INDIAN SCHOOL SOHAR
PRE- BOARD - II EXAMINATION 2024-2025
BIOLOGY (044)

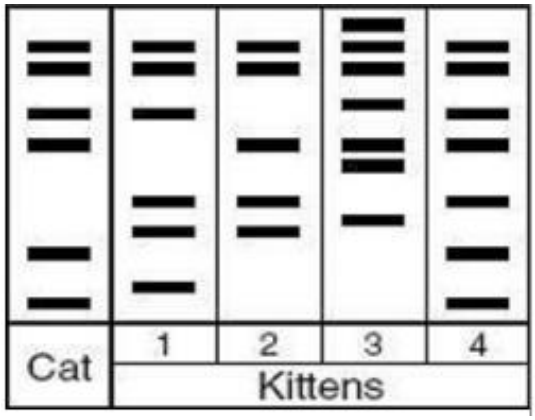
No. of printed pages:7

Date:13/01/2025
Class: XII

Time:3 Hours.
Max.Marks:70

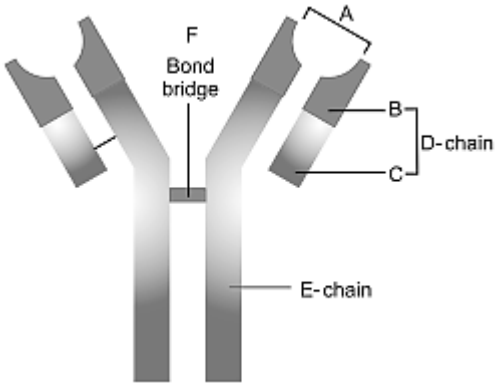
General Instructions:

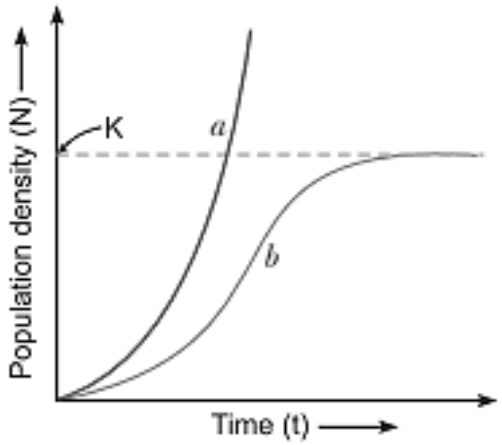
- All questions are compulsory.
- The question paper has five sections and 33 questions.
- Section–A has 16 questions of 1 mark each.
- Section–B has 5 questions of 2 marks each.
- Section– C has 7 questions of 3 marks each.
- Section– D has 2 case-based questions of 4 marks each.
- Section–E has 3 questions of 5 marks each.
- 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.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

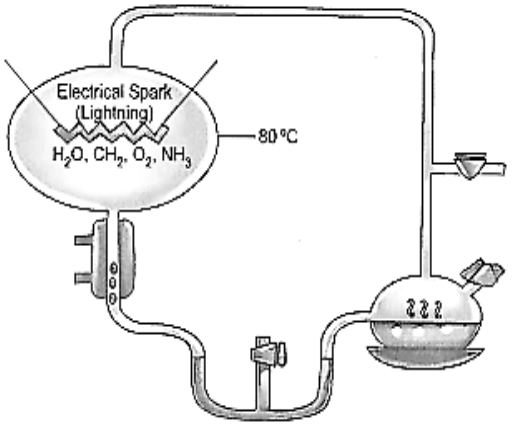
Q. No	Question	Marks
	Section – A **Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct.** **Select and write the correct choice as well as the answer to these questions.**	
1.	What would the genotype of the parents be if the offsprings have the phenotypes in a 1:1 proportion? A. Aa X Aa B. AA X AA C. Aa X AA D. Aa x aa	1
2.	The picture shows the DNA segment from a cat and its four possible offsprings. Which of these is most likely to be the kitten from that cat's litter?  A. Kittens 1 and 4 B. Kittens 1 and 2 C. Kitten 4 only D. Kittens 2 and 3	1

