Sample Paper 1

Biology (044)

Class XII Session 2023-24

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. 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.
4. 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.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

1. If most individuals in a population are young, why is the population likely to grow rapidly in the future?

(a) Many individuals will begin to reproduce soon
(b) Death rates will be low
(c) Immigration and emigration can be ignored
(d) All of these

2. Primary endosperm nucleus (PEN) is formed by the fusion of

(a) 2 polar nuclei + 1 synergid cell nucleus
(b) 1 polar nucleus + 1 antipodal cell nucleus + 1 synergid cell nucleus
(c) 2 polar nuclei + 1 male gamete nucleus
(d) 2 antipodal cell nuclei + 1 male gamete nucleus.

3. Which enzyme helps in removing oil stains from clothes?

(a) Streptokinase
(b) Trypsin
(c) Lipase
(d) Amylase

4. Which of the following is a cause of transmission of HIV?

(a) Multiple sexual partners
(b) Transfusion of contaminated blood
(c) Sharing infected needles
(d) All of these

5. Hardy-Weinberg equilibrium is known to be essentially affected by factors like, gene flow, genetic drift, mutation, genetic recombination and

(a) evolution
(b) limiting factors
(c) saltation
(d) natural selection

6. Plasmid used to construct the first recombinant DNA was isolated from which bacterium species?

(a) Escherichia coli
(b) Salmonella typhimurium
(c) Agrobacterium tumefaciens
(d) Thermus aquaticus

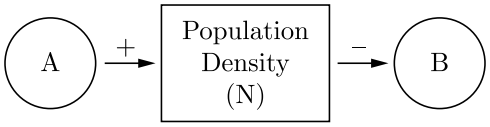
7. Microbes are used in
I. primary treatment of sewage
II. secondary treatment of sewage
III. anaerobic sludge digesters
IV. production of biogas.
Choose the correct option.

(a) I, II and III
(b) I, III and IV
(c) II, III and IV
(d) I, II, III and IV

8. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?

(a) 20%
(b) 40%
(c) 30%
(d) 60%

9. The density of a population in a given habitat during a given period, fluctuates due to changes in certain basic processes. On this basis, fill up boxes A and B in the given flow chart with correct option.



(a) A-Natality, B-Mortality
(b) A-Immigration, B-Emigration
(c) A-Natality, B-Immigration
(d) Both (a) and (b)

10. The given Punnett's square represents the pattern of inheritance in a dihybrid cross where yellow (Y) and round (R) seed condition is dominant over white (y) and wrinkled (r) seed condition.

	YR	Yr	yR	yr
YR	F	J	N	R
Yr	G	K	O	S
yR	H	L	P	T
yr	I	M	Q	U

A plant of type 'H' will produce seeds with the genotype identical to seeds produced by the plants of

(a) type M
(b) type J
(c) type P
(d) type N

11. Match column I with column II and select the correct option from the given codes.

	Column I		**Column II**
A.	Recombinant DNA technology	(i)	Chilled ethanol
B.	Precipitation of DNA	(ii)	DNA staining
C.	PCR	(iii)	Gene amplification
D.	Ethidium bromide	(iv)	Genetic engineering

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

12. The given table shows differences between spermatogenesis and spermiogenesis. Select the incorrect option.

	Spermatogenesis	**Spermiogenesis**
(a)	Process of formation of spermatozoa.	Process of differentiation of spermatozoon from a spermatid.
(b)	It changes a haploid structure into another haploid structure.	It involves conversion of a diploid structure into haploid structure.
(c)	Growth and divisions occur.	Divisions and growth are absent.
(d)	A spermatogonium forms four spermatozoa.	A spermatid forms a single spermatozoon.

13. **Assertion :** Elimination of a competitively inferior species in a closely related or otherwise similar group is known as competitive exclusion principle.
Reason : If two species compete for the same resource, they could avoid competition by choosing different times for feeding or different foraging patterns.

