

Sample Question Paper-4

BIOLOGY (044)

Class- XII, Session: 2022-23

SOLVED

Time Allowed : 3 hours

Maximum Marks : 70

General Instructions :

- All questions are compulsory.
- The question paper has five sections and 33 questions. All questions are compulsory.
- 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.
- 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.
- Wherever necessary, neat and properly labelled diagrams should be drawn.

Section - A

- From among the sets of terms given below, identify those that are associated with the gynoecium.
(A) Stigma, ovule, embryo sac, placenta. (B) Thalamus, pistil, style, ovule.
(C) Ovule, ovary, embryo sac, tapetum. (D) Ovule, stamen, ovary, embryo sac. [1]
- Match the following and choose the correct options. [1]

	Column I		Column II
a.	Trophoblast	i.	Embedding of blastocyst in the endometrium
b.	Cleavage	ii.	Group of cells that would differentiate as embryo
c.	Inner cell mass	iii.	Outer layer of blastocyst attached to the endometrium
d.	Implantation	iv.	Mitotic division of zygote

Options :

- a-ii, b-i, c-iii, d-iv (B) a-iii, b-iv, c-ii, d-i
 - a-iii, b-i, c-ii, d-iv (D) a-ii, b-iv, c-iii, d-i [1]
- DNA is a polymer of nucleotides which are linked to each other by 3'-5' phosphodiester bond. To prevent polymerisation of nucleotides, which of the following modifications would you choose?
(A) Replace purine with pyrimidines.
(B) Remove/replace 3'-OH group in deoxyribose.
(C) Remove/replace 2'-OH group with some other group in deoxyribose.
(D) Both (B) and (C) [1]
 - With regard to mature mRNA in eukaryotes:
(A) exons and introns do not appear in the mature RNA.
(B) exons appear, but introns do not appear in the mature RNA.
(C) introns appear but exons do not appear in the mature RNA.
(D) both exons and introns appear in the mature RNA. [1]
 - When an apparently healthy person is diagnosed as unhealthy by a psychiatrist, the reason could be that :
(A) the patient was not efficient at his work.
(B) the patient was not economically prosperous.
(C) the patient shows behavioural and social maladjustment.
(D) he does not take interest in sports. [1]
 - Transplantation of tissues/organs to save certain patients often fails due to rejection of such tissues/organs by the patient. Which type of immune response is responsible for such rejections?
(A) Auto-immune response (B) Humoral immune response
(C) Physiological immune response (D) Cell-mediated immune response [1]

7. Tobacco consumption is known to stimulate secretion of adrenaline and nor-adrenaline. The component causing this could be:
 (A) nicotine. (B) tannic acid.
 (C) curamin. (D) catechin. [1]
8. Which of the following has popularised the PCR (Polymerase Chain Reaction) ?
 (A) Easy availability of DNA template (B) Availability of synthetic primers
 (C) Availability of cheap deoxyribonucleotides (D) Availability of thermostable DNA polymerase. [1]
9. If a population of 50 *Paramecium* present in a pool increases to 150 after an hour, what would be the growth rate of population?
 (A) 50 per hour (B) 200 per hour
 (C) 5 per hour (D) 100 per hour [1]
10. Ecological niche is
 (A) the surface area of the ocean.
 (B) an ecologically adapted zone.
 (C) the physical position and functional role of a species within the community.
 (D) formed of all plants and animals living at the bottom of a lake. [1]
11. Match the animals given in column A with their location in column B.

	Column A (Animals)		Column B (Location)
a.	Dodo	(i)	Africa
b.	Quagga	(ii)	Russia
c.	<i>Thylacine</i>	(iii)	Mauritius
d.	Stellar's sea cow	(iv)	Australia

