CBSE EXAMINATION PAPER-2024

BIOLOGY

(Solved)

Time allowed : 3 hours | Maximum Marks : 82

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **39 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 3** are case based questions

iv. **Section B** – questions number **4 to 19** are multiple choice questions

v. **Section C** – questions number **20 to 25** are very short answer

vi. **Section D** – questions number **26 to 33** are short answer

vii. **Section E** – questions number **34 to 39** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

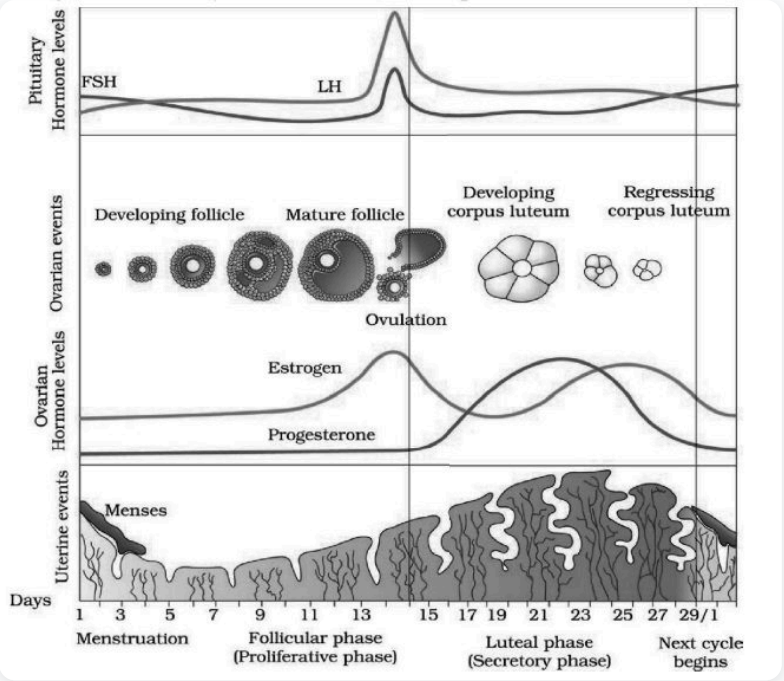
ix. Use of calculator is NOT allowed.

Section A

Question 1.

Question 2.

In a human female, the reproductive phase starts on the onset of puberty and ceases around middle age of the female. Study the graph given below regarding menstrual cycle and answer the questions that follow:



(1)

Name the hormones and their source organ, which are responsible for menstrual cycle at puberty.

[1 Marks]

(2)

For successful pregnancy, at what phase of the menstrual cycle an early embryo (upto 3blastomeres) should be Implanted in the Uterus (IUT) of a human female who has opted for Assisted Reproductive Technology (ART)? Support your answer with a reason.

[1 Marks]

(3)

Name the hormone and its source organ responsible for the events. occurring during proliferative phase of menstrual cycle. Explain the event.

[1 Marks]

(4)

In a normal human female , why does menstruation only occurs if the released ovum is not fertilized ? explain?

[2 Marks]

Question 3.

Read the following passage and answer the questions that follow:

"Mosquitoes are drastically affecting the human health in almost all the developing tropical countries. Different species of mosquitoes cause very fatal diseases so much so that many humans loose their life and if they survive, are unable to put in productive hours to sustain their life. With the result the health index of the country goes down."

(1)

Name a species of mosquito other than female Anopheles and the disease, for which it carries the pathogen.

[2 Marks]

(2)

Name the form in which Plasmodium gains entry into (i) human body (ii) the female Anopheles body.

[1 Marks]

(3)

Explain the events which occur within a female Anopheles mosquito afty it has sucked blood from a malaria patient.

[1 Marks]

(4)

Why do the symptoms of malaria not appear in a person immediately after being bitten by an infected female Anopheles? Give one reason. Explain when and how do the symptoms of the disease would appear.

[1 Marks]

Section B

Question 4.

A single gene that controls the expression of more than one trait is said to show

[1 Marks]

(A) Incomplete dominance

(B) Polygenic inheritance

(C) Multiple allelism

(D) Pleiotropism

Question 5.