(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.

14. **Assertion :** Mouse is the most preferred mammal for studies on gene transfers.
Reason : Mouse possesses features like short oestrous cycle and gestation period, relatively short generation time, production of several offspring per pregnancy, etc.

(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.

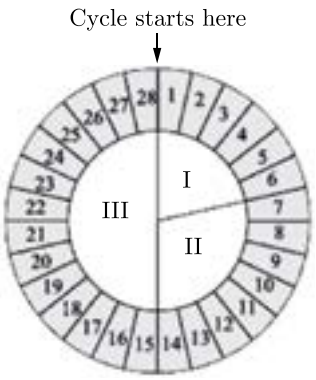
15. Given below is the diagram of a normal 28 day menstrual cycle in a human female. It depicts phase I, II and III. Study this diagram and comment upon the appropriateness of the Assertion and the Reason. **Assertion :** The hormone secreted in large amounts in phase III is also responsible for maintaining pregnancy in human females.
Reason : Corpus luteum secretes progesterone in phase I however it degenerates completely in phase III.

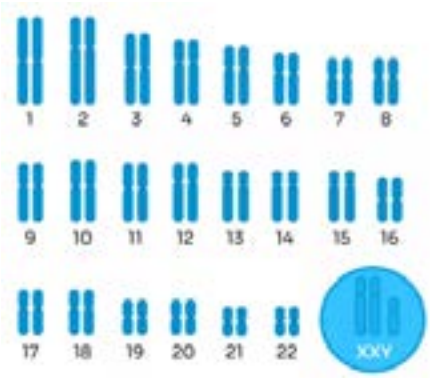
(a) Both A and R are true and R is the correct explanation of A.

(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.





16. **Assertion :** Emigration is outward movement of some individuals from local population.
Reason : Emigration is caused by occurrence of deficiencies and calamities.

(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.

SECTION - B

17. Write the role of on and 'restriction' site in a cloning vector pBR322.

18. (a) It is generally observed that the children who had suffered from chicken-pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.

(b) What are interferons? Mention their role.

19. Study the given diagram.

A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.

(a) Identify A, B and its parts C and D.

(b) State the fate of C and D in the course of embryonic development in humans.

20. Draw a pyramid of numbers considering a big banyan tree supporting a population of insects, small birds and their predators.

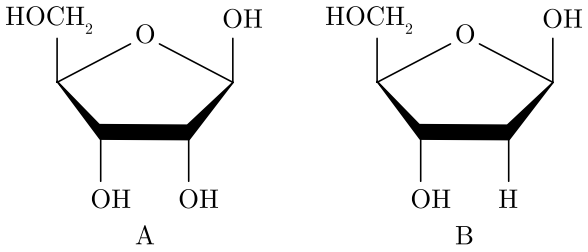
OR

Name the type of food chains responsible for the flow of larger fraction of energy in an aquatic and a terrestial ecosystem respectively. Mention one difference between the two food chains.

21. Two children one with blood group 'AB' and other with blood group '0' are born to parents where the father has blood group W and the mother has blood group 'B'. Work out a cross to show how is it possible?

SECTION - C

22. Carefully examine structures A and B of pentose sugar given below. Which one of the two is more reactive? Give reasons.



23. Explain the role of pituitary and ovarian hormones in the menstrual cycle of human females.

24. Differentiate between autogamy, geitonogamy and xenogamy.

25. Convergent evolution and divergent evolution are the two concepts explaining organic evolution. Explain each one with the help of an example.

26. (i) Name the plant source of the drug commonly called 'smack. How does it affect the body of the abuser?
(ii) What is humoral immunity?

OR

(i) What is colostrum? Why are breast-fed babies likely to be healthy?
(ii) Malaria, typhoid, pneumonia and amoebiasis are some of the human infectious diseases. Which one of these are transmitted through mechanical carriers?