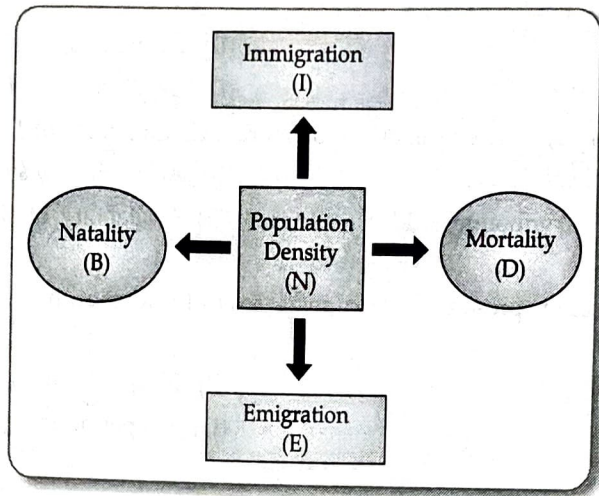
Choose the correct match from the following :

- (A) a – (i), b – (iii), c – (ii), d – (iv) (B) a – (iv), b – (iii), c – (i), d – (ii)
 (C) a – (iii), b – (i), c – (ii), d – (iv) (D) a – (iii), b – (i), c – (iv), d – (ii) [1]
12. Which of the following is a partial root parasite?
 (A) Sandal wood (B) *Mistletoe*
 (C) *Orobanche* (D) *Ganoderma* [1]

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

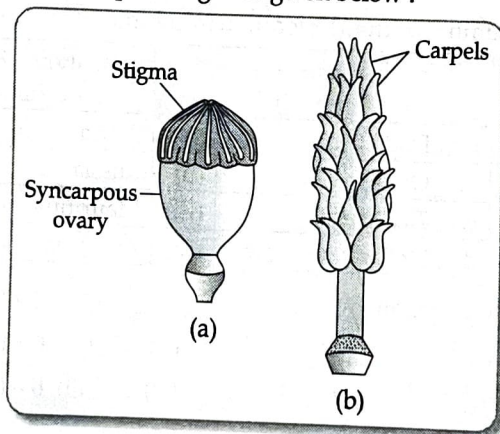
- (A) Both (A) and (R) are true (R) is the correct explanation of (A).
 (B) Both (A) and (R) are true but (R) is not the correct explanation of (A).
 (C) (A) is true but (R) is false.
 (D) (A) is false but (R) is true.

13. Assertion (A): Flowers are site of sexual reproduction.
 Reason (R): Different type of embryological process occur inside the flower. [1]
14. Assertion (A): Haemophilia is an autosomal disorder.
 Reason (R): A haemophilic father can never pass the gene for haemophilia to his son. [1]
15. Assertion (A): The enzyme involved in the continuous replication of DNA strand is DNA polymerase.
 Reason (R): The polarity of the template strand is 3'→5'. [1]
16. Given below is the image showing flow of population density, observe the image and answer the following question.
 Assertion (A): Natality contributes to the increase in population density.
 Reason (R): Natality refers to the number of births during a given period in the population which is added to the initial density. [1] [A1]

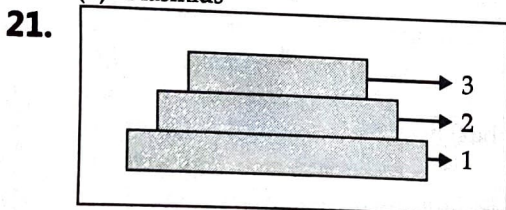


Section – B

17. Identify the type of carpel with the help of diagrams given below :



18. Explain co-dominance with the help of one example.
19. On a visit to a Hill station, one of your friend, suddenly became unwell and felt uneasy. [2]
 (a) List two symptoms you would look for, to term it to be due to allergy. [2]
 (b) Explain the response of the body to an allergen.
 (c) Name two drugs that can be recommended for immediate relief.
20. Explain the roles of the following with the help of an example each in recombinant DNA technology. [2]
 (a) Restriction enzymes
 (b) Plasmids



- (a) Label the three tiers 1, 2, 3 given in the above age pyramid.
 (b) What type of population growth is represented by the above age pyramid?

