



Delhi Public School, Howrah

PERIODIC TEST II (2024-2025)

Class-XII

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

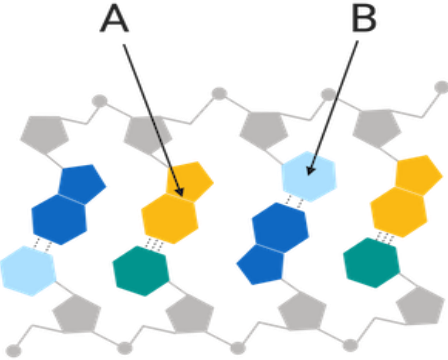
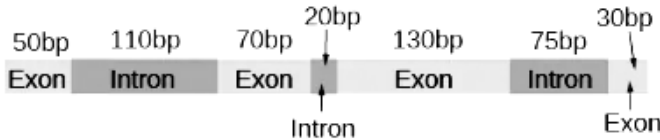
Subject:- Biology (Code No. 044)

Time:-3 Hours

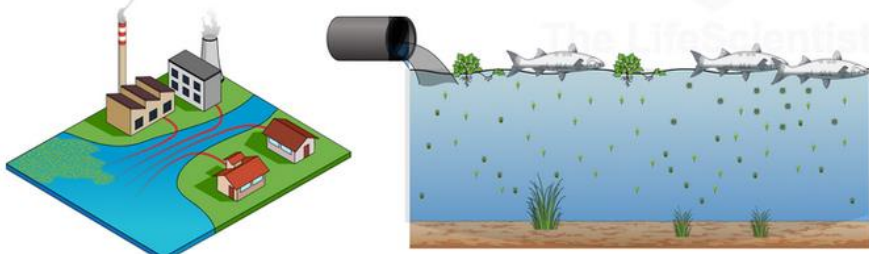
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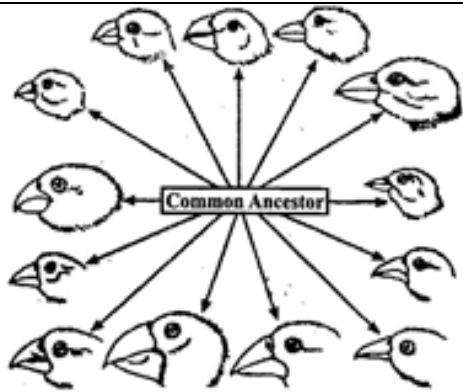
General Instructions:

- All questions are compulsory.
- The question paper has five sections and 33 questions. All questions are compulsory.
- 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.
- 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.	SECTION A	Marks
1.	<p>The following diagram shows nucleotide base-pairing in a double-stranded DNA molecule. The nitrogenous bases in two of the nucleotides are labelled as A and B.</p>  <p>Which of the following correctly compares nitrogenous bases A and B?</p> <ol style="list-style-type: none"> Nitrogenous base A is a pyrimidine, while nitrogenous base B is a purine. Nitrogenous base A is a purine, while nitrogenous base B is a pyrimidine. Nitrogenous bases A and B are both pyrimidines. Nitrogenous bases A and B are both purines. 	1
2.	<p>An unprocessed pre-mRNA has the following structure.</p>  <p>Which of the following is not a possible size (in bp) of the mature mRNA?</p> <ol style="list-style-type: none"> 205bp 180bp 150bp 100bp 	1

<p>3.</p>	<p>The following symbols represent enzymes involved in DNA replication.</p> <p>topoisomerase ● helicase ☪</p> <p>DNA polymerase ▲ ligase ▭</p> <p>Based on the above symbols, which of the following diagrams most accurately depicts the process of DNA replication?</p> <p>a. b.</p> <p>c. d.</p>	<p>1</p>
<p>4.</p>	<p>In a somatic cell, there are 16 chromosomes. What will be the number of chromosomes in the pollen mother cell of the plant?</p> <p>a. 16 b. 8 c. 24 d. 32</p>	<p>1</p>
<p>5.</p>	<p>An ectopic pregnancy is a pregnancy that occurs outside the womb. Considering the normal trajectory of the egg after ovulation, which structure in the picture below is more likely to undergo zygote implantation in an ectopic pregnancy?</p> <p>a. A b. B c. C d. D</p>	<p>1</p>
<p>6.</p>	<p>A population of organisms has a gene for which there are two alleles, D and d. The allele frequency of D = 0.8. If this population satisfies all five of the Hardy-Weinberg conditions, what are the genotype frequencies that are expected in the next generation?</p> <p>a. DD = 0.04; Dd = 0.32; dd = 0.64 b. DD = 0.64; Dd = 0.32; dd = 0.64 c. DD = 0.04; Dd = 0.64; dd = 0.32 d. DD = 0.64; Dd = 0.32; dd = 0.04</p>	<p>1</p>
<p>7.</p>	<p>Amit and Mahi are unable to conceive, though they are producing gametes normally. Their doctor suspects that somehow Mahi's reproductive tract can't provide the right conditions for fertilization. Which of the</p>	<p>1</p>

