



Delhi Public School, Howrah

PERIODIC TEST I (2024-25)
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

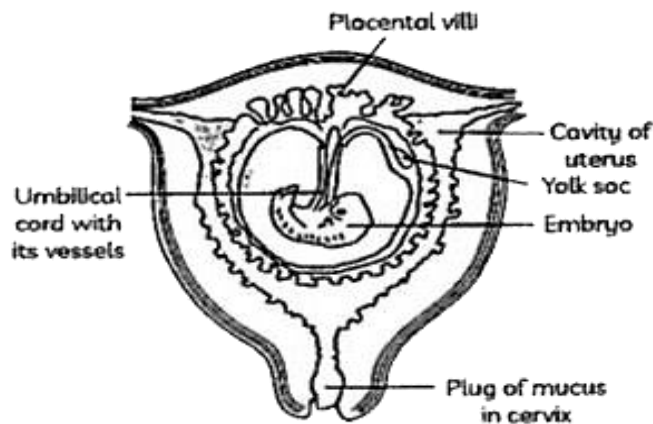
F.M. - 70

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections: Section A, Section B, Section C, Section D and Section E. There are 33 questions in the question paper.
3. Section- 'A' has 16 questions containing MCQs and Assertion-Reasoning type 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.
4. There is no overall choice. However internal choice is provided in some questions. Students have to do any one of the alternatives.
5. Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

1. Concentration of which of the following substances will decrease in the maternal blood as it flows from embryo to placenta through the umbilical cord? 1



- i. Oxygen ii. Amino Acids iii. Carbon dioxide iv. Urea

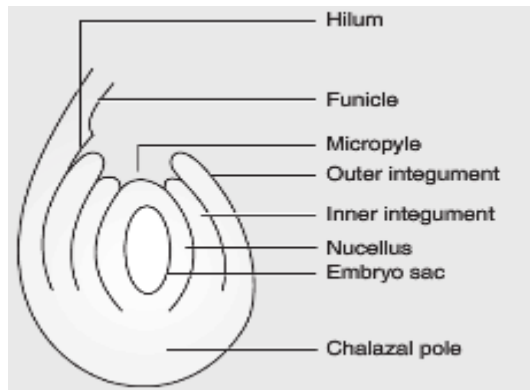
Choose the correct option with respect to the concentration of substances in maternal blood.

- a. i and ii
b. ii and iv
c. iii and iv
d. i and iv

2. Lactation delays the resumption of menstruation and ovulation cycle due to interference of which hormone? 1
- a. Estrogen
b. Anti-diuretic hormone
c. Human chorionic gonadotropin
d. Prolactin

3. In the figure of anatropous ovule given below, choose the correct option for the characteristic distribution of cells within the typical embryo sac

1

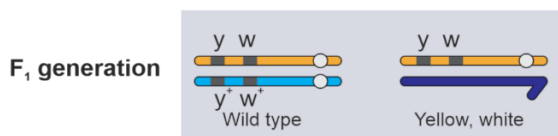


	Number of cells at chalazal end	Number of cells at micropylar end	Number of nuclei left in central cell
A	3	2	3
B	3	3	2
C	2	3	3
D	2	2	4

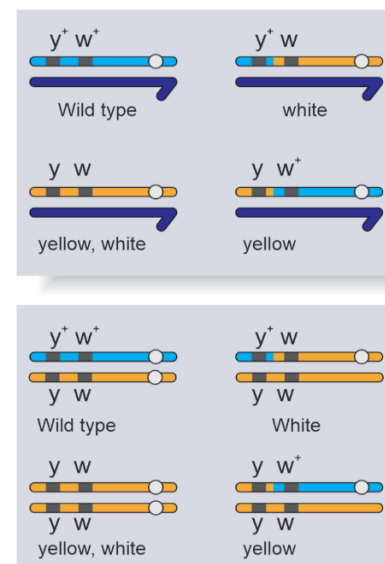
- a. A
b. B
c. C
d. D

4. The dihybrid cross that was conducted by Morgan involving mating between parental generation for genes yellow-bodied, white-eyed female *Drosophila* and wild-type male *Drosophila* up to F_2 generation is given below.

