



Delhi Public School, Howrah

PERIODIC TEST II (2025-26)

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:

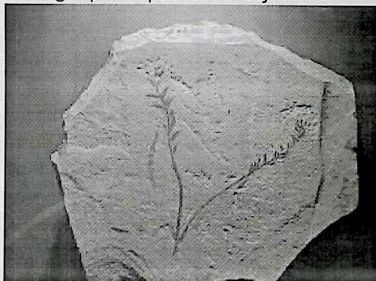
1. All questions are compulsory.
2. The question paper has five sections: Section A, Section B, Section C, Section D and Section E. There are 33 questions in the question paper.
3. Section- 'A' has 16 questions containing MCQs and Assertion-Reasoning type questions of one mark each; Section 'B' has 5 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. Answer all 33 questions. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labelled diagrams should be drawn.

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. The image below is that of an extinct angiosperm species *Archaeofructus*.

1

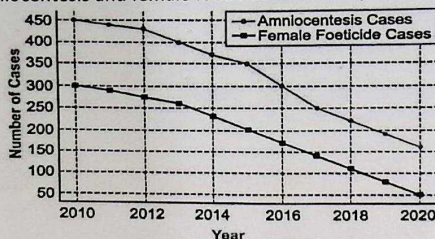


In a science fiction movie, scientists find fossilized pollen grains of *Archaeofructus* and use them to fertilize a modern genus of *Archaeofructus*. Nitya thinks that these pollen grains can be found under polar ice sheets where the temperature is around - 40°C. Is her claim correct and why?

- A. Yes, because - 40°C is enough to keep pollen grains viable.
 - B. No, because the pollen grains will get wet and won't function.
 - C. Yes, because pollen grains are viable at any temperature for several years.
 - D. No, because pollen grains need to be stored at much lower temperature to be viable.
2. Intensely lactating mothers do not generally conceive due to the:
- A. Suppression of gonadotropins.
 - B. Hypersecretion of gonadotropin.
 - C. Suppression of gametic transport.
 - D. Suppression of fertilization.

1

3. The hypothetical data on amniocentesis and female foeticide cases are presented in the graph below:



Considering other possible reasons for these changes, assess how effective the law banning amniocentesis for sex determination has been in reducing cases of female feticides?

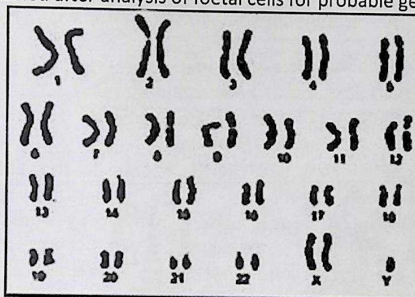
- The decline in amniocentesis cases is primarily due to improved prenatal diagnostic technologies, not the statutory ban.
 - Although both trends decline, the reduction in female feticides cases could also been influenced by increased public awareness and societal changes
 - The direct correlation between the ban and the decrease in female feticides cases alone confirms the effectiveness of the ban.
 - The reduction in female feticides cases is mainly due to external healthcare policies unrelated to the ban on amniocentesis.
4. Which one of the following enzymes should a fungal cell be treated with to get the DNA along with other macromolecules released from it?
- Isozymes
 - Cellulase
 - Chitinase
 - Ribonuclease
5. In a population of birds, those with intermediate-sized wings survive better than those with very small or very large wings. Which type of selection process is taking place?
- Directional
 - Stabilizing
 - Disruptive
 - Distributional
6. Given below are column A with a list of certain Assisted Reproductive Technologies (ART) and in column B the procedures followed during ART.

COLUMN A (ART)	COLUMN B (PROCEDURES)
1. GIFT	a. Transfer of ovum from a donor into the fallopian tube of another female.
2. ICSI	b. Transfer of semen from the donor into the vagina of the female.
3. ZIFT	c. Injecting sperms directly into the ovum.
4. IUI	d. Transfer of early embryos into the fallopian tube.

Choose the option where ART correctly matches with the procedure?