A person with trisomy of 21+ chromosome shows

[1 Marks]

(A) Rudimentary ovaries

(B) Gynaecomastia

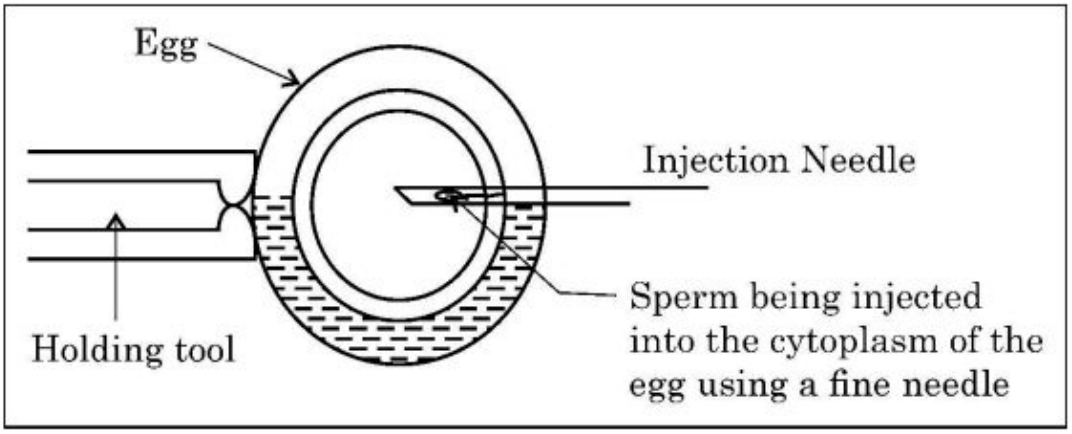
(C) Characteristic palm crease

(D) Furrowed tongue

Question 6.

Observe the schematic representation of assisted reproductive technology given below, Egg Injection Needle—"Jesus Sperm being injected into the cytoplasm of the egg using a fine needle. Identify the most appropriate technique depicted in the above diagram.

[1 Marks]



(A) ICSI

(B) IUI

(C) IVF

(D) ZIFT

Question 7.

Interferons are proteins secreted by

[1 Marks]

(A) Bacteria infected cell

(B) WBC

(C) RBC

(D) Virus infected cell

Question 8.

During biological treatment of sewage, the masses of bacteria held together by fungal filaments to form mesh-like structures are called

[1 Marks]

(A) Anaerobic sludge

(B) Primary sludge

(C) Activated sludge

(D) Flocs

Question 9.

Which one of the following statements is correct in the context of observing DNA separation by agarose gel electrophoresis?

[1 Marks]

(A) Ethidium bromide stained DNA can be seen under UV light.

(B) DNA can be seen in visible light.

(C) DNA can be seen without staining in visible light.

(D) Ethidium bromide stained DNA can be seen in visible light.

Question 10.

A phenomenon where a male insect mistakenly identifies the patterns of an orchid flower as the female insect partner, and tries to copulate and thereby pollinates the flower is said to be

[1 Marks]

(A) Pseudofertilisation

(B) Pseudopollination

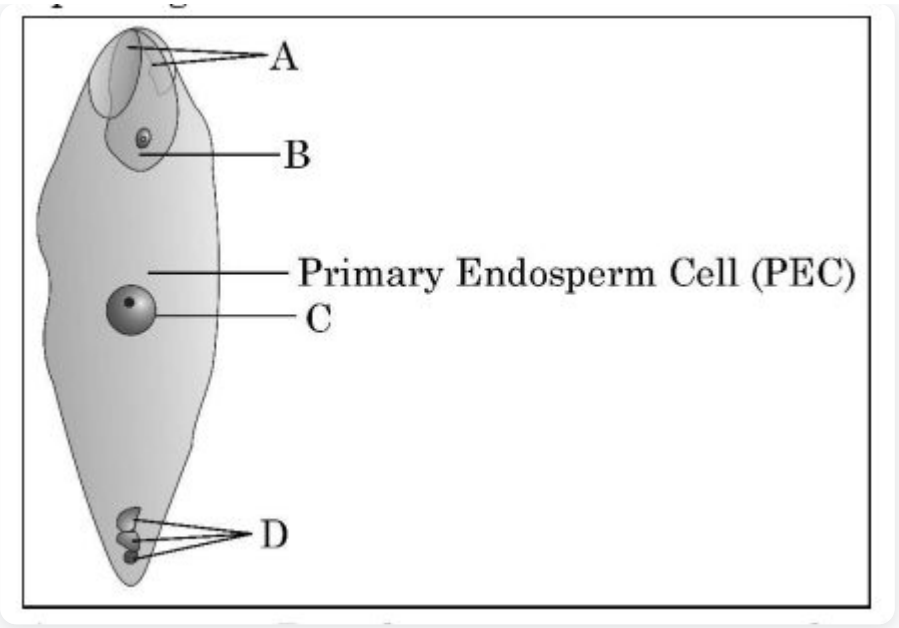
(C) Pseudoparthenocarpy

(D) Pseudocopulation

Question 11.