27. (a) Write the palindromic nucleotide for the following DNA segment : 5′-GAATTC-3′

(b) Name the restriction endonuclease that recognises this sequence.

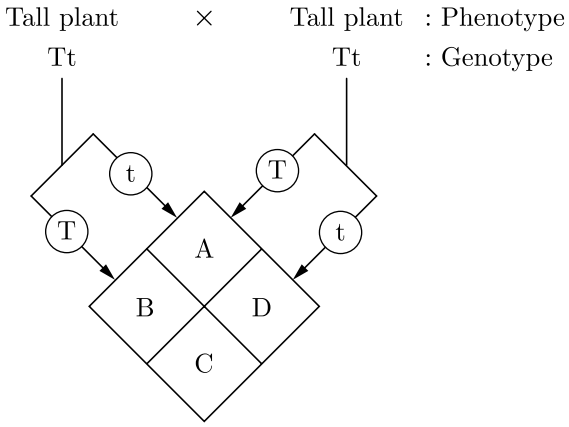
(c) How are 'sticky-ends' produced? Mention their role.

28. A particular species of wild cat is endangered. In order to save them from extinction, which is a desirable in situ or ex situ? Justify your answer and explain the difference between the two approaches.

SECTION - D

DIRECTION : Question No. 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. Look at the diagram and answer the following questions.



(a) Write the genotypes of A, B, C, D.

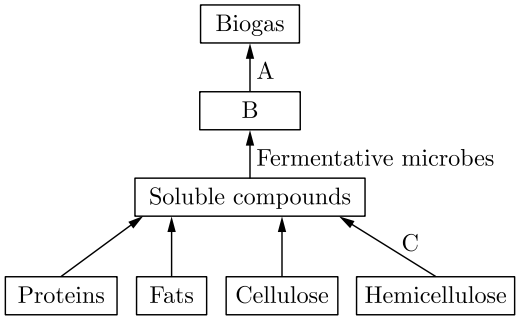
(b) Write the phenotypes of A, B, C, D.

(c) Write phenotypic and genotypic ratio of progeny.

OR

(c) Write the conclusions Mendel arrived at on dominance of traits on the basis of monohybrid crosses that he carried out in pea plants.

30. Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the flow chart for biogas production given below and answer the following questions.



(a) Mention the major component of biogas.

(b) Identify 'B' in the flow chart?

(c) What does A depicts in the given flow chart?

OR

(c) What are advantages of biogas?

SECTION - E

31. (a) Describe the events of oogenesis with the help of schematic representation.

(b) Write two differences between oogenesis and spermatogenesis.

OR

(a) When a seed of an orange is squeezed, many embryos, instead of one are observed. Explain how it is possible.

(b) Are these embryos genetically similar or different? Comment.

32. (a) Describe the process of synthesis of fully functional *m*RNA in a eukaryotic cell.

(b) How is the process of *m*RNA synthesis different from that in prokaryotes?

OR

(a) The given flow chart highlighting the steps in DNA fingerprinting technique. Identify a, b, c, d, e and 1

Isolation of DNA from blood cells
↓
Cutting of DNA by 'a'
↓
Separation of DNA framents by electrophoresis using 'b'
↓
Transfer (blotting) of fragments to 'c' gel
↓
DNA splits into single strand
↓
Introduction of lanelled 'd' probe
↓
'e' of single strands with 'd'
↓
Detection of hybridised DNA fragments by 'f'

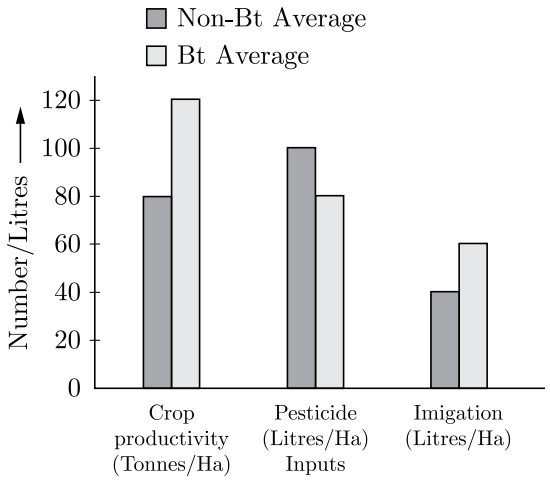
(b) List any two applications of DNA fingerprinting technique.