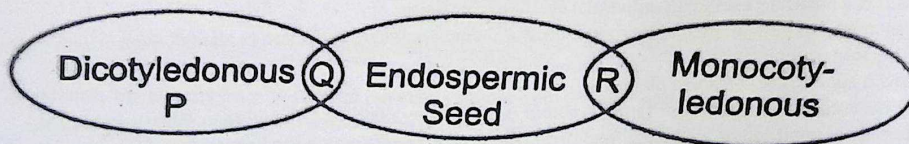
- 1-a 2-b 3-c 4-d
 - 1-d 2-a 3-b 4-c
 - 1-d 2-c 3-a 4-b
 - 1-a 2-c 3-d 4-b
7. In a biotechnology lab, two bacterial cultures are engineered to produce insulin using plasmids that carry the gene for insulin production. After several rounds of bacterial division, the researchers notice difference in insulin yield between the two cultures. Which of the following is the most likely explanation for the observed difference in insulin production?
- One culture has developed a resistance to the plasmid, leading to reduced insulin production.
 - One culture has a higher copy number of plasmids carrying the insulin gene, resulting in greater insulin production.
 - One culture has plasmids that have been completely integrated into the bacterial chromosome, reducing insulin yield.
 - One culture has plasmids with a mutation that blocks insulin gene expression, leading to reduced insulin production.

8. Neha observes a skipped meiotic and mitotic divisions during megasporogenesis and mega gametogenesis, respectively. Which of the following outcome is most likely to for embryo sac structure, ploidy, and fertilization? 1
1. The embryo sac may have fewer nuclei.
 2. The egg cell and the central cell will both be diploid, disrupting the process of double fertilization.
 3. Only one megaspore will develop, and its nucleus will remain diploid, impacting embryo and endosperm formation.
 4. The antipodal cells will fail to form, and the embryo sac will contain abnormal nuclei numbers with higher ploidy.
- A. 1 and 3 only
B. 2 and 4 only
C. 1, 2 and 4 only
D. 1, 3 and 4 only
9. A group of scientists is conducting an experiment to create a new plant hybrid by the means of somatic hybridization. Which of the following steps should they prioritize to ensure successful somatic hybridization and subsequent plant development? 1
- Isolate meristems from virus-infected plants and culture them in vitro.
 - Ensure the nutrient medium contains only water and inorganic salts.
 - Digest cell walls of selected plant cells to obtain naked protoplasts and then fuse them.
 - Use traditional breeding techniques to cross-pollinate the two plant species.
10. Given below is a karyotype obtained after analysis of foetal cells for probable genetic disorder. 1



Based on the above karyotype, the chromosomal disorder detected in unborn foetus and the consequent symptoms the child may suffer from are

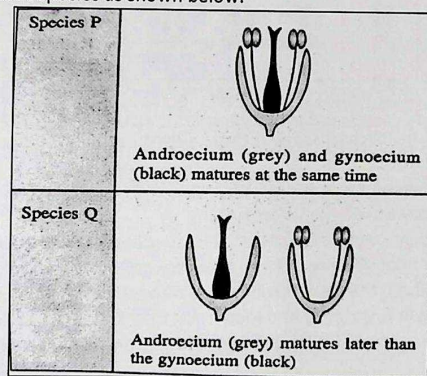
- Down's syndrome: Gynaecomastia, overall masculine development.
 - Down's syndrome: Furrowed tongue, short stature.
 - Klinefelter's syndrome: Gynaecomastia, Masculine development.
 - Klinefelter's syndrome: Rudimentary ovaries, short stature.
- A plant breeder crossed a pure-bred tall plant having white flowers with a pure-bred dwarf plant having blue flowers. He obtained 202 plants in F_1 progeny and found that they are all tall having blue flowers. Upon selfing these F_1 plants he obtained a progeny of 2160 plants. Approximately how many of these are likely to be short having blue flowers?
- A. 1215 B. 405 C. 540 D. 135
12. Ravi is classifying seeds into dicotyledonous, monocotyledonous and endospermic groups using a Venn diagram. 1
- Select the correct examples of P Q and R.



