



विद्या सर्वार्थ साधिका

ANANDALAYA
PERIODIC TEST - 2
Class : XII

Subject: Biology (044)

Date : 27-09-2024

MM : 70

Time: 3 Hrs

General Instructions:

1. There are 33 questions in all. All questions are compulsory.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E. All the sections are compulsory.
3. Section A consists of 12 MCQs and 4 Assertion and Reason questions of 1 mark each, Section B consists of 5 questions of 2 marks each, Section C consists of 7 questions of 3 marks each, Section D consists of 2 case study-based questions of 4 marks each and Section E consists of 3 long questions of 5 marks each.
4. There is no overall choice. However, an internal choice has been provided in Section B, C, D and E. You must attempt only one of the choices in such questions.
5. Draw neat diagrams wherever necessary.

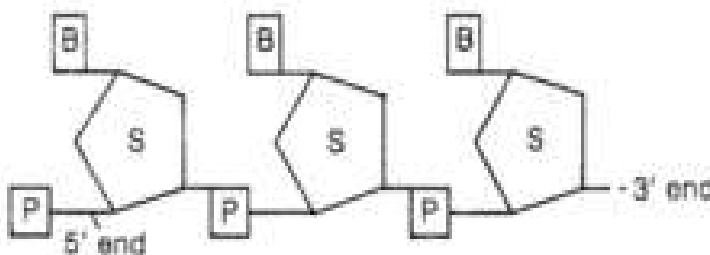
SECTION A

1. In a young anther, a group of compactly arranged homogenous cells were observed in the centre (1)
of each microsporangium. What is the name given to these cells?
(A) Tapetum (B) Sporogenous Tissue
(C) Endothecium (D) Epidermis

2. Select the incorrect match from the following : (1)

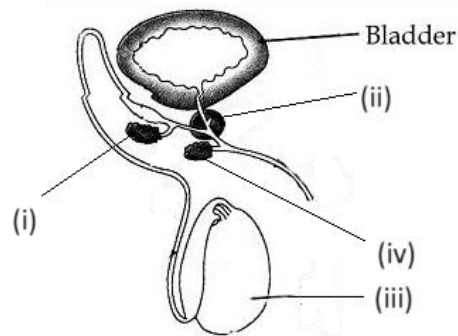
<i>Human Karyotype</i>		<i>Characters</i>
(A)	45 + XX	-- Broad palm with characteristic palm crease
(B)	44 + XXY	-- Overall feminine development
(C)	44 + XO	-- Sterile females as ovaries are rudimentary
(D)	44 + XY	-- Normal male

3. The type of bond between deoxyribose sugar and phosphate in a polynucleotide chain is: (1)



- (A) phosphodiester bond (B) glycosidic bond
(C) hydrogen bond (D) covalent bond
4. If the sequence of bases in the coding strand of DNA is ATTCGATG, then the sequence of (1)
bases in mRNA will be _____.
(A) ATTCGATG (B) AUUCGAUG (C) TAAGCTAC (D) UAAGCUAC

5. Identify the labelled parts that contribute to the formation of the semen. (1)



- (A) (i) and (ii) (B) (i), (ii) and (iv)
 (C) (i), (iii) and (iv) (D) (i) and (iv)
6. The process of spermatogenesis involves a series of steps that result in the formation of mature sperm. What cells are released after the completion of the multiplication stage? (1)
 (A) Spermatids (B) Primary Spermatocyte
 (C) Secondary Spermatocyte (D) Spermatogonia
7. Which of the following is not a pair of contrasting traits studied by Gregor Mendel? (1)
 (A) Green and yellow pods (B) Full and constricted pods
 (C) Axial and terminal flowers (D) Pink and white flowers
8. Which of the following is correct regarding HIV, Hepatitis B, Gonorrhoea and Trichomoniasis? (1)
 (A) Trichomoniasis is an STD whereas others are not.
 (B) Gonorrhoea is a viral disease whereas others are bacterial.
 (C) HIV is a pathogen whereas others are diseases.
 (D) Hepatitis B is eradicated whereas others are not.
9. The cross between white-eyed female *Drosophila* and a red-eyed male *Drosophila* would lead to the production of _____. (1)
 (A) red-eyed males and red-eyed females (B) white-eyed males and white-eyed females
 (C) red-eyed females and white-eyed males (D) white-eyed males and red-eyed females.
10. During evolution, the first cellular form of life appeared before how many million years? (1)
 (A) 2000 mya (B) 3000 mya (C) 4000 mya (D) 4500 mya
11. The bones of forelimbs of whales, bats and man are similar in structure, because _____. (1)
 (A) one organism has given rise to another (B) they share a common ancestor
 (C) they perform the same function (D) they have biochemical similarities
12. Which of the following sentences is true about the evolutionary process? (1)
 (A) There is no real progress in the idea of evolution
 (B) Humans are unique, a new type of organism
 (C) Progress is nature's religion
 (D) The evolution of life forms was rapid in the beginning ages

Question Nos. 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 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. (A): Coacervates are believed to be the precursors of life. (1)
(R): Coacervates were self-duplicating aggregates of proteins surrounded by lipid molecules.
14. (A): Family planning is an action plan to attain reproductive health among people. (1)
(R): Improved programmes covering reproduction-related areas were propagated by RCH to create awareness among people.
15. (A): Viruses having RNA genomes have shorter life spans and mutate faster. (1)
(R): RNA is unstable and thus mutates faster.
16. (A): Follicle stimulating hormone controls the maintenance and functions of male reproductive organs. (1)
(R): FSH directly acts on spermatogonia to stimulate sperm production.