1

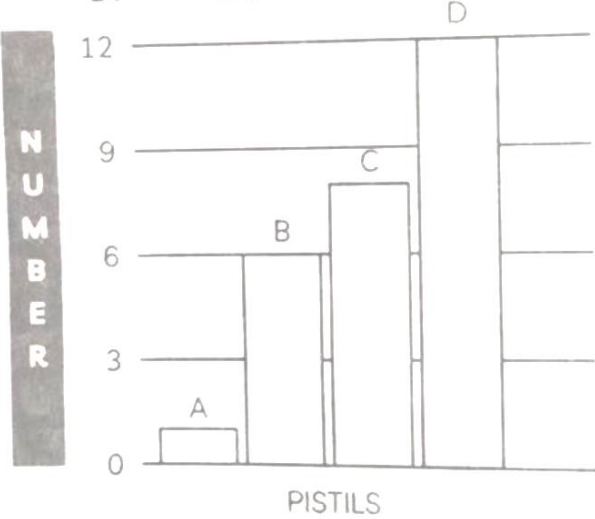
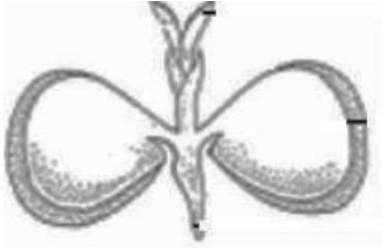
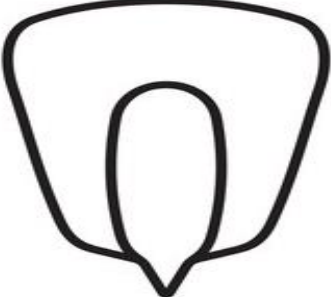


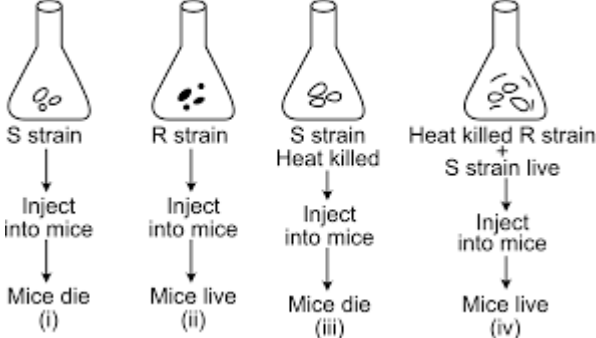
F_2 generation



Study the results obtained from the F_2 progeny and choose the correct option from the given choice for the F_2 progeny.

- a. Parental type , 1.3% : Strength of linkage is high
b. Recombinant type , 1.3 % : Strength of linkage is low
c. Parental type 98.7 % : Strength of linkage is high
d. Recombinant types , 98.7 % : Strength of linkage is low

5.	<p>A procedure that finds use in testing for genetic disorders, but is also misused for foeticide is:</p> <ol style="list-style-type: none"> Lactational amenorrhea Amniocentesis Artificial insemination Parturition 	1
6.	<p>Based on the given graph, what will be the type of gynoecium in B?</p>  <p>a. Monocarpellary b. Bicarpellary c. Tricarpellary d. Multicarpellary</p>	1
7.	<p>Which of the following statements are true related to the seed X and Y?</p>  <p>SEED X</p>  <p>SEED Y</p> <p>(i) Seed X is dicot and endospermic or albuminous. (ii) Seed X is dicot and non-endospermic or non-albuminous. (iii) Seed Y is monocot and endospermic or albuminous. (iv) Seed Y is monocot and non-endospermic or non-albuminous.</p> <p>Choose the correct option with respect to the nature of the seed</p> <ol style="list-style-type: none"> (i), (iii) (ii), (iii) (i), (iv) (ii), (iv) 	1
8.	<p>A botanist studying <i>Viola</i> (common pansy) noticed that one of the two flower types, withered and developed no further due to some unfavorable condition, but the other flower type on the same plant survived and it resulted in an assured seed set. Which of the following will be correct?</p> <ol style="list-style-type: none"> The flower type which survived is cleistogamous and it always exhibits autogamy. The flower type which survived is chasmogamous and it always exhibits geitonogamy. The flower type which survived is cleistogamous and it exhibits both autogamy and geitonogamy. The flower type which survived is chasmogamous and it never exhibits autogamy. 	1

