INDIAN SCHOOL SOHAR

TERM I EXAMINATION (2023-24)

BIOLOGY

CLASS: XII MAX.MARKS: 70

DATE: 28/09/2023 TIME: 3 HOURS

General instructions:

Read the following instructions carefully and strictly follow them:

(i) This question paper contains **33** questions. **All** questions are **compulsory.**

(ii) This question paper is divided into **five** sections Section **A, B, C, D** and **E**.

(iii) In **Section A** – Questions no. **1** to **16** are multiple choice (MCQ) type questions, carrying **1** mark each.

(iv) In **Section B –** Questions no. **17** to **21** are very short answer (VSA) type questions, carrying **2** marks each.

(v) In **Section C –** Questions no. **22** to **28** are short answer (SA) type questions, carrying **3** marks each.

(vi) In **Section D** – Questions no. **29** and **30** are case-based questions, carrying **4** marks each.

(vii) In **Section E –** Questions no. **31** to **33** are long answer (LA) type questions, carrying **5** marks each.

(viii) There is no overall choice. However, an internal choice has been provided in **1** question in Section B, **1** question in Section C, **2** questions in Section D and **3** questions in Section E. A candidate has to attempt only **one** of the alternatives in such questions.

(ix) Wherever necessary, neat and properly labeled diagrams should be drawn. Use of calculators in **not** allowed.

SECTION – A

Q. No.	Questions	Marks
1.	In a fertilized ovule, n, 2 n and 3 n conditions occur respectively in a) antipodal, zygote and endosperm b) zygote, nucellus and endosperm c) endosperm, nucellus and zygote d) antipodals, synergids and integusments	1
2.	If a dwarf pea plant was treated with gibberellic acid, it became a tall, as tall pea plants. If these pea plants are crossed with pure tall pea plants, what will be the phenotypic ratio in F_1 generation? a) All dwarf plants b) 50% tall and 50% dwarf plants c) 75% tall and 25% dwarf plants d) 100% tall plants	1
3.	Which of the following sequences will be produced as a result of transcription of the DNA sequence – CGATTACAG a) GCUAAUGUC b) CGUAAUCUG c) GCTAATGTC d) GCUAATCTG	1
4.	Rheumatoid arthritis is caused when (i) Lymphocytes become more active (ii) Body attacks self cells (iii) More antibodies are produced in the body (iv) The ability to differentiate pathogens or foreign molecules from self-cells is lost a) (i) and (ii) b) (iii) and (iv) c) (i) and (iii) d) (ii) and (iv)	1
5.	Select the correct group of biocontrol agents. a) *Nostoc, Azospirillium, Nucleopolyhedrovirus* b) *Bacillus thuringiensis*, Tobacco mosaic virus, Aphids c) *Trichoderma*, Baculovirus, *Bacillus thuringiensis* d) *Oscillatoria, Rhizobium, Trichoderma*	1

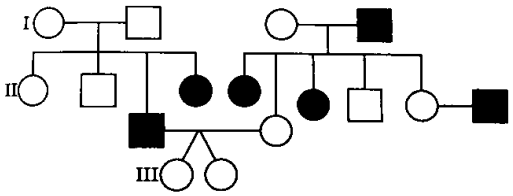
6. Swathi was growing a bacterial colony in a culture flask under ideal laboratory conditions where the resources were replenished. Which of the following equations will represent the growth in this case? (Where population size is N, birth rate is b, death rate is d, unit timeperiod is t, and carrying capacity is K). 1

a) $dN/dt = KN$
b) $dN/dt = rN$
c) $dN/dt = rN\ (K - N/K)$
d) $dN/dt = rN\ (K + N/K)$

7. If 2000 J of solar energy is incident on green vegetation, the latter traps 20 J of energy and converts it into organic matter by photosynthesis. What will be the energy received by carnivores by feeding on herbivores? 1