P	Q	R
A. Castor	Onion	Wheat
B. Bean	Castor	Maize
C. Pea	Gram	Barley
D. Coconut	Rubber	Groundnut

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

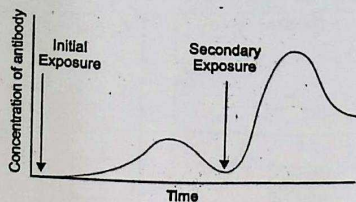
- A. Both A and R are true and R is the correct explanation of A.
 B. Both A and R are true but R is not the correct explanation of A.
 C. A is true but R is false.
 D. A is false but R is true.
13. **Assertion (A):** The trophoblast is involved in the embryo formation, and the inner cell mass gets attached to the endometrium. 1
Reason(R): The blastocyst consists of an outer layer, the trophoblast and an inner cell mass.
14. **Assertion (A):** An experiment was conducted where protoplasts from tomato and potato plants were fused and grown into a hybrid plant known as pomato. 1
Reason(R): The resulting hybrid plants, pomato, exhibited all the desirable traits of both parent plants for commercial utilization.
15. **Assertion (A):** Periodic abstinence is a natural method of birth control where couples avoid intercourse from day 10 to 17 of the menstrual cycle. 1
Reason(R): Ovulation occurs around the middle of the menstrual cycle.
16. **Assertion (A):** In gel electrophoresis, DNA moves towards the cathode. 1
Reason(R): DNA is negatively charged due to its phosphate backbone.
- Section - B**
17. Consider the flowers of two plant species as shown below: 2



- A. What kind of pollination is expected to occur in species P and Q? Give reason for your answer.
 B. If a plant cultivator wants more superior varieties of offsprings which species (P or Q) would he choose and why?
18. Construct a flowchart exhibiting sequential events of oogenesis. 2
19. A. "Apomixis is a form of asexual reproduction that mimics sexual reproduction in plants". Explain with the help of a suitable example. 2
 B. How is apomixis beneficial to plants?
20. A normal visioned woman whose father is colour blind marries a normal visioned man. What would be the probability of her I) sons and II) daughters to be colour blind? Explain with the help of a pedigree chart. 2

21. **Attempt either option A or B.**

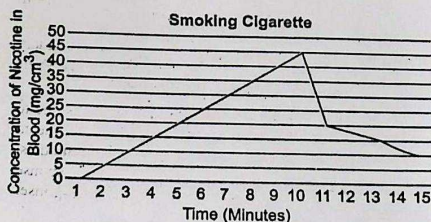
A. The graph given below shows the concentration of antibodies against a pathogen over a period of 30 years in a person's body.



- What is the significance of the two peaks observed in the given graph?
- Explain the reason behind the difference in the size of the two peaks.

OR

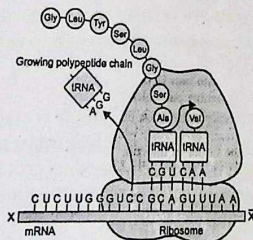
B. Alex, is a regular smoker and inhales about 10 puffs per minute. After about 10 minutes, Alex starts to feel a 'buzz' or slight head rush due to the peak nicotine levels in his blood. This situation is represented in the graph given below.



- How will this affect the concentration of carbon monoxide in the blood and the percentage of hemoglobin bound to oxygen?
- How does cigarette smoking result in high blood pressure and increase in heart rate?

Section - C

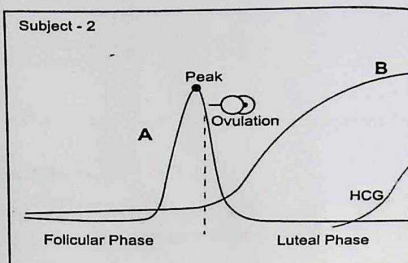
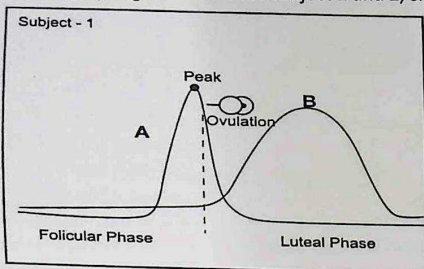
22. A. Wings of butterflies and wings of birds contribute to locomotion. Explain the type of evolution such organs are a result of. 3
- B. In England during the post industrialization period, the count of melanin moths increased in urban areas but remained low in rural areas. Explain.
- C. How is the use of herbicides, pesticides and antibiotics by humans for various purposes comparable with the observations made on moths in the above question? What is this type of phenomenon called?
23. Study the diagram given below and answer the question that follows: 3



- Identify the polarity from 'X' to 'X' in the mRNA sequence of the given diagram. Mention how many more amino acids can be added to the polypeptide that is being translated and why?
- Write the initiating codon for translation, its anticodon, and the amino acid it codes for.