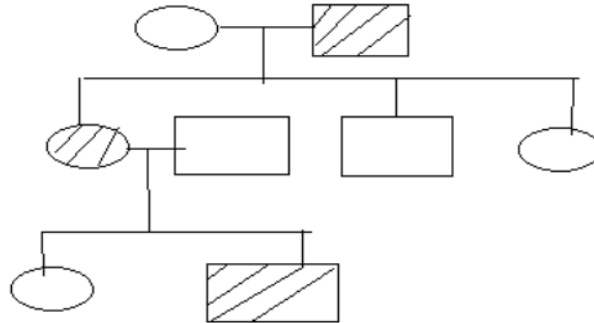
9.	<p>Study the given diagrammatic representation of Griffith's experiment to demonstrate transformation in bacteria. Select the option which is incorrectly representing the experiment.</p>  <p>a. (i) and (iii) b. (ii) and (iii) c. (iii) and (iv) d. (ii) and (iv)</p>	1
10.	<p>How many types of gametes would be produced if the genotype of a parent is AaBBCc?</p> <p>a. 4 b. 6 c. 8 d. 16</p>	1
11.	<p>Following statements are given regarding MTP. Choose the correct options given below:</p> <p>i. MTPs are generally advised during first trimester. ii. MTPs are used as a contraceptive method. iii. MTPs are always surgical. iv. MTPs require the assistance of qualified medical personnel.</p> <p>a. i and iii b. ii and iii c. i and iv d. i and ii</p>	1
12.	<p>A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the parents?</p> <p>a. TT and Tt b. Tt and Tt c. TT and TT d. Tt and tt</p>	1
<p>Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:</p> <p>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.</p>		
13.	<p>Assertion(A): Primary transcripts in eukaryotes are nonfunctional. Reason(R): Methyl guanosine triphosphate is attached to 5' – end of mRNA.</p>	1
14.	<p>Assertion(A): In <i>Mirabilis</i>, selfing of F₁ pink flower produces same phenotypic and genotypic ratio of 1:2:1 in F₂ generation. Reason(R): In <i>Mirabilis</i>, flower colour gene shows incomplete dominance.</p>	1
15.	<p>Assertion(A): Ribosomal RNA is synthesized in the nucleus of the cell. Reason(R): It is translated with the enzyme RNA polymerase III</p>	1
16.	<p>Assertion(A): Anemophily is non-directional. Reason(R): Entomophily is highly specific and directional.</p>	1

SECTION B

17. In cats, the allele (S) for short fur is dominant to the allele (s) for long fur.
 a. What is the genotype of a true-breeding, long-furred cat?
 b. Show the genotype of all cats if homozygous recessive is bred with first generation cats.

18. A normal visioned woman whose father is colorblind marries a normal visioned man. What will be the probability of her sons and daughters to be colorblind? Explain with the help of a pedigree chart.

19. Observe the pedigree given below and answer the following question.



a. Identify whether the trait is sex-linked or autosomal.
 b. Give an example of a disease in human beings which shows such a pattern of inheritance.

20. During the course of evolution why DNA was chosen over RNA as genetic material? Give two reasons by first discussing the desired criteria in a molecule that can act as genetic material and in the light of biochemical differences between DNA and RNA.

21. a. Removal of gonads cannot be considered as a contraceptive option. Why?
 b. Mention two advantages of lactational amenorrhea as a contraceptive method.

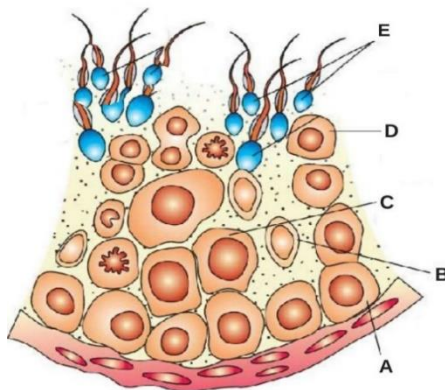
OR

a. All reproductive tract infections RTIs are STDs, but all STDs are not RTIs. Justify with example.
 b. The procedure of GIFT involves the transfer of female gamete to the fallopian tube. Can gametes be transferred to the uterus to achieve the same result? Explain.

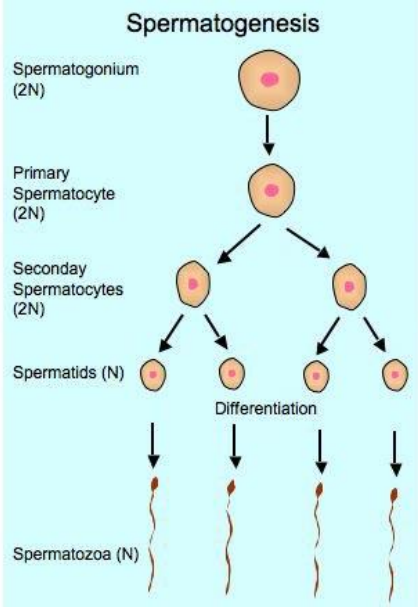
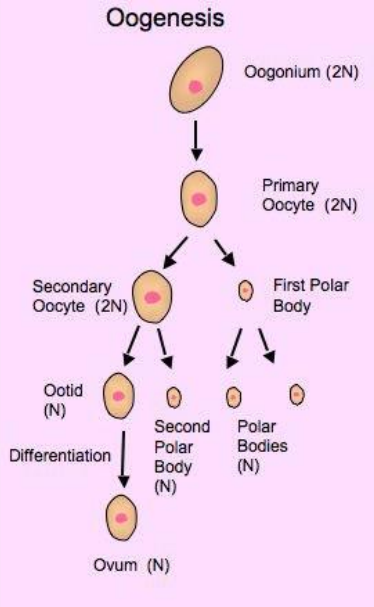
SECTION C