33. (a) Explain how to find whether an *E. coli* bacterium has transformed or not when a recombinant DNA bearing ampicillin resistant gene is transferred into it.

(b) What does the ampicillin resistant gene act as in the above case?

OR

There are two different farm lands, one where Bt-cotton crop was cultivated and the other where non Bt-cotton crop (indigenous) was cultivated. Farmers responsible for this experimental cultivation were free to use the farming practices of their choice. During the cultivation period, the data was collected with respect to the amount of pesticide used, water required for irrigation and at harvesting time, the crop productivity. Based on the data collected, a bar graph was plotted which is shown below.



Answer the following questions:

(i) Write your interpretation, with reason, on the basis of the three parameters plotted in the graph.

(ii) Which one of the crops would you like to cultivate in your farm and why?

(iii) Which one out of these two crops would a farmer from West Bengal like to cultivate and why?

□□□□□□□

Sample Paper 2

Biology (044)

Class XII Session 2023-24

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
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SECTION - A

1. The structure in chromatin seen as 'beads-on string' when viewed under electron microscope are called

(a) nucleotides (b) nucleosides

(c) histone octamer (d) nucleosomes

2. For which of the following cases, population density can be easily determined by not utilising biological-entities directly?

(a) Fish density (b) Density of bacteria in bacterial culture

(c) Siberian cranes at Bharatpur wetlands (d) Tiger census

3. Identify the palindromic sequence in the following.

(a) $\frac{\text{GAATTC}}{\text{CTTUUG}}$ (b) $\frac{\text{GGATCC}}{\text{CCTAGG}}$

(c) $\frac{\text{CCTGG}}{\text{GGACC}}$ (d) $\frac{\text{CGATA}}{\text{GCTAA}}$

4. Identify the incorrect pair from the following with respect to angiosperms.

(a) Primary endosperm nucleus-3n (b) Antipodals-2n

(c) Cells of nucellus of ovule-2n (d) Vegetative cell of male gametophyte-n

5. Biochemical oxygen demand (BOD) in a river water

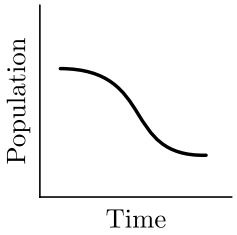
(a) has no relationship with concentration of oxygen in the water

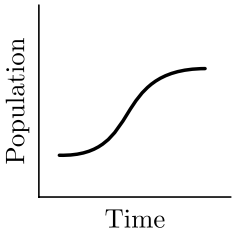
(b) gives a measure of Salmonella in the water

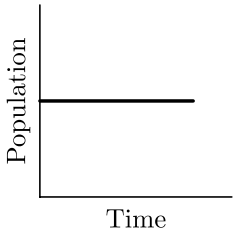
(c) increases when sewage added to river water

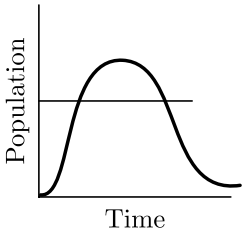
(d) remains unchanged when algal bloom occurs

6. In a given population of 2000 individuals, 80 births and 125 deaths were reported over a given period of time. Which of the following graphs will correspond to it?