SECTION B

17. Observe both the figures and mention the function of A in Fig-2 and B in Fig-1. (2)

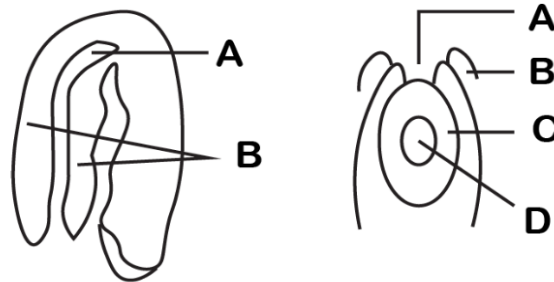


Fig-1

Fig-2

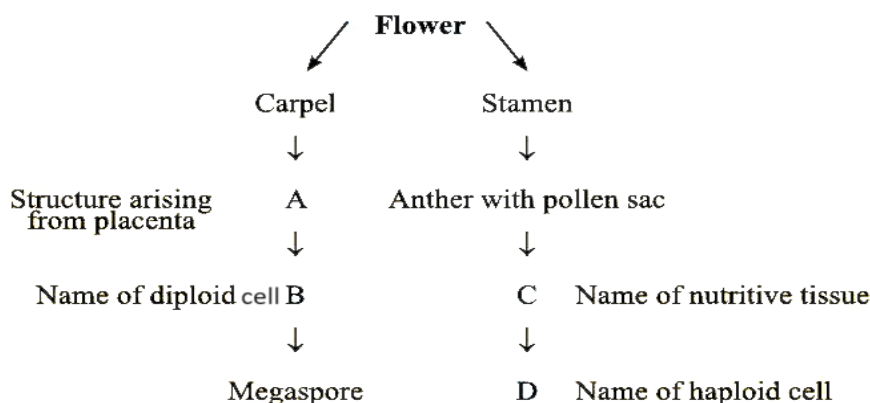
18. Even though each pollen grain has two male gametes. Why at least 10 pollen grains and not 5 pollen grains required to fertilise 10 ovules present in a particular carpel? (2)
19. Why are cleistogamous flowers invariably autogamous flowers? (2)
20. A tRNA is charged with the amino acid methionine. (2)
(i) Give the anti-codon of this tRNA.
(ii) Name the enzyme responsible for binding of amino acid to tRNA.
21. Lactational Amenorrhea is a method of contraception Justify. What is the maximum effectiveness of this method in terms of period/duration? (2)

OR

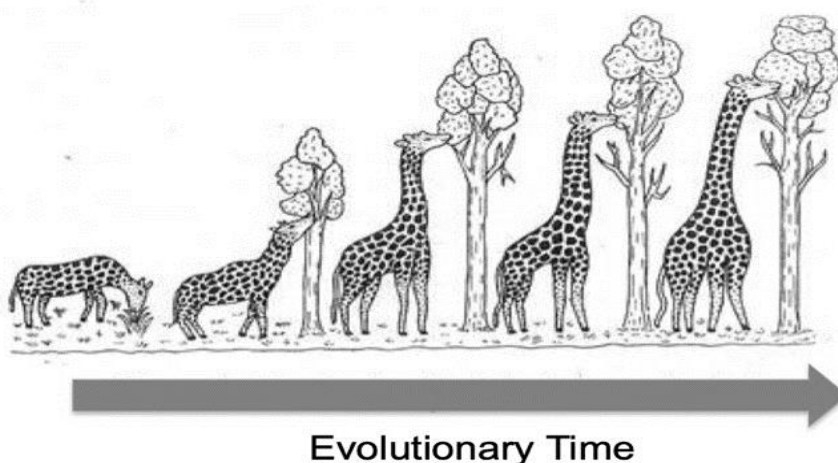
What are implants? How do they help in preventing fertilisation?