Identify the correct labellings in the figure of a fertilised embryo sac of an angiosperm given below

[1 Marks]



(A) A - degenerating synergids, B - zygote, C - degenerating antipodals, D - PEN

(B) A - degenerating synergids, B - zygote, C - PEN, D - degenerating antipodals

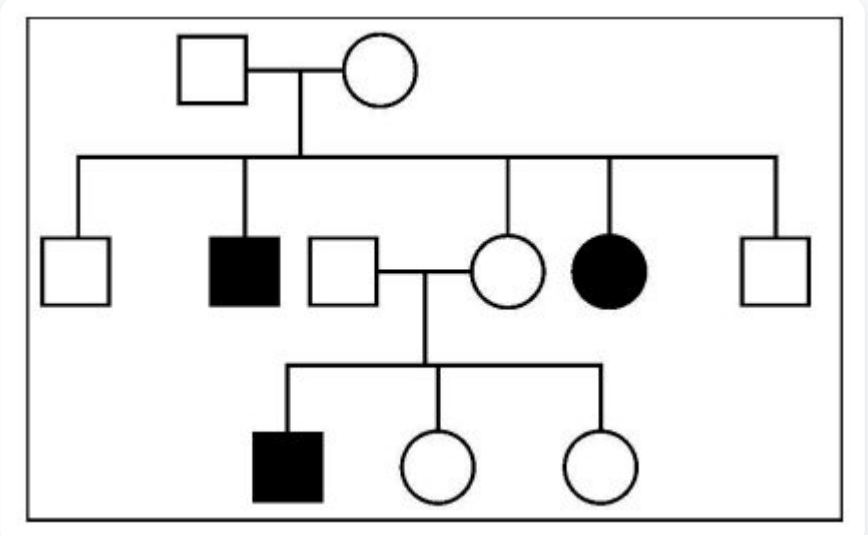
(C) A - degenerating antipodals, B - PEN, C - degenerating synergids, D - zygote

(D) A - zygote, B - degenerating synergids, C - degenerating antipodals, D - PEN

Question 12.

Study the pedigree chart of a family showing the inheritance pattern of a certain disorder. Select the option that correctly identifies the nature of the trait depicted in the pedigree chart.

[1 Marks]



(A) Autosomal dominant

(B) Dominant X-linked

(C) Autosomal recessive

(D) Recessive X-linked

Question 13.

Match the following genes of the lac operon listed in column 'A' with their respective products listed in column 'B'.

Select the correct option:

[1 Marks]

	A Gene		B Products
a.	'i' gene	(i)	β-galactosidase
b.	'z' gene	(ii)	lac permease
c.	'a' gene	(iii)	repressor
d.	'y' gene	(iv)	transacetylase

Select the correct option :

Options :

	a	b	c	d
(A)	(i)	(iii)	(ii)	(iv)
(B)	(iii)	(i)	(ii)	(iv)
(C)	(iii)	(i)	(iv)	(ii)
(D)	(iii)	(iv)	(i)	(ii)

(A) Option B

(B) Option C

(C) Option A

(D) Option D

Question 14.

If both the parents are carriers for thalassaemia, the chances of an afflicted child to be born to them is:

[1 Marks]

(A) 100%

(B) 75%

(C) 25%

(D) 50%

Question 15.

If the sequence of nitrogen bases of the coding strand in a transcription unit is 5' - ATGAATG - 3', the sequence of bases in its RNA transcript would be:

[1 Marks]

(A) 5' - CAUUCAU - 3'

(B) 5' - GUAAGUA - 3'

(C) 5' - UACUUAC - 3'

(D) 5'-AUGAAUG-3'

Question 16.

Assertion (A): AIDS is a syndrome caused by HIV.

Reason (R): HIV is a virus that damages the immune system with DNA as its genetic material.

[1 Marks]

(A) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(B) (A) is true, but (R) is false.

(C) Both (A) and (R) are true and (R) is the correct explanation of (A).