- C. Explain the phenomenon of charging of an adapter molecule, and why does this molecule need to be charged?

24. Study the graphs given below for subject 1 and 2, showing different levels of hormones.



- A. Which hormone is responsible for the peak observed in subject 1 and 2? Name the hormone B in subject 2.
- B. Compare the levels of Hormone B in Subject-1 and Subject-2 during the luteal phase. What is the reason for the difference?
- C. What is the role of Hormone B after ovulation in Subject-1?
25. In a population of 10,000 individuals, 3600 show the recessive phenotype for a trait controlled by a single gene with two alleles (A and a). Assuming Hardy-Weinberg equilibrium:
1. Calculate the frequencies of both alleles (A and a).
 2. Calculate the frequencies of the genotypes: AA, Aa, and aa.
 3. Determine the number of individuals with each genotype.
26. Four friends - Shaan, Misha, Arjun and Tia- recently returned from a trip. Each of them developed different symptoms, which are listed below.

NAME	SYMPTOMS
Shaan	Nasal congestion, sore throat, hoarseness, coughing, tiredness.
Misha	Fever, cough, difficulty in breathing, bluish lips and nails, chills.
Arjun	Constipation, abdominal cramps, mucus and blood in stools.
Tia	Abdominal pain, internal bleeding, muscular pain, intestinal blockage.

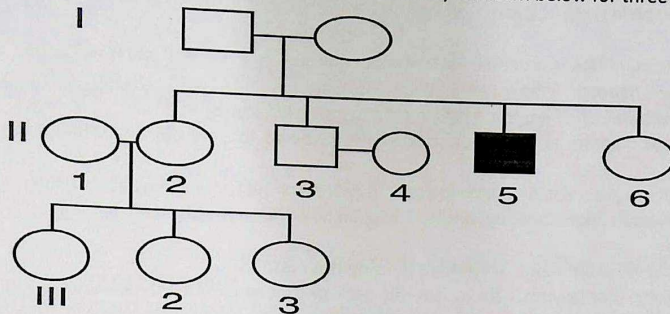
- A. What are the similarities and differences between the possible diseases they are suffering from:
- (I) Shaan and Misha? (II) Arjun and Tia?
- B. If the drinking water on the trip was contaminated, which two friends are more likely to have been affected? Give reason.
27. **Attempt either option A or B.**
- A.I. In a recent survey it is seen that IVF have a more success rate than GIFT and IUI for women under 35 years of age. Explain the biological reason behind this.
- II. Give reason as to why oral contraceptive pills are termed physiological birth control devices.
- III. A woman with a history of multiple pregnancies wants a long-term contraceptive solution. Which method would you suggest and why?

OR

- B.I. In rural areas, despite awareness programs, population growth remains high. As a health officer, which two measures would you prioritize to improve reproductive health outcomes?
- II. During counselling, a girl was told that barrier methods are "dual protectors." What does this mean?
- III. A woman complains of pain, irregular bleeding, and infertility. Doctor suspects STDs. Why such diseases are called "silent infections"?
28. A. A man with blood group A married a woman with blood group B. They have a son with AB blood group and a daughter with O blood group. Work out the cross and show the possibility of such a probability.
- B. A diploid organism is heterozygous for 4 loci; how many types of gametes can be produced?
- C. Briefly mention the contribution of T.H. Morgan in genetics.

