CBSE EXAMINATION PAPER-2024

BIOLOGY

(Solved)

Time allowed : 3 hours | Maximum Marks : 81

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **40 questions.** All questions are **compulsory.**

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

iii. **Section A** – questions number **1 to 5** are case based questions

iv. **Section B** – questions number **6 to 20** are multiple choice questions

v. **Section C** – questions number **21 to 26** are very short answer

vi. **Section D** – questions number **27 to 34** are short answer

vii. **Section E** – questions number **35 to 40** 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.

Read the following passage and answer the questions that follow. 4

Spermatogenesis is an important primary sex characteristic in humans

and all other vertebrates. The process is coordinated and controlled

under the influence of hormones. It starts with the onset of puberty in humans and thereafter continues. The primordial cells within the embryonic testis which differentiate into spermatogonia are the precursors of the sperms. These are located at the outer walls of the seminiferous tubules where the process of spermatogenesis proceeds.

Question 3.

Read the following passage and answer the questions that follow.

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(1)

State the site of action of FSH in the testes and describe its action thereafter.

[2 Marks]

(2)

Describe the role of LH in the process of spermatogenesis.

[2 Marks]

(3)

Name the cells and their products which undergo : 1

(i) Mitosis and Differentiation

(ii) Meiosis I and Meiosis II

during the process of spermatogenesis.

[1 Marks]

(4)

Name the accessory ducts that the sperms travel through from seminiferous tubules to reach the epididymis.

[1 Marks]

Question 4.

Read the following passage and answer the questions that follow.

In 1981, the health workers of United States of America had become aware of th s sarcoma, cancer of the skin and blood vessels and another disease pneumocystis pneumonia, a respiratory infection caused by a protozoan. Both these diseases were very rare in the general population, but occurred frequently in more severely immunosuppressed individuals. This led to the recognition of the immune system disorder that was named Acquired Immune

Deficiency Syndrome (AIDS).

In 1983, virologists working in the USA and France had identified a causative agent for 'AIDS', now known as Human Immunodeficiency Virus (HIV). "HIV" follows a set path to attack the human body to cause the disease.

(a) Name the group of cells the HIV attacks after gaining entry into the human body and write the various events that occur within this cell.

(b) Write the expanded form of the diagnostic test used for detecting AIDS. Write the possible treatment available for the disease at present.

(c) Mention any two steps suggested by WHO for preventing the spread of this disease.

Question 5.

Read the following passage and answer the questions that follow.

In 1981, the health workers of United States of America had become aware of th s sarcoma, cancer of the skin and blood vessels and another disease pneumocystis pneumonia, a respiratory infection caused by a protozoan. Both these diseases were very rare in the general population, but occurred frequently in more severely immunosuppressed individuals. This led to the recognition of the immune system disorder that was named Acquired Immune Deficiency Syndrome (AIDS). In 1983, virologists working in the USA and France had identified a causative agent for 'AIDS', now known as Human

Immunodeficiency Virus (HIV). "HIV" follows a set path to attack the human body to cause the disease.

(1)

Name the group of cells the HIV attacks after gaining entry into thehuman body and write the various events that occur within this cell.

[1 Marks]

(2)

Write the expanded form of the diagnostic test used for detecting AIDS. Write the possible treatment available for the disease at present.

[1 Marks]

(3)

Mention any two steps suggested by WHO for preventing the spreadof this disease.

[2 Marks]

(4)

"A patient suffering from AIDS does not die of this disease but fromsome other infection. Justify the statement.

[2 Marks]

Section B

Question 6.

An angiosperm embryo sac is located within the :

[1 Marks]

(A) Nucellus

(B) Ovary

(C) Placenta

(D) Megasporangium

Question 7.

Match the items in Column I with those in Column II and select the correctly matched option from those given below :

[1 Marks]

(A) 1(iii), 2(i), 3(iv), 4(ii)

(B) 1(ii), 2(iv), 3(i), 4(iii)

(C) 1(iii), 2(iv), 3(i), 4(ii)

(D) 1(ii), 2(i), 3(iv), 4(iii)

Question 8.

In humans, the secondary oocyte completes meiotic division when :

[1 Marks]

(A) acrosomal enzymes break down the zona pellucida.

(B) it is released from the matured Graafian follicle.

(C) it is penetrated by the sperm cell.

(D) it gets implanted in the uterine endometrium.

Question 9.

Which one of the following statements is not true ?

[1 Marks]

(A) Homology indicates common ancestry.

(B) Homologous organs have similar anatomical structure, but perform different functions.

(C) Homologous structures are a result of convergent evolution.

(D) Flippers of whales and dolphins are homologous organs.

Question 10.

A population is in genetic equilibrium/Hardy-Weinberg equilibrium for a, if the frequency of AA is 0.6, then the frequency of genotype Aa is :

[1 Marks]

(A) 0.48

(B) 0.32

(C) 0.42

(D) 0.21

Question 11.

In the double helical structure of DNA molecule, the strands are :

[1 Marks]

(A) anti-parallel and non-complementary

(B) anti-parallel and complementary

(C) identical and non-complementary

(D) identical and complementary

Question 12.

In a transcription unit the terminator is located towards the :

[1 Marks]

(A) 3 end of the template strand

(B) 3 end of the coding strand

(C) 5 end of the coding strand

(D) 5 end of the template strand

Question 13.

A woman with normal vision has a colour blind father. She marries a man with normal vision. The percentage chance of their progeny being colour blind is :

[1 Marks]

(A) 75%

(B) 50%

(C) 25%

(D) 100%

Question 14.

The vector for dengue fever is :

[1 Marks]

(A) Male Aedes mosquito

(B) Female Culex mosquito

(C) Female Aedes mosquito

(D) Female Anopheles mosquito

Question 15.