SECTION C

22. Given below is an incomplete flow chart showing formation of gamete in an angiosperm plant. Observe the flow chart carefully and fill in the blank A, B, C and D. Write the significance of B and D (3)



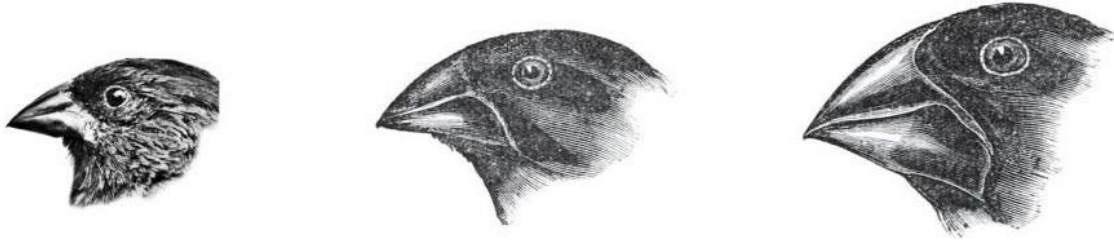
23. Write the scientific reason for the following: (3)
- Each and every coitus does not result in fertilisation and pregnancy.
 - Failure of testes to descend into scrotal sacs leads to sterility.
 - Menstruation does not occur during pregnancy upon fertilization due to high level of progesterone secreted by persisting corpus luteum and placenta.
24. Explain the role of Colostrum, Luteinising Hormone and Endometrium. (3)
25. Describe the experiment carried out by S.L. Miller. Name the scientists whose hypothesis prompted him to carry out this experiment. (3)
26. In a family, the father, the daughter and the son are colour blind, whereas the mother has normal vision. Do you think the son and the daughter have inherited the disease from their father ? Work out a cross to justify your answer. (3)
27. (a) Observe the picture given below. Name the naturalist and the theory postulated based on this example. (3)



- (b) Explain the theory in support of the evolution of the modern-day Giraffe.

28. (i) Write your observation on the variations seen in Darwin's finches.

(3)



(ii) How did Darwin explain the existence of different varieties of finches on the Galapagos islands?

OR

(a) Identify the examples of homologous and analogous structures from the following:

- (i) Vertebrate hearts
- (ii) Thorns in Bougainvillea and tendrils of Cucurbita
- (iii) Food storage organs in sweet potato and potato

(b) State the significance of homologous organs in evolution.

SECTION D

Question No. 29 and 30 are case based questions. Each question has 3 sub-questions with internal choice in one sub-question.

29. According to Hardy-Weinberg principle, the allele frequencies in a population are stable and remain constant through generations. When the frequency differs from the expected values, the difference indicates the extent (direction) of evolutionary change. Disturbance in the genetic equilibrium or Hardy-Weinberg equilibrium in a population can be interpreted as resulting in evolution.

(a) Write the algebraic equation representing Hardy-Weinberg equilibrium. (1)

(b) List any two factors that affect the genetic equilibrium. (1)

(c) In a population, 360 out of 1000 individuals have a genotype of AA while 480 have Aa genotype. The rest 160 belong to aa. Calculate the frequency of allele A in this population. (2)

OR

(c) Consider a population of sheep to be in Hardy-Weinberg equilibrium. The allele for black wool(w) has an allele frequency of 0.81 while the allele for white wool(W) has an allele frequency of 0.19. What is the percentage of heterozygous individuals in the sheep population? (2)

30. The process of translation requires transfer of genetic information from a polymer of nucleotides to synthesise a polymer of amino acids. The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or mRNA is called genetic code. George Gamow suggested that to code for all the 20 amino acids, code should be made up of three nucleotides.

(a) Define the term codon. (1)

(b) Write any two of the nonsense codons. (1)

(c) What are the codons for the amino acids phenylalanine, and leucine? (2)

OR

(c) Write any two salient features of genetic code. (2)

SECTION E

31. (a) (i) Explain the development of male gametophyte in an angiosperm. (5)
(ii) Draw a labelled diagram of a three-celled male gametophyte.

OR

- (b) (i) Draw a diagrammatic sectional view of ovary of human female and label the following :
(A) Blood vessels (B) Primary follicle (C) Tertiary follicle (D) Ovum
(ii) At which stage of life are primary follicles formed in a human female ?
(iii) Explain the events (both hormonal and structural) that occur at the time of ovulation till the onset of the next menstrual cycle.
32. (a) A true-breeding homozygous pea plant with green pods and axial flowers as dominant characters, is crossed with recessive homozygous pea plant having yellow pods and terminal flowers. (5)
(i) Work out the cross up to F_2 generation giving the phenotypic ratios of F_1 and F_2 generations respectively.
(ii) State the Mendelian principle which can be derived from such a cross and not from monohybrid cross.

OR

- (b) A snapdragon plant homozygous for red flowers when crossed with a white flowered plant of the same species produced pink flowers in F_1 generation.
(i) What is this phenotypic expression called?
(ii) Work out the cross to show the F_2 generation when F_1 was self-pollinated. Give the phenotypic and genotypic ratios of F_2 generation.
(iii) How do you compare the F_2 phenotypic and genotypic ratios with those of Mendelian monohybrid F_2 ratios.
33. (a) Matthew Meselson and Franklin Stahl performed experiment in 1958 to prove that DNA replicates semi-conservatively. Which organism was used first for the experimental proof? Explain the experiment that proved semiconservative replication of DNA. (5)

OR

- (b) (i) What is operon concept?
(ii) Schematically represent the gene expression of transcription unit.
(ii) Regulation of lac operon by repressor is referred to as negative regulation.