विद्या सर्वार्थ साधिका

ANANDALAYA

PERIODIC TEST-2

Class : XII

Subject: Biology (044) MM :70

Date : 27-09-2023 Time: 3hrs

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(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. 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 labelled diagrams should be drawn.

SECTION A

1. Choose the option that gives the correct number of pollen grains that will be formed after 325 microspore mother cells undergo microsporogenesis. (1)

   (C) 325 (B) 650 (C) 1300 (D) 975

2. Which among the following has many ovules in the ovary? (1)

   (A) Papaya (B) Water Melon (C) Orchid (D) All of these

3. The diagnostic test that confirms typhoid in humans is ___. (1)

   (A) Widal test (B) ELISA (C) MRI (D) Amniocentesis

4. Which one of these is a correct pair of pathogen and its vector? (1)

   (A) *Entamoeba* and *Aedes* (B) *Plasmodium* and *Anopheles*

   (C) *Salmonella* and *Aedes* (D) *Plasmodium* and *Culex*

5. Which one of the following is not a property of cancer cells? (1)

   (A) They proliferate in an uncontrolled manner

   (B) They show contact inhibition.

   (C) They compete with the normal cells for vital nutrients

   (D) They do not remain confined to the area of their origin.

6. The commonly used vector for human genome sequencing is___ . (1)

   (A) Retroviruses (B) T-DNA (C) BAC and YAC (D) Plasmid vector

7. Satellite DNA is important as it ____ .

   (A) codes for proteins needed for cell cycle

   (B) does not code for proteins and is the same in all members of a population

   (C) shows high degree of polymorphism which is heritable from parent to offspring

   (D) codes for enzymes needed for replication of DNA

8. Which of the following combinations in Griffith's experiments resulted in the death of the mice? (1)

   (A) Live R type cells + Heat-killed S type cells

   (B) Heat- killed R type cell+ live S type cells

   (C) Heat-killed R type cells +Heat killed S type cells

   (D) Heat-killed S strain

9. Suppose an mRNA molecule with repeating sequence of GU bases - GUGUGUGUGUGU codes for a tetra-peptide with alternating sequence of valine and cysteine, it proves that the codons for valine and cysteine are ___. (1)

(A) GUG and UGU (B) UGU and GUG
(C) GUU and UGG (D) UGG and GUU

10. Amino acid sequence in a polypeptide during protein synthesis (translation) is determined by the sequence of bases in _____. (1)

(A) ribosomal RNA (B) messenger RNA
(C) transfer RNA (D) soluble RNA

11. Eukaryotic genes are called "split genes" because they contain ___ . (1)

(A) exons and cistrons (B) introns and cistrons
(C) exons and introns (D) cistrons and mutons

12. The process of copying the genetic information from one strand of DNA to RNA, is called___ . (1)

(A) transcription (B) translation
(C) transformation (D) transduction

Questions 13 to 16 consists of two statements- Assertion (A) and Reason (R). Answer these questions selecting the appropriate option as 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 and R is false.
D. A is false but R is true.

13. Assertion: Mary Mallon continued to spread Typhoid for many years. (1)
Reason: *Salmonella typhi* generally enters the small intestine through contaminated food and water.

14. Assertion: The Covid-19 virus has a shorter life span and evolves into new strains at a faster speed. (1)
Reason: RNA being unstable mutates at a faster rate.

15. Assertion: Heterochromatin is transcriptionally inactive. (1)
Reason: Heterochromatin lacks genes.

16. Assertion: The diameter of the double stranded DNA is 2nm and it remains the same throughout its entire length. (1)
Reason: A purine of one strand always pairs with a pyrimidine of the complimentary strand.

SECTION B

17. When and where do chorionic villi appear in humans? State their functions. (2)

18. A cross was made between two plants of the genotypes AaBb and aabb. What would be the phenotypic ratio of the progeny? Mention the term used to denote this kind of cross. (2)

19. Removal of gonads cannot be considered as a contraceptive option. State the reason. (2)

20. It is said that apomixis is a method of asexual reproduction. Justify your answer. (2)

21. (a) Why is enzyme cellulase needed for isolating genetic material from plant cells and not from animal cells? (2)
(b) Write the names of the enzymes that are used for isolation of DNA from bacterial and fungal cells, respectively for recombinant DNA technology.

