overcome infertility in human couples

or

(i) Mention the event that induces the completion of the meiotic division of the

secondary oocyte.

(ii) Trace the journey of the ovum from the ovary, its fertilization and further development until the implantation of the embryo.

32. Write a brief note on the role of lymphoid organs in the immune response. Elaborate on the different types of lymphoid organs in the human body with examples.

or

The pathogen of a disease depends on RBCs of humans for growth and reproduction. The person with this pathogen suffers from a chill and high fever.

(a) Identify the disease.

(b) Name the pathogen.

(c) What is the cause of fever?

(d) Represent the life cycle of the pathogen diagrammatically.

33.(i) Describe Hershey and Chase's experiment.

(ii) Write the aim of the experiment

or

(i) Describe the process of transcription in bacteria.

(ii) Explain the processing the /mRNA needs to undergo before becoming functional mRNA in eukaryotes.