Which one of the following pairs is not correctly matched ?

[1 Marks]

(A) Monascus purpureus Citric Acid

(B) Clostridium butylicum Butyric acid

(C) Trichoderma polysporum Cyclosporin A

(D) Streptococcus Streptokinase

Question 16.

Which one of the following is not a feature of plasmids ?

[1 Marks]

(A) Circular

(B) Extra-chromosomal

(C) Self-replicating

(D) Single stranded

Question 17.

The pyramid of biomass in sea is generally inverted because in sea :

[1 Marks]

(A) Large fishes feed on small fishes.

(B) Number of phytoplanktons is less.

(C) Biomass of fishes exceeds that of phytoplankton.

(D) Number of phytoplanktons is more.

Question 18.

Assertion (A) : RNA is unstable and can mutate at a faster rate.

Reason (R) : The presence of 2 OH group in every nucleotide of RNA makes it labile and easily degradable.

[1 Marks]

(A) Assertion (A) is false, but Reason (R) is true.

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

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

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

Question 19.

Assertion (A) : Virus-infected cells produce interferons.

Reason (R) : Interferons can cause inflammation of virus-infected cells.

[1 Marks]

(A) Assertion (A) is false, but Reason (R) is true.

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

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

(D) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct

explanation of the Assertion (A).

Question 20.

Assertion (A) : Specific enzymes are used to degrade the cell wall in organisms to isolate the DNA from the cell.

Reason (R) : Fungal cell wall is degraded by the enzyme cellulase.

[1 Marks]

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

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

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

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

Section C

Question 21. Name any two copper releasing intra-uterine devices. State two reasons that make them effective contraceptives.

[2 Marks]

Question 22. Name any two outbreeding devices that flowering plants have developed and explain how they help in encouraging cross-pollination.

[2 Marks]

Question 23. Although Haemophilia and sickle cell anemia are two blood related Mendelian disorders, yet, they differ in their pattern of inheritance. State any two differences.

[2 Marks]

Question 24.

Identify A, B, C and D in the following table :

[2 Marks]

Question 25. How is the rate of decomposition affected by the nature of detritus and temperature?

[2 Marks]

Question 26.

Write the role of 'ori' and restriction site in the cloning vector PBR322.

[2 Marks]

Section D

Question 27.

(a) Why is "in vitro fertilization (IVF)" so named? State its importance.

(b) Distinguish between GIFT and ZIFT.

[3 Marks]

Question 28.

(i) Write the karyotype and the genetic disorder of an individual who has developed from a zygote formed from an 'XX' egg fertilised by a Y sperm.

(ii) Mention any two symptoms of this genetic disorder.

(iii) Write the possible reason that leads to the formation of this 'XX' egg

[3 Marks]

Question 29.

In case of any dispute, a very small sample of tissue or even a drop of blood can help us to determine the paternity of a child. Provide a scientific explanation to substantiate the statement.

[3 Marks]

Question 30.

(a) Explain the process by which amino acid gets attached to the tRNA molecule during translation process.

(b) How does the translation process get terminated ?

(c) Expand Where are they located ?

[3 Marks]

Question 31.

(a) Differentiate between humoral immune response and cell-mediated immune response.

(b) Draw a schematic diagram of an antibody molecule and label any four parts.

[3 Marks]

Question 32.

The picture given below shows :

(a) Roots of a typical control tobacco crop plant (infected).

(b) Transgenic tobacco plant showing healthy roots even after deliberate infection by nematode.

Explain how this transformation was achieved in the tobacco plant.

[3 Marks]

Question 33.

Given below is a pie chart representing global diversity of vertebrates.

(a) Redraw the pie chart identifying the groups and in their respective positions.

(b) Mention two examples of recently extinct animals.

[3 Marks]

Question 34.

Predation is referred to as a detrimental interaction. Explain any three positive roles, supported by an example each, that a predator plays in an ecosystem.

[3 Marks]

Section E

Question 35.

(i) Explain the process of double fertilization in an angiosperm starting from the germination of pollen grains on the stigma, mentioning the ploidy of the end products formed at the end. State the role of synergids during the course of the process.

(ii) Why does the development of endosperm precede that of the embryo ?

[5 Marks]

Question 36.

(i) Mention the site where fertilisation of the ovum occurs in a human female. Explain the process of fertilization and mention how polyspermy is prevented.

(ii) Name the embryonic stage that gets implanted in the uterus. Explain the process of implantation in a human female.

[5 Marks]

Question 37.

(i) Compare the pattern of inheritance of flower colour in garden pea plant (violet/white) with snapdragon plant (red/white) on the basis of the following :

(1) F1 phenotypic expression;

(2) expected phenotypic and genotypic expression of F2 generation;

(3) the conclusion you reached at the end of the comparison made.

(ii) List any two characteristics of pattern of inheritance of human blood group ABO.

[5 Marks]

Question 38.

(i) Draw a schematic, self-explanatory labelled diagram of lac operon in switched on condition .

(ii) Why is regulation of lac operon referred to as negative regulation ?

[5 Marks]

Question 39.

(i) Why should a cell be made competent to take up an alien DNA ? How can a bacterial cell be made competent using calcium ions ? Explain.

(ii) (1) State the importance of gel electrophoresis in biotechnology.

(2) Explain the principle on which this technique works.

(3) Mention why ethidium bromide is used in this technique.

[5 Marks]

Question 40.

Bt cotton , the genetically modified crop, has greatly helped the cotton farmers to increase their crop yield.

(i) How was Bt cotton plant made resistant to bollworm ? Explain.

(ii) Describe the mechanism that leads to the death of bollworms feeding on Bt cotton plants.

[5 Marks]