22. a. A diploid organism is heterozygous for four loci. How many types of gametes be produced if the genes are not linked?
 b. When a cross is made between tall plant with yellow seeds (TtYy) and tall plant with green seeds (Ttyy), what proportion of phenotype in the offsprings could be expected to be
 a. tall and green b. dwarf and green (Show the cross)

23. The figure given below shows a part of a seminiferous tubule.



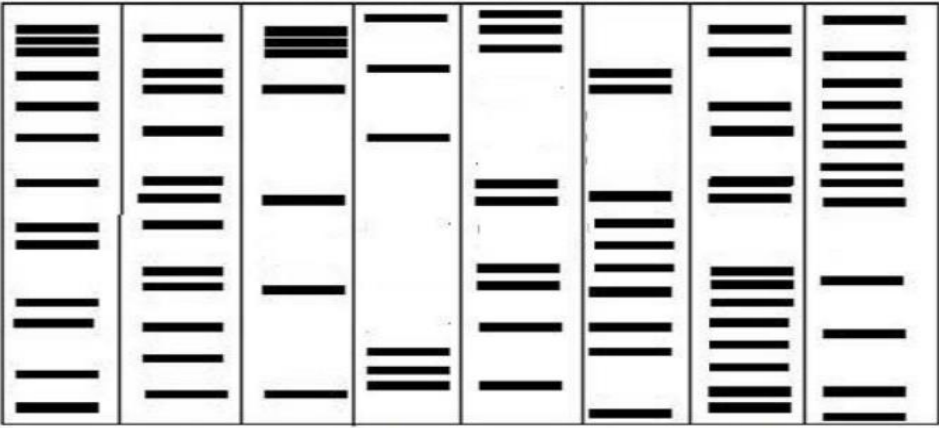
a. Label A to D.

	<p>b. What will be the number of chromosomes in secondary spermatocyte, spermatid? Justify your answer.</p> <p>c. The testis of humans are situated outside the abdominal cavity. Explain the reason for this situation.</p>	
24.	<p>a. A DNA segment has a total of 1500 nucleotides. Out of which 410 are guanine containing nucleotides. How many pyrimidine bases this segment possesses?</p> <p>b. You are repeating the Hershey-Chase experiment and are provided with two isotopes: ^{32}P and ^{15}N (in place of ^{35}S in the original experiment). How do you expect your results to be different? Explain.</p>	3
25.	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>A</p> </div> <div style="text-align: center;">  <p>B</p> </div> </div> <p>With reference to the above schematic diagram of spermatogenesis (A) and oogenesis(B), answer the following questions.</p> <p>a. If about 300 million spermatozoa may be present in a human male ejaculation at one time, then calculate how many spermatocytes will be involved to produce this number of spermatozoa?</p> <p>b. How many spermatids will be formed?</p> <p>c. How many chromatids are found during oogenesis in primary oocyte and first polar body in a human female?</p>	1+1+1
26.	<p>A small stretch of DNA that codes for a polypeptide is given below.</p> <p>3'----- CAT CAT AGA TGA AAC----- 5'</p> <p>a. Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence?</p> <p>i. 3`... ..CAT CAT AGA TGA ATC... ..5`</p> <p>ii. 3`... ..CAT ATA GAT GAA AC... .. 5</p> <p>b. How many amino acids will be translated in each of the above two cases?</p>	3
27.	<p>Draw the diagram of microsporangium and label its wall layers. Write briefly on the role of endothecium.</p> <p style="text-align: center;">OR</p> <p>Draw a labelled diagram of mature embryo sac. Explain the stages of formation of embryo sac.</p>	3

28.	<p>a. A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason.</p> <p>b. Compare in any two ways the chromosomal theory of inheritance as proposed by Sutton and Boveri with that of experimental results on pea plant presented by Mendel.</p>	3
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SECTION D

Q29 and Q30 are case based questions. Each question has subparts with internal choice in one subpart

