B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

PRE-BOARD-II EXAMINATION 2025-26
BIOLOGY (044)
SET-I

Class: XII | Duration: 3 Hours
Date: 09/12/2025 | Max. Marks:70
Admission no: | Roll no:

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) 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.
(iv) 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.
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION-A

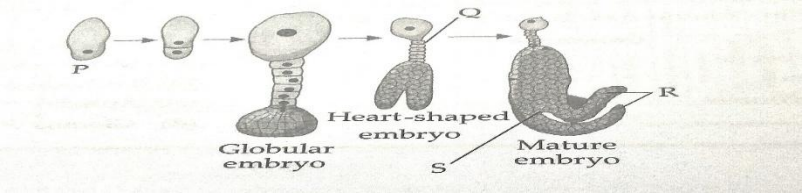
Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q.n | Question

1. How many pollen grains and ovules are likely to be formed in the anther and the ovary of an angiosperm bearing 50 microspore mother cells and 50 megaspore mother cells respectively? 1

A. 100, 25 B. 200, 50
C. 50, 50 D. 200, 100

2. The diagram given below shows labelling of four parts of a dicot embryo during its development as P, Q, R and S. 1



Choose the option that indicates correct labelling of 'P', 'Q', 'R' and 'S' of embryo in different stages of its development:

	P	Q	R	S
A.	Egg	Suspensor	Radicle	Cotyledon
B.	Zygote	Suspensor	Cotyledon	Plumule
C.	Egg	Radicle	Suspensor	Cotyledon
D.	Zygote	Suspensor	Cotyledon	Radicle

3. Which one of the following hormones is secreted by the human placenta that helps in the maintenance of pregnancy? 1

A. Relaxin B. Human chorionic gonadotropin

C. Oxytocin D. Human placental lactogen

4. Which of the following features shows the mechanism of sex determination in honey-bee? 1

(i) An offspring formed from the union of a sperm and egg develops as a female.

(ii) Males have half the number of chromosomes than that of female.

(iii) The males are haploid having 32 chromosomes.

(iv) All workers and males are diploid having 16 chromosomes.

A. i and ii B. ii and iii

C. i and iv D. ii and iv

5. In humans, non-disjunction of the 21st pair of chromosome leads to: 1

A. Acquired immune deficiency syndrome B. Klinefelter's syndrome

C. Turner's syndrome D. Down's syndrome

6. In *E.coli*, the lac operon gets switched on when lactose is 1

A. present in the medium and it binds to the repressor.

B. not present in the medium and the repressor binds to the operator.

C. not present in the medium and RNA polymerase binds to the operator.

D. active lactose present in the medium binds to RNA polymerase.

7. In a double helical structure of DNA molecule, the strands are: 1

A. identical and complementary B. identical and non-complementary

C. anti-parallel and complementary D. anti-parallel and non-complementary

8. In eukaryotes, the removal of introns and joining of exons during mRNA processing is called: 1

A. Splicing B. Transcription C. Translation D. Capping

9. Which one of the following codons has dual function? 1

A. AUG B. AUC C. ACU D. ACA

10. The vector for dengue fever is: 1

A. Female Aedes mosquito B. Female Anopheles mosquito

C. Male Aedes mosquito D. Female Culex mosquito

11. Industrial production of which of these products can be negatively affected by the presence of *Saccharomyces cerevisiae*? 1

A. Beer B. Wine C. Fruit juice D. Wheat bread

12. Crystals of Bt toxin produced by some bacteria, do not kill the bacteria producing them because: 1

A. Bacteria are resistant to the toxin B. Toxin is inactive

C. Bacteria encloses 'toxin' in a special capsule. D. None of these

Question No. 13 to 16 consist of two statements-Assertion (A) and Reason (R). Answer these questions by 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): Golden rice is a genetically modified crop that contains high iron content. 1

Reason (R): Golden rice is enriched with beta-carotene to address vitamin A deficiency.

14. Assertion (A): Cells of tapetum have more than one nucleus. 1
Reason (R): They undergo meiosis without cytokinesis.

15. Assertion (A): Elimination of a competitively inferior species in a closely related or otherwise similar group is known as competitive exclusion principle. 1
Reason (R): If two species compete for the same resource, they could avoid competition by choosing different times for feeding or different foraging patterns.

16. Assertion (A): Antihistamines are effective in treating allergy symptoms. 1
Reason (R): Allergies occur due to excessive secretion of histamines in response to allergens.

SECTION-B

17. Attempt either option A or B. 2
A. From which end of the ovule, and how does the pollen tube gain its entry into the embryo sac of a hibiscus flower?

OR

B. State the fate of the male nuclei present in the pollen tube.

18. List four points (criteria) that a molecule must fulfill to act as a genetic material. 2

19. i) Write the scientific name from where natural cannabinoids are obtained. 2
ii) How does this drug affect human body?

20. Attempt either option A or B. 2
A. 'Curd is easier to digest by humans than milk'. Justify giving suitable reasons.

OR

B. A culture plate of Lactobacillus shows blue-colored colonies and colorless colonies. Explain the principle involved in the formation of such variance in the color of colonies.

21. Attempt either option A or B. 2
A. Differentiate between two different types of pyramids of biomass with the help of one example of each.