(D) (A) is false, but (R) is true.

Question 17.

Assertion (A): In molecular diagnosis, single stranded DNA or RNA tagged with radioactive molecule is called a probe.

Reason (R): A probe always searches and hybridises with its complementary DNA in a clone of cells.

[1 Marks]

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) (A) is true, but (R) is false.

(C) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(D) (A) is false, but (R) is true.

Question 18.

Assertion (A): In birds the sex of the offspring is determined by males.

Reason (R) : Males are homogametic while females are heterogametic.

[1 Marks]

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) (A) is false, but (R) is true.

(C) (A) is true, but (R) is false.

(D) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

Question 19.

Assertion (A): Communities that comprise of more species tend to be more stable.

Reason (R) : A higher number of species results in less year to year variation in total biomass.

[1 Marks]

(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 false, but (R) is true.

(D) (A) is true, but (R) is false.

Section C

Question 20.

"Farmers prefer apomictic seeds to hybrid seeds." Justify giving two reasons.

[2 Marks]

Question 21.

Mention one advantage and one disadvantage of amniocentesis.

[2 Marks]

Question 22.

$5' - G\downarrow A\ A\ T\ T\ C - 3'$

$3' - C\ T\ T\ A\ A\uparrow G - 5'$

a) Name the restriction enzyme that recognises the given specific sequence of bases. What are such sequence of bases referred to as?

(b) What are the arrows in the given figure indicating? Write the result obtained thereafter.

[2 Marks]

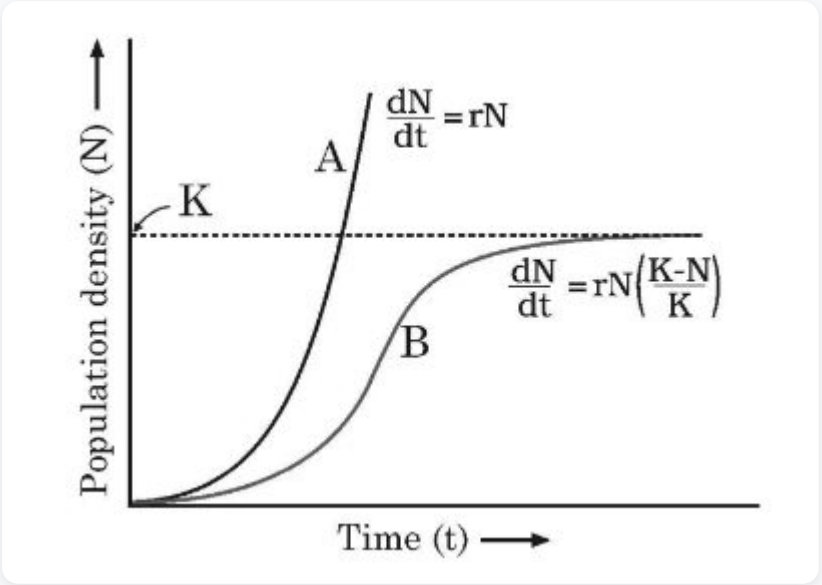
Question 23.

Observe the population growth curve and answer the questions given below:

(a) State the conditions under which growth curve 'A' and growth curve B plotted in the graph are possible.

(b) Mention what does 'K' in the graph represent

[2 Marks]



Question 24.

Explain how are plants benefitted by their association with "Glomus species

[2 Marks]

Question 25.

If the base adenine constitutes 31% of an isolated DNA fragment, then write what will be the expected perrentage of the base cytosine in it.

Explain how did you arrive at the answer given.

[2 Marks]

Section D

Question 26.

Identify a, b, c, d, e and fin the table given below:

[3 Marks]

Sl. No.	Organism	Bioactive Molecule	Use
1.	*Monascus purpureus*	a	b
2.	c	d	Antibiotic
3.	e	Cyclosporin A	f

Question 27.

Tropical regions harbour more species than the temperate regions. How have biologists tried to explain this in their own ways? Explain.

[3 Marks]

Question 28.

(i) What does an ecological pyramid represent?

(ii) The Ecological pyramids may have an 'upright' or an 'inverted' shape. Justify with the help of suitable examples.

[3 Marks]

Question 29.

(a) What are transgenic animals?

(b) Name the transgenic animal having the largest number amongst all the existing transgenic animals.

(c) State any 3 reasons for which these types of animals are being produced.