(a) 

(b) 

(c) 

(d) 

7. A plant native to South America, which produces cocaine is

(a) Erythroxylum coca (b) Atropa belladonna

(c) Datura stramonium (d) Papaver somniferum

8. Match column I with column II.

	Column I		**Column II**
A.	Fimbriae	(i)	Oviduct
B.	Fallopian tube	(ii)	Capture ova released into coelom
C.	Infundibulum	(iii)	Site of fertilization
D.	Ampulla	(iv)	Part of oviduct closer to ovary

(a) A-(iv), B-(i), C-(ii), D-(iii) (b) A-(ii), B-(i), C-(iv), D-(iii)

(c) A-(i), B-(ii), C-(iii), D-(iv) (d) A-(i), B-(iii), C-(iv), D-(ii)

9. Replacement of the lighter-coloured variety of peppered moth (Biston betularia) to its darker variety (Biston carbonaria) in England is the example of

(a) natural selection (b) regeneration

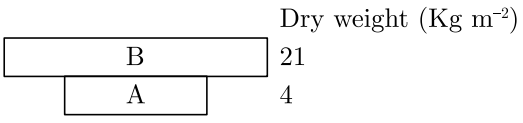
(c) genetic isolation (d) temporal isolation

10. The inoculum is added to the fresh milk in order to convert milk into curd, the term 'inoculum' here refers to

(a) a starter rich in vitamin B_{12} (b) a starter rich in proteins

(c) a starter containing millions of LAB (d) an aerobic digester

11. Given figure represents a pyramid of biomass in an aquatic ecosystem.



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Identify A and B and select the correct answer.
(i) A is the crop which supports and B is the crop which is supported.
(ii) A is the crop which is supported and B is the crop which supports.
(iii) A is phytoplanktons and B is zooplanktons.
(iv) A is zooplanktons and B is phytoplanktons.

(a) (i) and (iv) (b) (ii) and (iii)
(c) (i) and (iii) (d) (ii) and (iv)

12. During insertional inactivation, the presence of a chromogenic substrate gives blue coloured colonies if the plasmid in the bacteria does not have an insert. The blue colour is produced by the enzyme

(a) α-glucosidase (b) restriction endonuclease
(c) β-galactosidase (d) Taq polymerase

13. **Assertion :** The plant biomass which serves as the food of herbivores and decomposers is said to result from the net primary productivity.
Reason : Gross primary productivity is the rate of total production of organic material (biomass) during photosynthesis.

(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.

14. **Assertion :** In a monohybrid cross, F_1 generations indicate dominant characters.
Reason : Dominance occurs only in heterozygous state.

(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.

15. **Assertion :** Many endemic species are seen to flourish in sacred forests.
Reason : Sacred forests are undisturbed forest patches and biodiversity rich areas.

(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.

16. **Assertion :** The primary productivity of different ecosystems can be easily compared.
Reason : The magnitude of primary productivity depends on the photosynthetic capacity of producers and the prevailing environmental conditions.

(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.

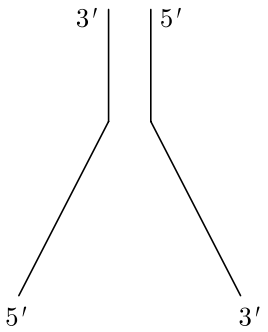
Continue on next page.....

SECTION - B

17. What could be the possible treatments for a patient exhibiting ADA deficiency?

18. Where is sporopollenin present in plants? State its significance with reference to its chemical nature.

19. Refer to the given below figure.

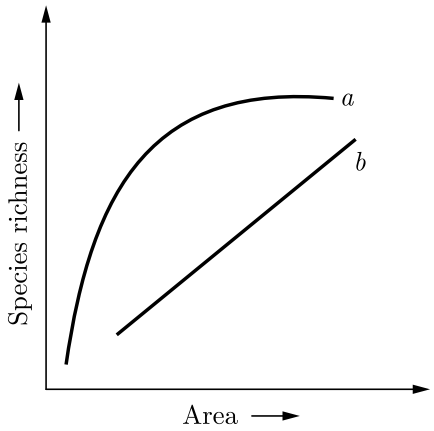


(a) Redraw the structure as a replicating fork and label the parts.