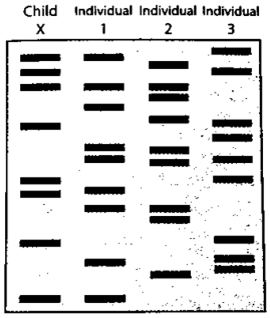
a) 2 J
b) 0.2 J
c) 0.02 J
d) 20 J

8. What is the pattern of inheritance in the given pedigree chart? 1



a) Autosomal dominant
b) Autosomal recessive
c) Sex-linked dominant
d) Sex-linked recessive

9. Study the DNA profiles obtained as a result of DNA finger printing of a child 'X' and three individuals 1,2 and 3. Which one of the following options shows the possible parent(s) of the child 'X'? 1



a) 1 and 2
b) 2 and 3
c) 1 and 3
d) Only individual 3

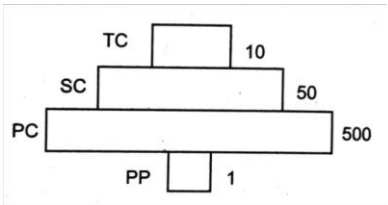
10. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown below? 1

a) Depressant
b) Hallucinogen
c) Painkiller
d) Stimulant

11. Identify the option that does not exhibit a parasitic relationship 1

a) Head lice in humans
b) *Cuscuta* on a mango tree
c) Female *Anopheles*
d) Ticks on dogs

12. Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels? 1



a) Level PC is "insects" and level SC is "small insectivorous birds"
b) Level PP is "phytoplanktons" in sea and "whale" on top level TC
c) Level one PP is "pipal trees" and the level SC is "sheep"
d) Level PC is "rats" and level SC is "cats"

Question No. 13 – 16 consist of two statements – Assertion (A) and Reason (R).
Answer these questions selecting the appropriate option given 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: Apomictic embryos are genetically identical to the parent plant. 1
Reason: Apomixis is the production of seeds without fertilization.

14. Assertion: For DNA replication RNA primer is needed. 1
Reason: Synthesis of new DNA chain is initiated by DNA polymerase.

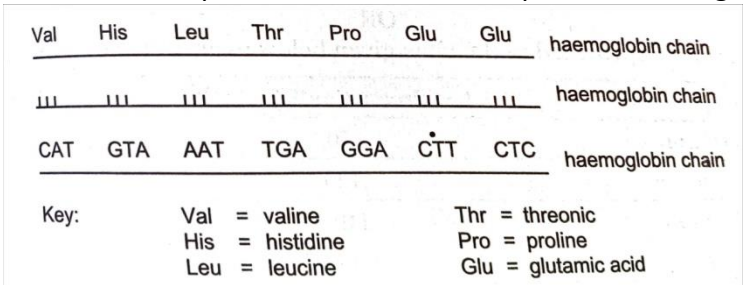
15. Assertion: Cheese is the partially degraded concentrate of milk fat and casein. 1
Reason: The quality and characteristic taste of cheese is determined by the biochemical activities of specific microorganisms.

16. Assertion: A trophic level represents a species level. 1
Reason: Biomass is the mass of living organisms in terms of fresh or dry weight.

SECTION – B

17. Geitonogamous flowering plants are genetically autogamous but functionally cross-pollinated. Justify. 2

18. The diagram below shows the sequence of amino acids in part of a hemoglobin molecule. 2

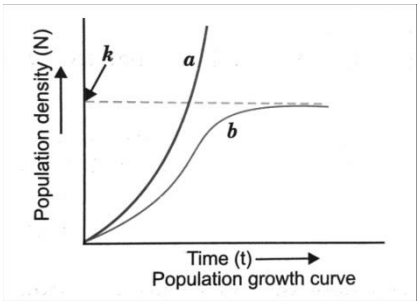


(a) If the base T* was substituted with A, how would it affect the hemoglobin chain?
(b) Name the condition and the effects associated with the above substitution.

19. What would happen if histones were to be mutated and made rich in amino acids aspartic acid and glutamic acid in place of basic amino acids such as lysine and arginine? 2

20. For an individual 'X' with a history of lung cancer in the parents, doctors advised certain genetic testing processes that help in detecting the inheritance of mutations. 2
(a) Malignant tumors spread rapidly and avoid detection. α –interferon is a biological response modifier and can target specific disease causing mechanisms. How does α-interferon help in the treatment of malignant tumors?
(b) For a cancer caused by inheritance of genetic mutations, how will the malignancy spread internally?