3.	Which one of the following is an example of carrying out biological control of pests/ diseases using microbes? A. Trichoderma sp. against certain plant pathogens. B. Dragonflies against aphids and mosquitoes. C. Bt-cotton to increase cotton yield. D. Ladybird beetle against aphids in mustard.	1
4.	Total number of nucleotide sequences of DNA that codes for a hormone is 1530. The proportion of different bases in the sequence is found to be Adenine = 34%, Guanine = 19%, Cytosine = 23%, Thymine = 19%. Applying Chargaff's rule, what conclusion can be drawn? A. It is a double stranded circular DNA. B. It is a single stranded DNA. C. It is a double stranded linear DNA. D. It is a single stranded DNA coiled on Histones.	
5.	Which type of selection explains industrial melanism observed in the moth, *Bitson betularia*? A. Stabilizing B. Directional C. Disruptive D. Artificial	1
6.	While isolating DNA from bacteria, which of the following enzymes is not required? A. Lysozyme B. Ribonuclease C. Deoxyribonuclease D. Protease	1
7.	Interaction between clown fish living among the stinging tentacles of sea anemone is an example of: A. Amensalism B. Parasitism C. Mutualism D. Commensalism	1
8.	Ovulation in human females normally takes place……during the menstrual cycle. A. At the mid-secretory phase B. Just before the end of the secretory phase. C. At the beginning of the proliferative phase. D. At the end of the proliferative phase.	1
9.	The process of mineralization by microorganisms 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.	1
10.	Two genes R and Y are located very close on the chromosome linkage map of the maize plant. When RRYY and rryy genotypes are hybridized the F2 segregation will show:	1

	A. Segregation in the expected 9:3:3:1 ratio. B. Segregation in 3:1 ratio. C. Higher number of parental types. D. Higher number of recombinant types	
11.	Which one of the following is not a feature of biodiversity hotspots? A. Large number of species. B. Abundance of endemic species. C. Mostly located in the tropics. D. Mostly located in the polar regions.	1
12.	There is no cell division involved in: A. Spermatogenesis. B. Oogenesis C. Embryogenesis D. Spermiogenesis	1
	Question No. 13 to 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: Ti plasmid (tumor-inducing plasmid) of *Agrobacterium tumefaciens* is used as a cloning vector. Reason: Ti plasmid integrates a segment of its DNA, termed T-DNA into the chromosomal DNA of its host plant cells.	1
14.	Assertion: In mutualism, both the population are benefitted and neither can survive under natural condition without the other. Reason: Both populations are benefitted by the association, but their relationships are not obligatory.	1
15.	Assertion: Apomictic embryos are genetically identical to the parent. Reason: Apomictic process is the production of seeds without fertilization.	1
16.	Assertion: Restriction enzymes recognise the palindromic sequence. Reason: Palindromic sequences are read the same in both directions of the two strands.	1
	Section – B	
17.	***Attempt either option A or B.*** **A.** Why is making host cells 'competent' essential for rDNA technology? Mention any two ways by which this can be achieved. **OR** **B.** Why are cloning vectors being necessary in cloning? Name any two such vectors that are used in experiments with *Escherichia coli.*	2

18.	***Attempt either option A or B.*** **A.** Given below is a schematic representation of a mRNA strand;  i) Where are UTRs found and what is their significance? ii) In the above sequence, write down the sequence of codons of the translational unit in mRNA. **OR** **B.** What is aminoacylation? State its significance.	2
19.	***Attempt either option A or B.*** **A.** "Stability of a community depends on its species richness." Write how did David Tilman show this experimentally. **OR** **B.** Would the extinction of one insect pollinator affect the ecosystem? Explain.	2
20.	***Attempt either option A or B.*** **A.** Name the special types of lymphocytes in humans. How do they differ in their roles in the immune response? **OR** **B.** Identify A, D, E and F in the diagram of an antibody molecule given below:  	2
21.	***Attempt either option A or B.*** **A.** What are the shortcomings of ecological pyramids in the study of ecosystem? **OR** **B.** State the difference between the first trophic levels of detritus food chain and grazing food chain.	2
	Section – C	
22.	Briefly explain the functions of: a) Coleoptile b) Tapetum c) Scutellum	3
23.	How is the process of natural insulin formation in the human body different from that of rDNA technology? Explain.	3