(b) Write the source of energy for this replication.

20. Name the genus of baculovirus that acts as a biological control agent in spite of being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job.

21.



The above graph show species-area relationship. Write the equation of the curve 'a' and explain it.

OR

How does over-exploitation of beneficial species affect biodiversity? Explain with the help of one example.

SECTION - C

22. Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain.

23. A cross was carried out between two pea plants showing the contrasting traits of height of the plants. The result of the cross showed 50% parental characters.

(a) Work out the cross with the help of a Punnett square.

(b) Name the type of the cross carried out.

24. Prior to a sports event, blood and urine samples of sports persons are collected for drug tests.

(a) Why is there a need to conduct such tests?

(b) Name the drugs the authorities usually look for.

(c) Write the generic names of two plants from which these drugs are obtained.

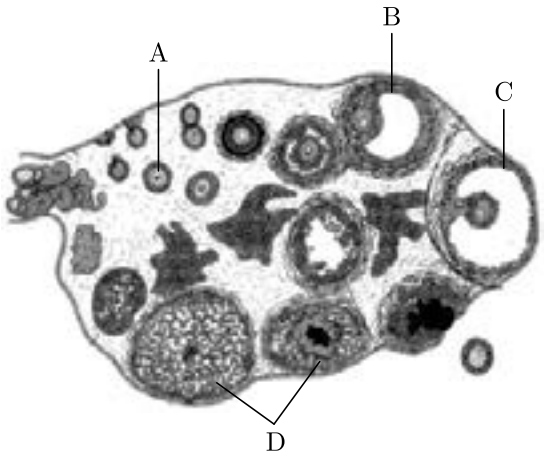
25. Why is predation required in a community of different organisms?

OR

(a) Explain "birth rate" in a population by taking a suitable example.

(b) Write the other two characterstics which only a population shows but an individual cannot.

26. Study the transverse section of human ovary given below and answer the questions that follow.



(a) Name the hormone that helps in growth of $A \rightarrow B \rightarrow C$

(b) Name the hormone secreted by A and B.

(c) State the role of hormone produced by D.

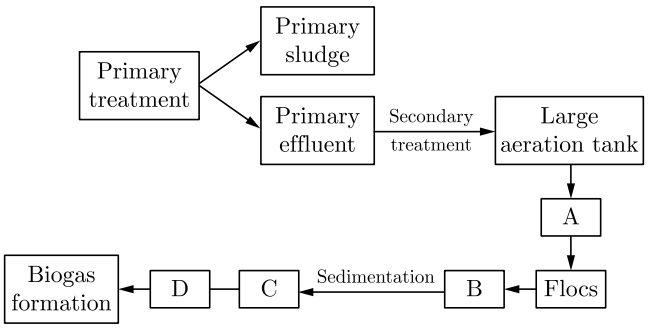
27. 'Plasmid is a boon to biotechnology'. Justify this statement quoting the production of human insulin as an example.

28. When does a geneticist need to carry a test cross? How is it carried?

SECTION - D

DIRECTION : Question No. 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. Refer to the given below flow chart that shows the sewage treatment.



(a) With reference to the above flow chart explain the role of step A in the given process.

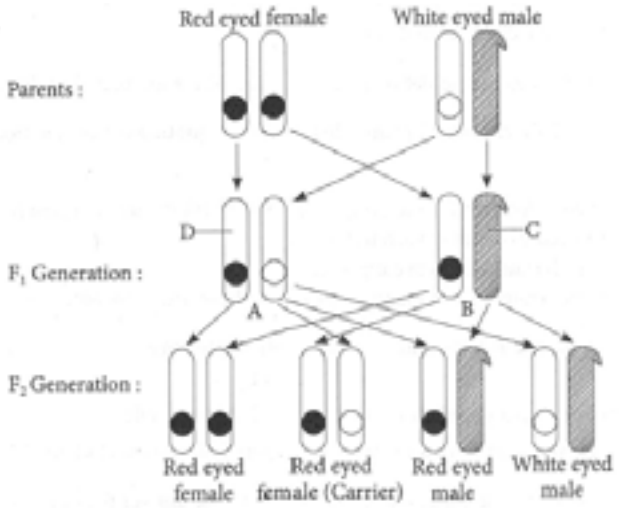
(b) Identify A, B, C and D in the given process.