21. Identify the curves 'a' and 'b' shown in the graph given below. List the conditions responsible for growth patterns 'a' and 'b'. 2



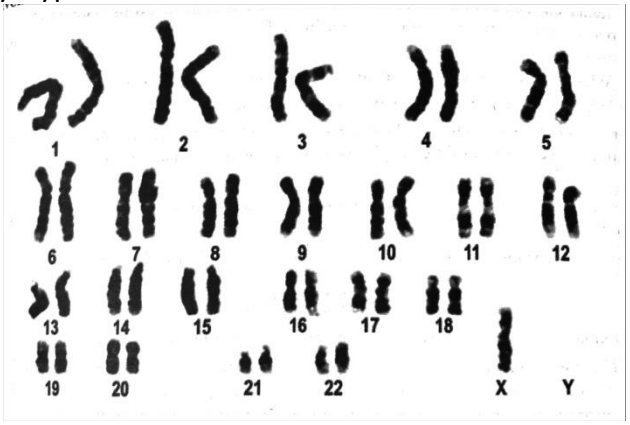
OR

"it is possible that a species may occupy more than one trophic level in the same ecosystem at the same time." Explain with the help of one example.

SECTION – C

22. If the meiocyte of a maize plant contains 20 chromosomes, write the number of chromosomes in the endosperm and embryo of the maize grain and give reasons in support of your answer. 3

23. Given below is the karyotype of an individual. 3

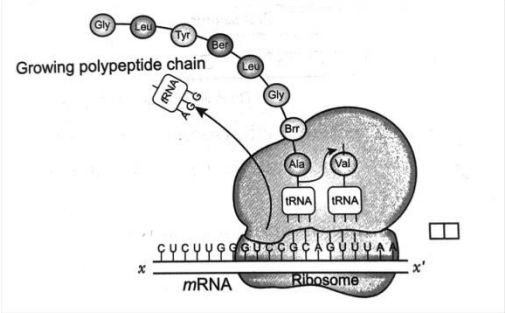


(a) What are the characteristic reproductive and physical features of such an individual?
(b) What is the category of such disorders called?
(c) What is its name and how is it caused?

24. In a typical nucleus some regions of chromatin are stained light and others dark. Explain why it is so and what its significance is. 3

OR

(a) Identify the polarity of X to X' in the diagram below and mention how many more amino acids are expected to be added to this polypeptide chain.



(b) Mention the codon and anticodon for alanine.
(c) Why are some untranslated sequences of bases seen in mRNA coding fro a polypeptide? Where exactly are they present on mRNA?

25. (a) Name and state the type of immunity that acts as a 'biological shield' to the developing foetus against many infections in the mother's womb. 3
(b) A large proportion of infants remain free from potent infections at least three months after birth, or even longer if breast fed. Explain, giving suitable reasons.

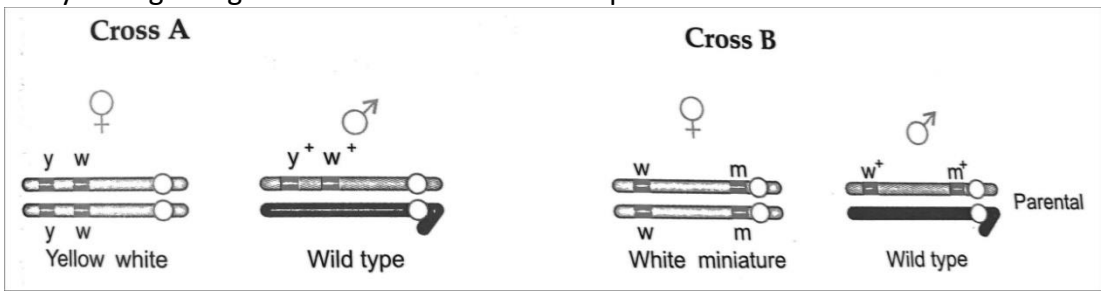
26. Secondary treatment of the sewage is also called Biological treatment. Justify this statement and explain the process. 3

27. (a) Explain any two defense mechanisms plants have evolved against their predators. 3
(b) How does predation differ from parasitism?