OR

What will happen to an ecosystem if:

- (a) All producers are removed;
 (b) All organisms of herbivore level are eliminated; and
 (c) All top carnivore population is removed

[2]

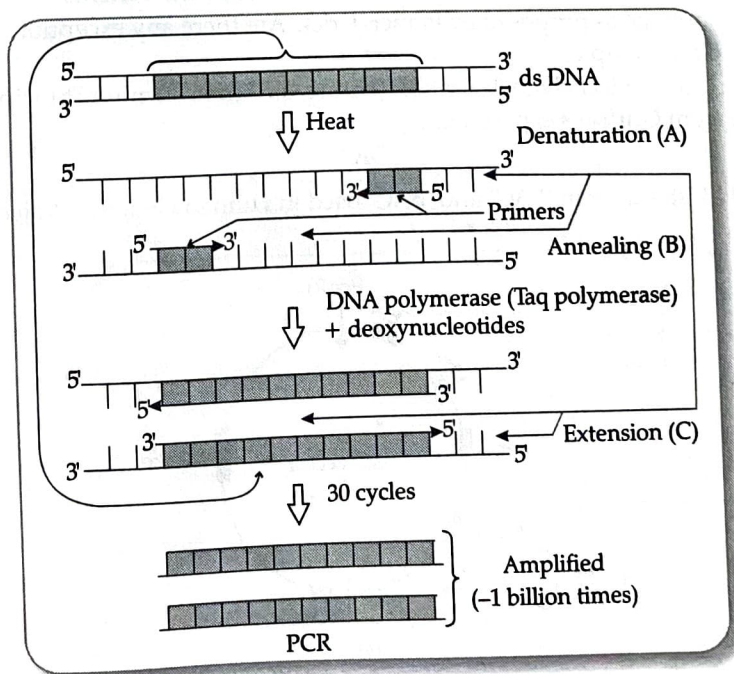
[2]

Section - C

22. Read the following statement and answer the questions that follow:
"A guava fruit has 200 viable seeds."
- What are viable seeds?
 - Write the total number of:
 - Pollen grains
 - Gametes in producing 200 viable guava seeds.
 - Prepare a flow chart to depict the post-pollination events leading to viable-seed production in a flowering plant. [3]
23. (a) Geitonogamy and xenogamy, both require pollinating agents, yet they are very different from each other. Explain how. [3]
- (b) Describe the characteristics of flowers that are pollinated by wind. [3]
24. (a) How does a test cross help to determine the genotype of an individual? [3]
- (b) What is the cross between the progeny of F_1 and the homozygous recessive parent called? How is it useful? [3]
- (c) A person has to perform crosses for the purpose of studying inheritance of a few traits / characters. What should be the criteria for selecting the organisms? [3]
25. Give an example for :
- An endothermic animal
 - An ectothermic animal
 - An organism of benthic zone [3]
26. Differentiate between active immunity and passive immunity. [3]

OR

- What are interferons? How do interferons check infection of new cells? [3]
 - Why is mother's milk considered the most appropriate food for a new born infant? [3]
27. (a) Identify and explain steps 'A', 'B' and 'C' in the PCR diagram given below. [3]



- (b) While doing a PCR, 'denaturation' step is missed. What will be its effect on the process? [3]
28. (a) "In a food-chain, a trophic level represents a functional level, not a species." Explain. [3]
- (b) Organisms at a higher trophic level have less energy available. Comment. [3]

Section – D

Q. no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. Read the following passage and answer the questions given below:

Sutton, who was American, studied chromosomes and meiosis in grasshoppers. Boveri, who was German, studied the same things in sea urchins. In 1902 and 1903, Sutton and Boveri published independent papers proposing the Chromosomal Theory of Inheritance. They state that genes are found at specific locations on chromosomes and the behaviour of chromosomes during meiosis can explain Mendel's law of inheritance. T.H. Morgan, worked with tiny fruit flies, *Drosophila melanogaster* and provided the first strong confirmation of the chromosomal theory. He concluded that the eye color gene must be located on the X-chromosome. [4]

- (a) How do hereditary traits and chromosome behaviour pass from one generation to the next?
- (b) Is it true with respect to chromosomal theory of inheritance that both chromosomes as well as genes segregate at the time of gamete formation such that complete pair is transmitted to a gamete?
- (c) What does the Chromosomal theory of inheritance explains?

OR

How chromosomal theory of inheritance is different from Mendel's theory?