[3 Marks]

Question 30.

If the cells in the leaves of a maize plant contain 10 chromosomes each, write the number of chromosomes in its endosperm and zygote. Name and explain the process by which an endosperm and a zygote are formed in maize.

[3 Marks]

Question 31.

(a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?

(b) "DNA replication is continuous and discontinuous on the two strands within the replication fork." Explain with the help of a schematic representation.

[3 Marks]

Question 32.

Explain the processing of heterogeneous nuclear RNA OmRNA) into a fully functional mRNA in eukaryotes. Where does this processing occur in the coll?

[3 Marks]

Question 33.

The world is facing accelerated rates of species extinction largely due to human activities. Explain any three human activities responsible for accelerated rates of species extinction.

[3 Marks]

Section E

Question 34.

(i) Draw a schematic diagram of the cloning vector pBR 322 and label (1) Bam HI site (2) gene for ampicillin resistance (3) 'ori (4) 'rop' gene.

(ii) State the role of 'rop' gene.

(iii) A cloning vector does not have a selectable marker. How will it affect the process of cloning?

(iv) Why is insertional inactivation preferred over the use of selectable markers in cloning vectors?

[5 Marks]

Question 35.

(i) Name the nematode (scientific name) that infects the roots of tobacco plant and reduces its yield.

(ii) Name the vector that is used to introduce nematode-specific genes into the host plant (tobacco).

(iii) How do sense and anti-sense RNAs function?

(iv) Why could parasite not survive in a transgenic tobacco plant?

[5 Marks]

Question 36.

(i) Draw a diagram of a human sperm. Label any four parts and write their functions.

(ii) In a human female, probability of an ovum to get fertilized by more than one sperm is impossible. Give reason.

[5 Marks]

Question 37.

(i) With the help of labelled diagram only, show the different stages of embryo development in a dicot plant.

(ii) Endosperm development precedes embryo development. Justify.

[5 Marks]

Question 38.

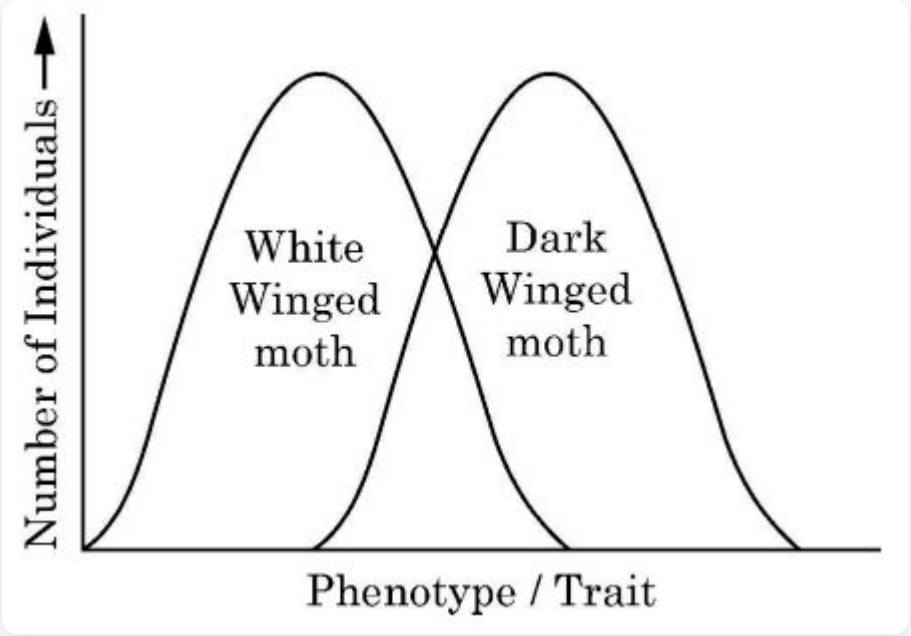
(a) Natural selection operates in different ways in nature.

(i) Identify the type of natural selection depicted in the graph above.

(ii) In England after industrialisation, the population of dark winged moths were more favoured than white winged moth. Explain.

(ii) Anthropogenic action can enhance the rate of evolution. Explain with the help of an example.

[5 Marks]



Question 39.

(i) Why did Hershey and Chase use S and P in their experiment? Explain.

(ii) State the importance of (1) blending and (2) centrifugation in their experiment.

(ii) Write the conclusion they arrived at the end of their experiment.

[5 Marks]