	<p>following methods would help them have a child?</p> <ol style="list-style-type: none"> Zygote intrafallopian transfer Artificial insemination Embryo transfer Gamete intrafallopian transfer 																									
8.	<p>A lake with an inflow of domestic sewage rich in organic waste may result in:</p>  <ol style="list-style-type: none"> Drying of the lake very soon due to algal bloom. An increased production of fish due to lot of nutrients. Death of fish due to lack of oxygen. Increased population of aquatic food web organization. 	1																								
9.	<p>A plasmid has two antibiotic-resistance genes, one for ampicillin and one for tetracycline. It is treated with a restriction enzyme that cuts in the middle of the ampicillin gene. DNA fragments containing a haemoglobin gene were cut with the same enzyme. The plasmids and fragments are mixed, treated with ligase and used to transform bacterial cells. Clones that have taken up the recombinant DNA are the one that</p> <ol style="list-style-type: none"> are blue and can grow on plates with both antibiotics can grow on plates with ampicillin, but not with tetracycline can grow on plates with tetracycline, but not with ampicillin Cannot grow with any antibiotics 	1																								
10.	<p>In horses, the allele for straight hair (H) is dominant, and the allele for curly hair (h) is recessive. A horse breeder mates a homozygous dominant mother with a heterozygous male. What is the chance that the offspring will have straight hair?</p> <ol style="list-style-type: none"> 0/4 4/4 3/4 1/4 	1																								
11.	<p>A scientist compares DNA taken from four different living species.</p> <table border="1" data-bbox="170 1281 738 1648"> <thead> <tr> <th>Species A</th> <th>Species X</th> <th>Species Y</th> <th>Species Z</th> </tr> </thead> <tbody> <tr> <td>—</td> <td>—</td> <td>==</td> <td>—</td> </tr> <tr> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> </tbody> </table> <p>Which of the following statements is accurate?</p> <ol style="list-style-type: none"> Species Y and Species Z can interbreed. Species A and Z share a recent common ancestor. Species A and Species Y are the same. Species X evolved from Species Y. 	Species A	Species X	Species Y	Species Z	—	—	==	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Species A	Species X	Species Y	Species Z																							
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12.	<p>The diversity within the wild bird species in the given diagram can best be explained by which process?</p>	1																								



- a. Natural selection b. Ecological succession c. Adaptive radiation d. Both [a] and [c]

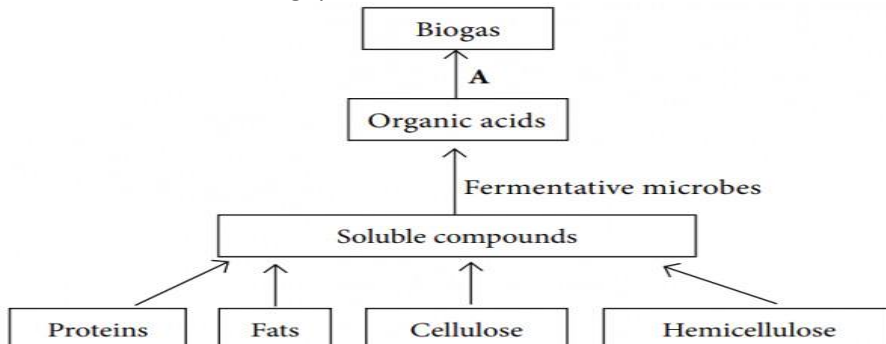
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- 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 (A): The megaspore mother cell divides mitotically to produce four spores. Reason (R): Megaspore mother cells are diploid and megaspore is haploid.	1
14.	Assertion (A): Family planning is an action plan to attain reproductive health among people. Reason (R): Improved programmes covering reproduction related areas were propagated by RCH to create awareness among people.	1
15.	Assertion (A): Restriction enzymes cut the strand of DNA to produce sticky ends. Reason (R): Stickiness of the ends facilitates the action of the enzyme DNA polymerase.	1
16.	Assertion (A): <i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i> are responsible for causing infectious diseases in human beings. Reason (R): A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person.	1