(c) Explain the process at step D.

OR

(c) What is the significance of low B in the given process and how does it forms C?

30. Study the given figure and answer the following questions.



(a) Identify A, B, C and D from the given figure.

(b) What kind of inheritance is shown in the given the figure?

(c) State the significance of this inheritance in the above mentioned cross.

OR

(c) What would happen in the given cross if the parents phenotype be reversed i.e., white eyed female and red eyed male respectively?

SECTION - E

31. An experiment 'X' provided evidence in support of 'Y'. In this experiment, four gases were circulated 'A', 'B', 'C, and 'D' in an air tight apparatus and electrical discharge from electrodes was passed at 800°C. The mixture of gases were passed through a condenser. After a week, the chemical composition of the liquid inside the apparatus was analysed. The results provided evidence through which 'Y' was more or less accepted.

(i) Identify gases A, B, C, D.
(ii) Which theory of origin of life is supported by the above experiment?
(iii) Draw a diagrammatic representation of experiment X.
(iv) What does A, B, C and D together produced in the experiment X?

OR

Explain three different ways in which natural selection can affect the frequency of a heritable trait in a population.

32. Give reasons why:

(a) DNA cannot pass into a host cell through the cell membrane.

(b) Proteases are added during isolation of DNA for genetic engineering.

(c) Single recognition site is preferred in a vector.

(d) Maintainance of sterile conditions in biotechnological processes.

(e) Genes encoding resistance to antibiotics considered as useful selectable markers for E.coli cloning vector.

OR

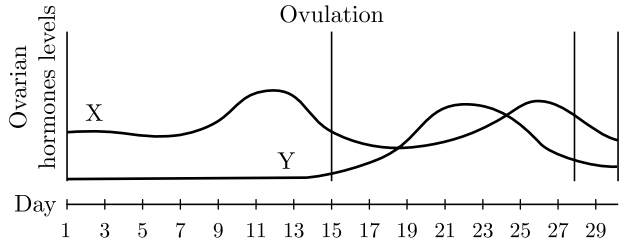
Causative agents of HIV-AIDS and COVID-19 belong to the same group of viruses. To diagnose and amplify the genetic material for further study of COVID-19 virus, 'RT-PCR' test is carried out.

(a) What does 'RT-PCR' stand for?

(b) Explain the various steps of PCR technique.

33. Study the graph given below related with menstrual cycle in females:

(a) Identify ovarian hormones X and Y mentioned in the graph and specify their source.

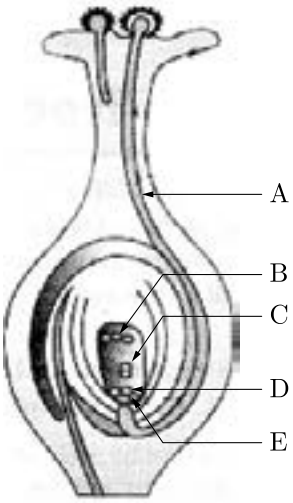


(b) Correlate and describe the uterine events that take place according to the ovarian hormone levels X and Y mentioned in the graph on -

(i) 6 - 15 days
(ii) 16 - 25 days
(iii) 26 - 28 days (when ovum is not fertilised)

OR

Refer the given below figure and answer the questions that follows:



(i) What phenomenon is represented in the above given figure ?
(ii) What is the path of entry of pollen tube ?
(iii) Label the parts marked as A to E.
(iv) What will happen after entering of pollen into one of the synergids?