30. Read the following passage and answer the questions given below:

AIDS is considered as a 'syndrome' rather as a disease. It is so because AIDS causing virus (HIV) enters the body of a healthy person generally through sexual organs or through blood transfusion. It damages body's Immune system and therefore, body no longer is able to fight off minor infections. Thus, there are no specific disease symptoms for AIDS and the patient develops complex diseases and symptoms. [4]

- (a) What are the common symptoms of AIDS?
- (b) Mention two diseases that spread through sexual contact.
- (c) Name any three preventive measures of AIDS disease.

OR

How AIDS can be diagnosed?

Section – E

31. What is polyembryony and how can it be commercially exploited? [5]

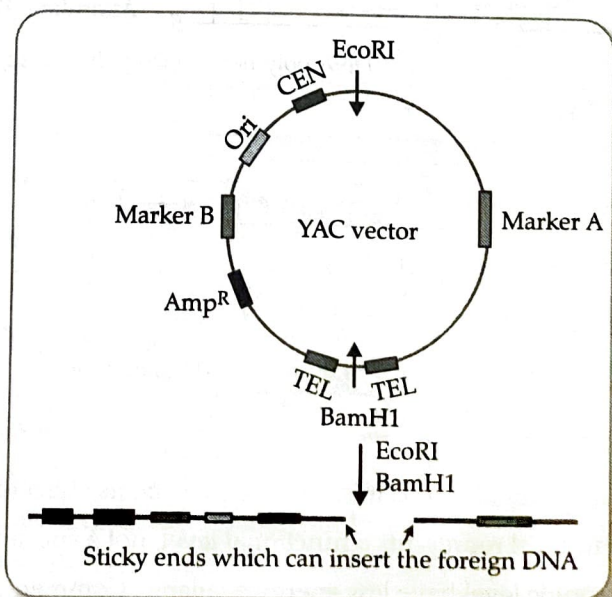
OR

Are parthenocarpy and apomixis different phenomena? Discuss their benefits. [5]

- 32.** (a) State the 'Central dogma' as proposed by Francis Crick. Are there any exceptions to it? Support your answer with a reason and an example. [5]
- (b) Explain how the biochemical characterisation (nature) of "Transforming Principle" was determined, which was not defined from Griffith's experiments. [5]

OR

- (a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (hGP). Mention their role in the project.



(b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during hGP.

(c) Expand 'SNPs' identified by scientists in hGP.

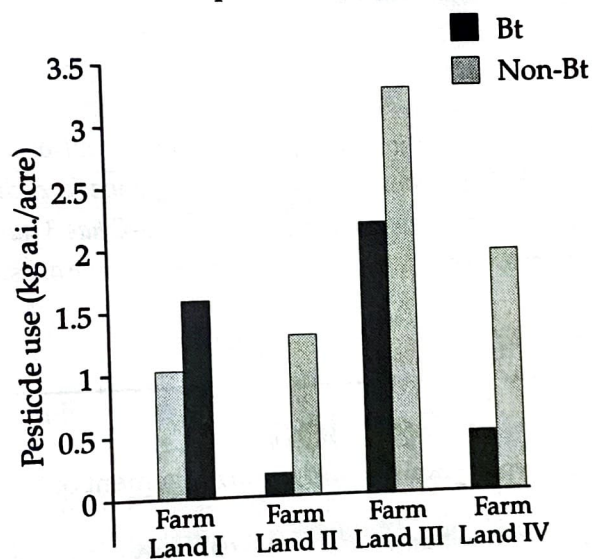
[5]

33. Besides better aeration and mixing properties, what other advantages do stirred tank bioreactors have over shake flasks?

[5]

OR

GM crops especially Bt crops are known to have higher resistance to pest attacks. To substantiate this, an experimental study was conducted in 4 different farmlands growing Bt and non Bt-Cotton crops. The farm lands had the same dimensions, fertility and were under similar climatic conditions. The histogram below shows the usage of pesticides on Bt crops and non-Bt crops in these farm lands.



- (a) Which of the above 4 farm lands has successfully applied the concepts of Biotechnology to show better management practices and use of agrochemicals? If you had to cultivate, which crop would you prefer (Bt or Non- Bt) and why?
- (b) Cotton Bollworms were introduced in another experimental study on the above farm lands wherein no pesticide was used. Explain what effect would a Bt and Non Bt crop have on the pest.

[5]