OR

B. Explain parasitism with the help of one example. State Gause's competitive exclusion principle.

SECTION-C

22. Write the various steps in the process of oogenesis in a human female. 3

23. (i)Why is "in vitro fertilization" (IVF) so named? State its importance. 3
(ii)Distinguish between GIFT and ZIFT.

24. (i)Write the karyotype and the genetic disorder of an individual who has 'XX' egg fertilized by a 'Y' sperm. 3
(ii) Mention any two symptoms of this genetic disorder.
(iii) Write the possible reason that leads to the formation of this 'XX' egg.

25. (i) State Oparin and Haldane hypothesis. 3
(ii) How did S.L. Miller prove their hypothesis experimentally? Explain.

26. A cancer patient is prescribed cyclosporin A after a kidney transplant. 3
(i) Name the microbe that produces cyclosporin A.
(ii) What is its biological role in transplant patients?
(iii) Why is *Aspergillus niger* widely used in industries?

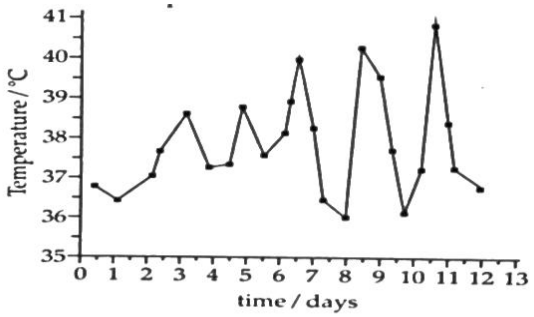
27. What are transgenic animals? Mention any two uses of such animals in biotechnology. 3

28. (i) In a pond there were 200 frogs. 40 more were born in the year. Calculate the birth rate of the population. 3

(ii) Population in terms of number is not always a necessary parameter to measure population density. Justify with two examples.

SECTION-D

29. Given below is the pattern of temperature in a person suffering from a non-viral disease transmitted by mosquitoes. Study the graph and answer the questions that follow: 4



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

B. How does this pathogen multiply in the human body?

C. How is this infection transmitted to humans?

D. Which stages of the life cycle of this pathogen are completed in the mosquito's gut?

30. Given below is a set of information about some fruits and seeds. 4

Fruit	Fruit and seed information
P	Nucellar cells surrounding the embryo sac develop into embryos.
Q	Ovary develops into the fruit by the application of growth hormones.
R	Thalamus contributes to fruit formation.
S	Ovary matures into a fruit after fertilisation.

On the basis of the information provided above, answer the following questions with justification for each answer.

A. How many embryo sacs will be present in each ovule of S before maturation and how many egg(s) will be present in each embryo sac when the embryo sac is developed from a single megaspore?

B. (i) Which of these fruits exhibits polyembryony? Will there embryos exhibit genetic variation? Justify.

(ii) What will be the ploidy of the embryonic cells in the above case ?

Attempt either subpart C or D.

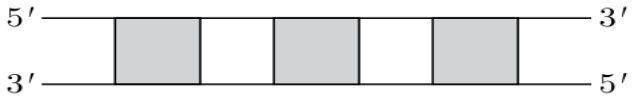
C. Which of these fruits can be considered as parthenocarpic? Give a reason.

OR

D. Which of the fruits P, Q, R and S is a true fruit with seeds? Give reason.

SECTION-E

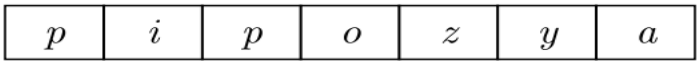
31. A. Illustrated below is a DNA segment, which constitute a gene. 5



(i) Will the whole gene be transcribed into RNA primarily? State 'Yes' or 'No'.
(ii) Name the shaded and unshaded parts of the gene.
(iii) Explain how these genes are expressed.
(iv) How is this gene different from prokaryotic gene in its expression?

OR

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



(i) Identify and name the regulatory gene in this operon. Explain its role in 'switching off ' the operon.
(ii) Why is the lac operon's regulation referred to as negative regulation?
(iii) Name the inducer molecule and the products of the genes 'z' and 'y' of the operon. Write the functions of these gene products.

32. A. (i) Explain the principle of polymerase chain reaction (PCR) and its applications in the field of biotechnology. 5
(ii) Describe the structure of mature human insulin. State one advantage of using recombinant insulin over animal insulin.

OR

B. (i) Define gene therapy and mention one disease where it has been successfully attempted.
(ii) Suggest two ways to protect indigenous knowledge and biological resources.

33. A. Justify the following statements with suitable proof/examples: - 5
(i) 'Competition is not limited to closely related species'
(ii) 'Competition is not always dependent on resources being limiting'
(iii) 'Competitive exclusion occurs in nature'
(iv) 'Competing species may evolve mechanisms for co-existence'
(v) 'Competition in nature comes from what is called 'competitive release''

OR

B. (i) How does a simple food chain exemplify the First Law of Thermodynamics?
(ii) The table below shows the number of species in different parts of the world.

Name of Place	Number of Bird species
Columbia	1400
India	1200
Northern South America	1300
New York	105
Denmark	504

Identify the common factor in regions with a higher number of bird species and suggest at least two reasons for this greater diversity.

**********ALL THE BEST**********