SECTION B

17.	a. An anther with malfunctioning tapetum often fails to provide viable male gametophytes. Give any one reason. b. How is papaya able to prevent both autogamy and geitonogamy?	2
18.	What is MTP? Why should strict conditions be followed during the MTP procedures?	2
19.	Explain the life cycle of plasmodium with a diagram.	2
20.	Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the given flow chart for biogas production and answer the following questions.	2



	<p>a. Name the group of bacteria (A) responsible for biogas production.</p> <p>b. What is the composition of biogas?</p> <p>c. How the bacteria responsible for biogas production is useful to cattle?</p>	
21.	<p>There are 100 students in a class. Ninety-six did well in the course whereas four blew it totally and received a grade of F. In the highly unlikely event that these traits are genetic rather than environmental, if these traits involve dominant and recessive alleles, and if the 4% represent the frequency of the homozygous recessive condition, please calculate the following:</p> <p>a. The frequency of the recessive allele.</p> <p>b. The frequency of the dominant allele.</p> <p>c. The frequency of heterozygous individuals.</p> <p style="text-align: center;">OR</p> <p>Within a population of butterflies, the color brown (B) is dominant over the color white (b). And, 40% of all butterflies are white. Given this simple information, calculate the following:</p> <p>a. The percentage of butterflies in the population that are heterozygous.</p> <p>b. The frequency of homozygous dominant individuals.</p>	2

SECTION C

22.	<p>Solve the given problems:</p> <p>a. The map distance between in certain organism between gene A and B is 4 units, B and C is 2 units and between C and D is 8 units. Which one of these gene pairs will show more recombination frequency? Give reasons in support of your answer.</p> <p>b. How many types of gametes are produced by the individual with genotype AABBCcDD and AaBbCcDd?</p> <p>c. How can we produce such seeds which, when sown, yield pink-coloured Four O' clock plants?</p>	3
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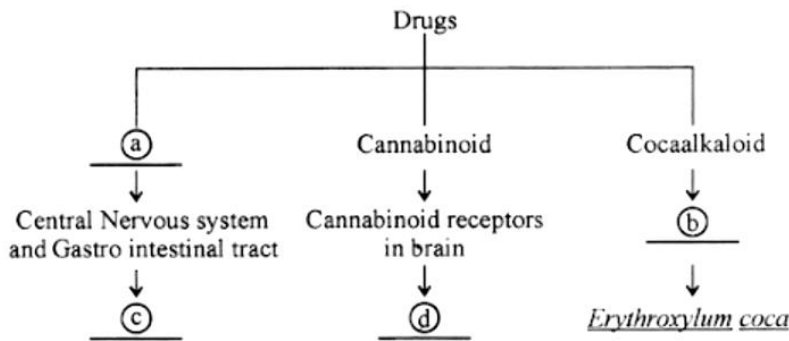
23.	<p>Solve the mystery of the following cases with proper justification:</p> <p>a. Mr. I. M. Megabucks, the wealthiest man in the world, recently died. Since his death, three women have come forward. Each woman claims to have a child by Megabucks and demands a substantial share of his estate for her child. Lawyers for the estate have insisted on DNA typing of each of the alleged heirs. Fortunately, Megabucks anticipated trouble like this before he died, and he arranged to have a sample of his blood frozen for DNA typing. The results of the typing are shown in the figure. Analyze the data and determine whether any of the children could be Megabucks' heir.</p> <div style="text-align: center;"> </div> <p>b. Mrs Brown had baked a birthday cake for her husband and then left it in a chain on the kitchen table. When she returned from shopping all that was left in the cake tin was a few crumbs and a smudge of blood where the thief had snagged their finger on the sharp edge of the tin.</p>	3
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Below are the DNA fingerprints of her four children. Which one of the children is most likely the thief?



24. a. Complete the illustration chart given below and identify a, b, c and d.

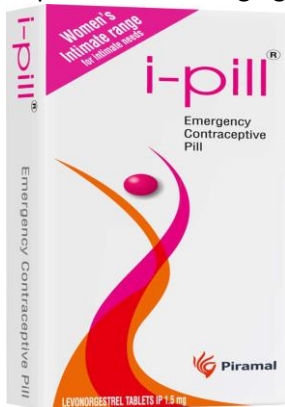
3



b. State the functions of mast cells in allergy response.