Section - D

29. A couple visits a genetic counsellor. They are concerned because the man's younger brother (5 in gen II) has a rare genetic disorder characterized by muscle degeneration. The disorder seems to affect only males in the family and appears in every generation. A simplified pedigree of the family is shown below for three generations:



Based on the understanding of inheritance pattern answer the following questions:

- Identify the mode of inheritance. Justify your answer based on the pedigree.
- Explain why the unaffected man (3 in gen II) is not at risk of transmitting the disorder to his children, even though his brother is affected.

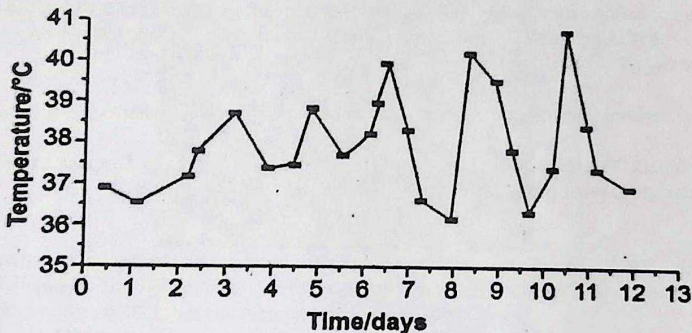
Attempt either subpart C or D.

- If the man's sister (1 in gen II) plans to have children, what is the probability that her son will be affected? Justify your answer.

OR

- Explain how unaffected parents (gen I) gave birth to affected son mentioning their genotype.

30. Given below is the pattern of temperature in a person suffering from a non-viral disease transmitted by mosquitoes.



Based on your understanding of the above graph and related concepts, answer the following questions:

Attempt either subpart A or B.

- Explain the factor(s) responsible for this pattern of temperature.

OR

- How is this infection transmitted to humans?
- How does this pathogen multiply in the human body?
- Explain the life cycle of this pathogen using a diagram.

Section - E

31. A. I. In an experiment, DNA ligase is inhibited. Predict and explain what would happen during replication. 5
II. A scientist adds radioactive nucleotides during replication in a eukaryotic cell culture. Which newly formed strands will be radioactive, and why?
III. Schematically explain the process of transcription in bacteria.

OR

- B.I. In eukaryotic cells, mRNA is processed after transcription. Suppose the 5' cap is not added to the primary transcript. What will happen to the mRNA in the cytoplasm?
II. Mention one contribution of genetic maps in human genome project.
III. Draw a schematic diagram of lac operon in both presence and absence of inducer in the culture medium of bacteria.
32. A. I. A farmer wants to grow cotton plant resistant to pests without using chemical pesticides. 5
a. Suggest a suitable biotechnology method. Explain how this method protects the plant from insects at the molecular level.
b. Mention one environmental advantage of using this method.
II. A farmer complains that his crops are repeatedly damaged by nematode infestation, leading to reduced yield. Scientists suggest using of RNA interference (RNAi) to protect the plants. How using RNAi in tobacco plants help to prevent infection by *Meloidogyne incognita* (nematode)? Mention one advantage of RNAi-based method over chemical nematicides.

OR

- B.I. A doctor suggests gene therapy for a child suffering from ADA (Adenosine deaminase) deficiency.
a. Why is gene therapy needed here?
b. Describe the method used to cure this disorder. Give one limitation of this method.
- II. A diabetic patient is advised to use insulin produced through recombinant DNA technology instead of animal-derived insulin. Why? How is human insulin produced in *E. coli* through biotechnology?
33. A. I. A student is trying to clone a gene into a bacterial plasmid but finds that the plasmid is not entering the bacterial cells. The teacher suggests making the bacterial cells 'competent' before transformation. What does it mean to make a bacterial cell 'competent'? Mention one method commonly used to induce competence in bacterial cells. Why is this step essential in recombinant DNA technology? 5
II. In a genetic engineering experiment, a scientist wanted to amplify a segment of DNA but the thermal cycles kept denaturing the DNA polymerase, leading to failure. What mistake was made? Which enzyme should be used instead, and why?

OR

- B.I. How have biotechnologists effectively used *Agrobacterium tumefaciens* in plants and retrovirus in animals? Explain.
II. During recombinant DNA technology, scientists often use plasmids as vectors. Suppose a plasmid lacks a selectable marker gene. What problem will arise, and how can it be overcome?