24.	Answer the following questions based on Meselson and Stahl's experiment: i) Write the name of the chemical substance used as a source of nitrogen in the experiment by them. ii) Why did the scientists synthesize the light and the heavy DNA molecules in the organism used in the experiment? iii) How did the scientists make it possible to distinguish the heavy DNA molecule from the light DNA molecule? Explain. iv) Write the conclusion the scientists arrived at after completing the experiment.	3
25.	Describe the functions of the following: a) Corpus luteum b) Acrosome c) Fimbriae	3
26.	What is satellite DNA in a genome? Explain its role in DNA fingerprinting.	3
27.	Study the graph given alongside and answer the questions that follow:  i) The curve 'b' is described by the following equation: $\frac{dN}{dt} = rN\left\{\frac{K-N}{K}\right\}$ What does 'K' stand for in this equation? Mention its significance. ii) Which one of the two curves is considered a more realistic one for most of the animal populations? iii) Which curve would depict the population of a species of deer if there are no predators in the habitat? Why is it so?	3
28.	Does self-incompatibility impose any restrictions on autogamy? Give reasons and suggest the method of pollination in such plants.	3
	Section – D	
29.	A student was simulating Urey and Miller's experiment to prove the origin of life. The set up used by the student is given;	4



A. Find out the reason why he could not get desired results.

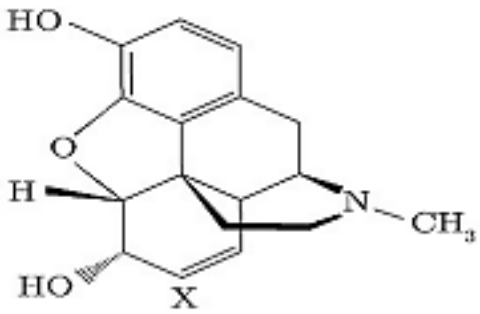
B. How did S.L Miller created conditions, which existed before the origin of any life on earth?

Attempt either subpart C or D.

C. Name the organic compound formed and collected at the end of the experiment.

D. Mention the kind of evolution his experiment supported.

30. After surgery, drug 'X' was injected into a patient to counteract the effect of pain receptors in the body and to induce sleep in the patient. The structure of the drug 'X' is provided: 4



X

A. Identify the drug from the chemical structure that was injected to the patient.

B. Mention the location of its receptors in the human body. State any two physical properties of the drug 'X'.

Attempt either subpart C or D.

C. Give the scientific name of the plant that can be used to obtain drug X.

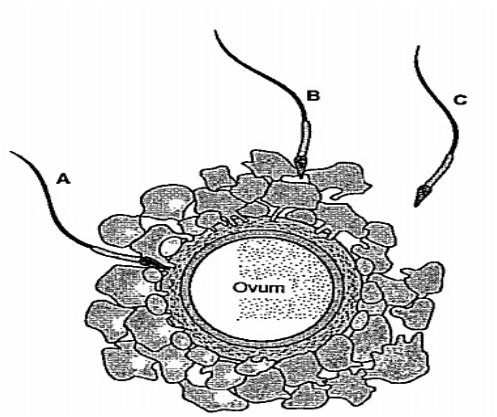
D. Write the effects of the compound obtained by drug X on the human body?

Section – E

31. In the future, genetic therapies may be used to prevent, treat, or cure certain inherited disorders in humans. Justify the statement with a suitable example. 5

OR

Draw and explain in sequence the process of amplification of a gene of interest using polymerase chain reaction.

32.	Given below is the diagram of a human ovum surrounded by a few sperms. Observe the diagram and answer the following questions:  i) Compare the fate of sperms A, B and C shown in the diagram. ii) What is the role of zona pellucida in this process? iii) Analyse the changes occurring in the ovum during the process. iv) How is the entry of sperm into the ovum facilitated? v) Specify the region of the female reproductive system where the event represented in the diagram takes place. **OR** A. Write the two crucial changes, the seeds undergo while reaching maturity that enables them to be in a viable state, until the onset of favorable conditions. B. How are parthenocarpic fruits produced by some plants and apomictic seeds by some others? Explain. C. Differentiate between pericarp and perisperm.	5
33.	A. There are many animals that have become extinct in the wild but continue to be maintained in Zoological parks. i) What type of biodiversity conservation is observed in this case? ii) Explain any other two ways which help in this type of conservation. B. Justify with the help of an example where a deliberate attempt by humans has led to the extinction of a particular species. **OR** A. What is the 'wise use' concept of Ramsar Convention? Name any two types of wetlands included in its mission. B. What are the basic arguments put forward regarding conservation of biodiversity?	5