25. a. A women's spouse is not able to inseminate her and has low sperm count in the ejaculates. The lady is exploring and consulting with a doctor at a fertility clinic. She wants to opt for a dependable and apt ART. Which ART should be utilized in this case?
 b. In case of unprotected, unplanned intercourse, emergency contraceptives are advised. These are depicted in the image given below. Explain about these emergency contraceptives.

3

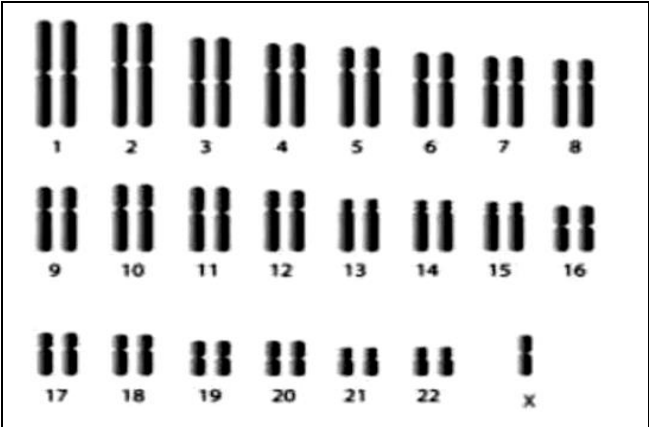


26. With a labelled diagram show the transport of ovum, fertilization and passage of growing embryo through Fallopian tube till it gets implanted in the uterus.

3

OR

Draw a diagrammatic presentation of various events during a menstrual cycle.

27.	<p>a. Analyze the given situations and give a suitable reason.</p> <p>i. Neela wants to make bread at home. She makes a dough using flour and yeast, and leaves it undisturbed for an hour. When she comes back to it, the dough has doubled in size.</p> <p>ii. Medha's yogurt is almost over, so she decides to make some more. She adds the remaining spoon of yogurt to boiling milk, and leaves it undisturbed overnight. In the morning, however, she is upset to see that the milk has not turned into yogurt.</p> <p>b. Three tanks, X, Y and Z each contain different samples of wastewater. The biochemical oxygen demand (BOD) of each sample was measured and are related as follows: BOD of Tank Z < BOD of Tank Y < BOD of Tank X</p> <p>Which of the tanks contains wastewater with the least polluting potential? Explain.</p>	3
28.	<p>Give reason why-</p> <p>a. Most zygotes in angiosperms divide only when certain amount of endosperm is formed.</p> <p>b. Pollen grains in wheat are shed at "3-celled stage while in peas they are shed at 2-celled stage.</p> <p>c. Integuments of an ovule harden and the water content is highly reduced as the seed matures.</p>	3
SECTION D		
<p>Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.</p>		
29.	<p>Refer to the passage and answer the following questions:</p> <p>A person gave blood at a blood donation camp. The nurse recklessly injected used syringe. He suffered from bouts of fever, diarrhea and weight loss and experienced weakness. The levels of helper T-lymphocytes and interferons showed significant change in this condition. Doctor suggested he was suffering from severe viral infection.</p> <p>a. Name the diagnostic test for the given condition.</p> <p style="text-align: center;">OR</p> <p>Name the virus and enzyme responsible for its replication.</p> <p>b. Mention two measures for preventing this viral infection.</p> <p>c. Name the cells of immune systems of the body that are affected by this infection. Also, mention its role.</p>	4
30.	<p>Observe the given picture and answer the following questions:</p> <p>Given below shows the karyotype of a child who is suffering from a sex chromosomal abnormality which occurs during failure of segregation of chromatids during cell division cycle. This results in the gain or loss of a chromosomes (s) called aneuploidy.</p> 	4

- Name the type of aneuploidy shown in this disease.
- Write the chromosomal complement of the child.
- How does sex chromosomal abnormality occurred in the child?

OR

Mention the diagnostic features of the disease.