OR

(a) Why are cloning of vectors necessary in rDNA technology?
(b) Why is thermostable DNA polymerase needed in PCR?

SECTION- C

22. Prior to a sports event, blood samples of sports persons are collected for drug tests.
A. Why is there a need to conduct such tests?
B. Name any two drugs that the authorities test for.
C. Write the generic names of two plants from which these drugs are obtained.

23. a. EcoRI is used to cut a segment of foreign DNA and that of a vector DNA to form a recombinant DNA. Show this with the help of schematic diagram. (3)
b. EcoRI will recognise the set of palindromic nucleotide sequence of base pairs in both the DNA segments. Mark the site at which EcoRI will act and cut both the segments.
c. Show the sticky ends formed on both the segments which will join later to form a recombinant DNA.

24. How is insertional inactivation of an enzyme used as a selectable marker to differentiate recombinants from non-recombinants? (3)

25. Draw the diagram of human sperm. Label only those parts that assist the sperm to reach and gain entry onto the female gamete. Also write the functions of those parts. (3)

26. After implantation, maternal and foetal tissues make some associations. Identify the tissues involved and justify their functions.

27. A student of Evolutionary Biology, studies the following structures in her lab: (3)
(i) Tubers of Sweet potato and Potato. (ii) Flippers of Dolphin and Penguin.
What type of evolution could he conclude after the observation? What types of organs are they? Explain in detail.

28. The marriage between a normal couple resulted in a son who was haemophilic and a normal daughter. In course of time, when the daughter was married to a normal man, to their surprise the grandson was haemophilic. (3)
A. Represent these relationships in the form of pedigree chart. Give the genotype of the daughter and her husband.
B. Write the conclusion you draw from the inheritance pattern of this disease.

SECTION D

29. In a court of law, a woman with blood group 'AB' claims a child of blood group 'O' as hers, as her husband is of blood group 'O'. Another couple of blood groups 'A' and 'B' also claims the child as theirs. The judge took the help of geneticist and the child was handed over to the second couple, with blood groups 'A' and 'B'. Based on the above information answer the following questions.
a. Where are the sugar polymers that determine the ABO blood groups in human present? (1)
b. Name the blood group that has (i) two types of antigens and (ii) no antigens. (1)
c. Write the genotypes of the first couple and show the possible blood groups their progeny can have, using a Punnett square. (2)

OR

c. Write the genotypes of the second couple and show the possible genotypes and phenotypes of their children using a Punnett square.

30. The chromosome number is fixed for all organisms as per their species. A change in the chromosome number leads to abnormality. For example, normal human chromosome number is 46 in both male and female. The human male is heterogametic. They produce 2 types of gametes. An error that may occur during meiosis stage of cell cycle may lead to nondisjunction, leading to the production of abnormal gametes with altered chromosome number. On fertilization, such gametes develop into abnormal individuals. (4)

Based on the above information, answer the following questions.

(a) State what is aneuploidy.

(b) If during gametogenesis, the chromatids of sex chromosomes fail to segregate during meiosis, write only the different types of gametes with altered chromosome number that could possibly be produced.

(c) A normal human sperm (22+Y) fertilises an ovum with karyotype '22+XX'. Name the disorder the offspring thus produced would suffer from and write any two symptoms of the disorder.

OR

(c) Name the best known and most common autosomal aneuploid abnormality in human and write any two symptoms of it.

31. Describe the steps involved in the sequencing of genome of an organism. (5)

OR

Write all the salient features of human genome as revealed by the human genome project.

32. (a) What does a disturbance in Hardey - Weinberg equilibrium indicative of? (5)

(b) Write any four factors that affect the equilibrium.

(c) Explain how they affect the equilibrium?

OR

(a) How is 'Evolution by Natural selection' explained by using the example of melanised moth?

(b) What is meant by preadaptive mutation?

(c) Was any variant wiped out during natural selection? Explain.

33. (a) Why are thalassemia and haemophilia categorised as Mendelian disorders? (5)

(b) Write the symptoms of these diseases. Explain their patterns of inheritance in Human.

(c) Write the genotypes of the normal parents not suffering from haemophilia, producing a haemophilic son.

OR

(a) Explain the type of inheritance pattern found in human skin colour.

(b) Draw a graph depicting this inheritance pattern.

(c) How is this different from Pleiotropy?