28. (a) Name the type of detritus that decomposes faster. List any two factors that enhance the rate of decomposition. 3
(b) Explain humification and mineralization in brief.

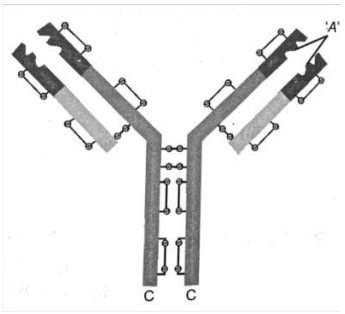
SECTION – D

29. Study the figures given below and answer the questions that follow. 4



(a) How distance between the genes is related to the frequency of recombination?
(b) What are 'true breeding lines' that are used to study inheritance pattern of traits in plants?
(c) In a dihybrid cross, when would the proportion of parental gene combinations be much higher than non-parental types, as experimentally shown by Morgan and his group?
OR
(c) If two genes are located far apart from each other on a chromosome, how the frequency of recombination will get affected?

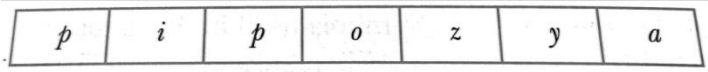
30. When our body encounters a pathogen, the immune system of our body produces antibodies in response, to encounter the pathogen. Study the cartoon of an antibody molecule given below and answer the questions that follow:



(a) Identify 'A' in the diagram and mention its significance.
(b) Why are antibodies represented as H_2L_2?
(c) Some allergens trigger sneezing and wheezing in human beings. What causes this type of response by the body?
OR
(c) State the functions of mast cells in allergy response.

SECTION – E

31. Study the schematic representation of the genes involved in the *lac* operon given below and answer the questions that follow: 5



(a) The active site of enzyme permease present in the cell membrane of a bacterium has been blocked by an inhibitor, how will it affect the *lac* operon?
(b) The protein produced by the *i* gene has become abnormal due to unknown reasons. Explain its impact on lactose metabolism stating the reason.
(c) If the nutrient medium for the bacteria contains only galactose; will operon be expressed? Justify your answer.

OR

Meselson and stahl carried out an experiment to prove the nature of DNA replication. Recall the experiment and answer the following questions.
(a) Which two types of nitrogen were used by them in their experiment and why?
(b) Why did they take samples of *E-coli* at definite time intervals for their observation?
(c) State the role of caesium chloride density gradient in their experiment.
(d) Write the conclusions they arrived at.

32. The use of chemical fertilizers to meet the ever-increasing demand of agricultural produce to feed the ever-increasing human population, has contributed significantly to environmental pollution. Now that we have realized the problems associated with the overuse of chemical fertilizers, there is large pressure to switch over to organic farming; there is a need these days to push for the use of biofertilisers. Currently, in our country, a number of biofertilisers are available in the market and farmers do use them regularly in their field. 5

(a) What are biofertilisers?
(b) Name (i) two free living bacteria and (ii) two cyanobacteria that are nitrogen fixers.
(c) Name the fungal genus that often forms mycorrhizal association with higher plants. Mention any three advantages, the mycorrhizal association provides to the plants.

OR

As the ovules transform into seeds, the ovary develops into a fruit after fertilisation in angiosperms; these two processes occur simultaneously. The fruits may be fleshy fruits or dry fruits. The fruits may be true fruits or false fruits while some others may be parthenocarpic fruits. Seedless fruits can be induced to develop by the application of auxins and gibberellins.

(a) Five an example of (i) a fleshy fruit and (ii) a dry fruit.
(b) What does the ovary wall develop into, in a fruit? Name its different regions/parts that can be distinguished in a true fleshy fruit.
(c) What is common among strawberry, apple and cashew, with respect to their fruits?
(d) What technical term is given to the development of ovary into a fruit without fertilisation? Give an example.

33. "Analysis of age pyramids for human population can provide important inputs for long-term planning strategies." Explain. 5

OR

"It is often said that the pyramid of energy is always upright. On the other hand, the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.