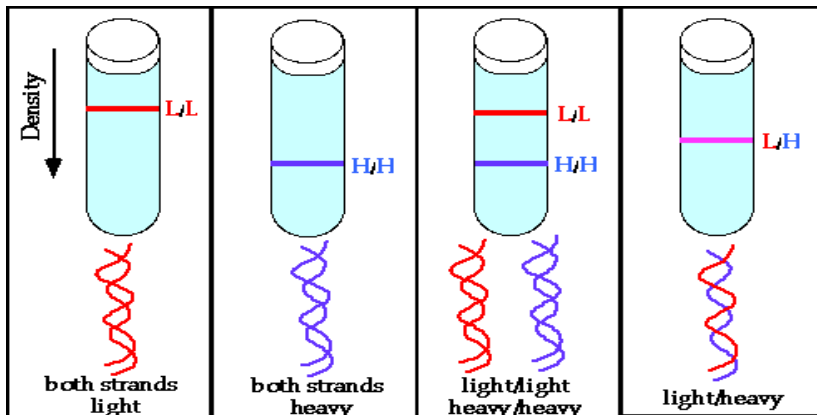
SECTION E

31. a. If a pure-breeding (homozygous) black (dominant), long-haired (recessive) cat is mated to a pure breeding Siamese, short-haired cat, and one of their male offspring is mated to one of their female offspring, what is the chance of producing a Siamese colored, short-haired kitten?
- b. Earl has normal color vision, while his wife Erma is colorblind. Colorblindness is an X-linked trait, and the normal allele is dominant to the colorblindness allele. If they have a large family, in what ways should the colorblindness trait affect their children?

OR

- a. i. In guinea pigs, two different genes affect the coat. One gene codes for coat color and there are 2 codominant alleles C1=Brown and C2=White. The heterozygous form is tan colored. The second gene codes for presence of hair with H=hairy (dominant) and h=hairless (recessive). If mom is C1C2hh and dad is brown and heterozygous for hairiness, find the possible phenotype and genotype from the cross.
- ii. If we didn't know the genotypes of the parents, but mom is hairless and dad is tan haired, and the babies produced included brown, tan, white, and hairless, can you guess the genotypes of the parents?

32. Answer the following questions based on Meselson and Stahl's experiment:



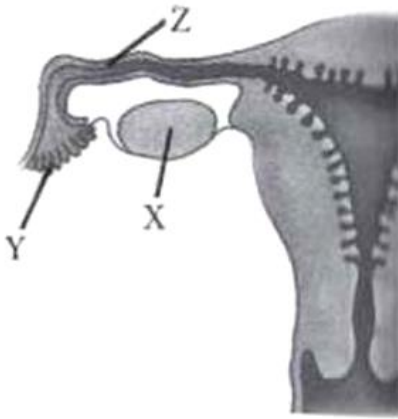
- Write the name of the chemical substance used as a source of nitrogen in the experiment by them.
- Why did the scientists synthesize the light and the heavy DNA molecules in the organism used in the experiment?
- How did the scientists make it possible to distinguish the heavy DNA molecule from the light DNA molecule? Explain.
- Write the conclusion the scientists arrived at after completing the experiment.
- Discuss the significance of heavy isotope of nitrogen in the Meselson and Stahl's experiment.

OR

- DNA separated from one cell, when introduced into another cell is able to bestow some of the properties of former to the latter. What is this change called in technical terms? Describe the experimental evidences which led to the discovery of the above phenomenon.
- Draw a schematic representation of the structure of a transcription unit.

33. a. This diagram below shows a part of the human female reproductive system.

5

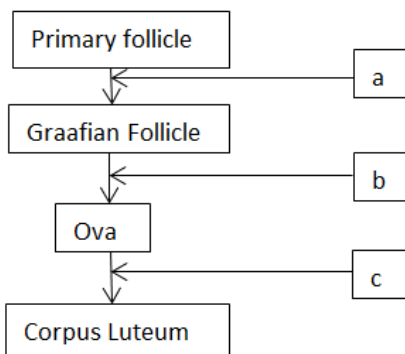


- Identify the labelled part X, Y and Z. Name the gamete cells that would be present in 'X' if taken from a newborn baby.
- Name 'Y' and write its function.
- Name 'Z' and write the events that take place here.

b. Name the muscular and the glandular layers of human uterus. Which one of these layers undergoes cyclic changes during menstrual cycle? Name the hormone essential for the maintenance of this layer.

OR

a. Mention the names of the hormones responsible for ovarian changes during the menstrual cycle in the boxes provided.



b. Explain the events in a normal woman during her menstrual cycle on the following days (A

(i) Pituitary hormone levels from 12 days.

(ii) Uterine events from 13-15 days.

(iii) Ovarian events from 16-23 days.

c. Where is acrosome present in humans? Write its function.