29.	<p>Read the following and answer the question that follows.</p> <p>There was a mix-up at the hospital after a fire accident in the nursery division. Schematic representation of DNA fingerprints is shown below:</p> <div style="text-align: center;"> <p>FATHER MOTHER CHILD 1 CHILD 2 CHILD 3 CHILD 4 CHILD 5 CHILD 6</p>  <p>LANE 1 LANE 2 LANE 3 LANE 4 LANE 5 LANE 6 LANE 7 LANE 8</p> </div> <p>a. Which of these children belong to the parents? Give reason.</p> <p>b. Describe the process in detail.</p> <p>c. How is this process useful in other areas?</p> <p style="text-align: center;">OR</p> <p>c. Mention the process that has increased the sensitivity of the process shown in the above figure.</p>	4
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30.	<p>Read the following and answer the question that follows.</p> <p>A biology student after studying about the different levels of hormones during the menstrual cycle was comparing two subjects (Patients). A table was created after looking at the levels of hormones A and B for Subject 1 and 2. Read the information in the table and answer the questions that follow:</p> <table border="1" data-bbox="167 1411 1412 1579"> <thead> <tr> <th></th> <th>HORMONE A</th> <th>HORMONE B</th> </tr> </thead> <tbody> <tr> <td>SUBJECT 1</td> <td>Shows a peak on the 14th day of menstrual cycle</td> <td>Falls down during luteal phase</td> </tr> <tr> <td>SUBJECT 2</td> <td>Shows a peak on the 14th day of menstrual cycle</td> <td>Level is maintained high in the luteal phase</td> </tr> </tbody> </table> <p>a. Why a peak in hormone level is seen in both the patients?</p> <p>b. Which structure in the ovary remain functional in subject B?</p> <p>c. Explain the changes seen in subject 1 during the peak in hormone A.</p> <p style="text-align: center;">OR</p> <p>c. Explain the reason as to increased level of hormone B in patient 2.</p>		HORMONE A	HORMONE B	SUBJECT 1	Shows a peak on the 14 th day of menstrual cycle	Falls down during luteal phase	SUBJECT 2	Shows a peak on the 14 th day of menstrual cycle	Level is maintained high in the luteal phase	4
	HORMONE A	HORMONE B									
SUBJECT 1	Shows a peak on the 14 th day of menstrual cycle	Falls down during luteal phase									
SUBJECT 2	Shows a peak on the 14 th day of menstrual cycle	Level is maintained high in the luteal phase									

SECTION E

31.	<p>Placed below are case studies of some couples who were not able to have kids. These couples are not ready for adoption or taking gametes from donors. After thoroughly examining the cases, which Assisted Reproductive Technology (ART) will you suggest to these couples as a medical expert? Explain briefly with justification of each case.</p>	5
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Couple	Test reports of Female partner	Test reports of male partner
Couple 1	Normal reports	Normal sperms in testes, Missing connection in epididymis and Vas deferens
Couple 2	Blockage in the fallopian tube	Normal reports
Couple 3	Normal reports	Poor semen parameters in terms of count, motility and morphology
Couple 4	Low ovarian reserve	Normal reports
Couple 5	Poor ovarian reserve	Morphologically abnormal sperms

OR

Given below are certain situations. Analyse the situation and suggest the name of suitable contraceptive device along with mode of action.

Situation	Requirement of contraceptive for -	Name of contraceptive device	Mode of action
1	blocking the entry of sperms through cervix		
2	spacing between children		
3	effective emergency contraceptive		
4	terminal method to prevent any more pregnancy in female		
5	sterilization in male		

32. a. Briefly explain the events of fertilization and implantation in an adult human female.
b. Diagrammatically show the formation of different follicular stages in a section of an ovary.
- OR
- a. Explain the process of hormonal regulation of spermatogenesis
b. Draw a sectional view of the seminiferous tubule.
33. A flower of tomato plant following the process of sexual reproduction produces 200 viable seeds.
Answer the following questions based on the above statement giving reasons.
- What would have been the minimum number of ovules present in per pollinated pistil?
 - How many microspore mother cells would minimally be required to produce requisite number of pollen grains?
 - How many pollen grains must have minimally pollinated the carpel?
 - How many male gametes would have been used to produce these 200 viable seeds?
 - How many megaspore mother cells were required in this process?
- OR
- Give reason for the following situations:
- Embryo sac of some apomictic species appear normal but contain diploid cells.
 - When a seed of an orange is squeezed, many embryos, instead of one are observed.
 - Micropyle remain as a small pore in the seed coat of a seed.
 - Integuments of an ovule harden and the water content is reduced as seed matures.
 - Apple and cashew are not called true fruits.

