**CBSE Class 12 Biology**

**Sample Paper 01 (2019-20)**

**Maximum Marks: 70**

**Time Allowed: 3 hours**

**General Instructions:**

i. There are a total of 27 questions and five sections in the question paper. All questions are compulsory.
ii. Section A contains question numbers 1 to 5, multiple choice questions of one mark each. Section B contains question numbers 6 to 12, short answer type I questions of two marks each. Section C contains question numbers 13 to 21, short answer type II questions of three marks each. Section D contains question number 22 to 24, case-based short answer type questions of three marks each. Section E contains question numbers 25 to 27, long answer type questions of five marks each.
iii. There is no overall choice in the question paper. However, internal choices are provided in two questions of one mark, one question of two marks, two questions of three marks and all three questions of five marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.

## Section A

1. Prostate gland and seminal vehicle perform the function of

    a. Secretion of pregnancy hormone

    b. Penetration of ovum

    c. All of these

    d. Nutrition and fluid medium for sperm movement

**OR**

Which one is not a side effect due to regular use of contraceptive methods

a. Breast cancer

b. AIDS

c. Abdominal pain

d. Nausea

2. Which of the following birth control measure can be considered as the safest?

a. Termination of unwanted pregnancy

b. The rhythm method

c. The use of physical barriers

d. Sterilization techniques

**OR**

In which one of the following options the two examples are correctly matched with their particular type of immunity?

| **Examples** | **Type of immunity** |
|---|---|
| **(1)**Saliva in mouth and tears in eyes | Physical barriers |
| **(2)**Mucus coating of epithelium lining the urogenital tract and the HCl in stomach | Physiological barriers |
| **(3)**Polymorpho-nuclear leukocytes and monocytes | Cellular barriers |
| **(4)**Anti-tetanus and anti-snake bite injections | Active immunity |

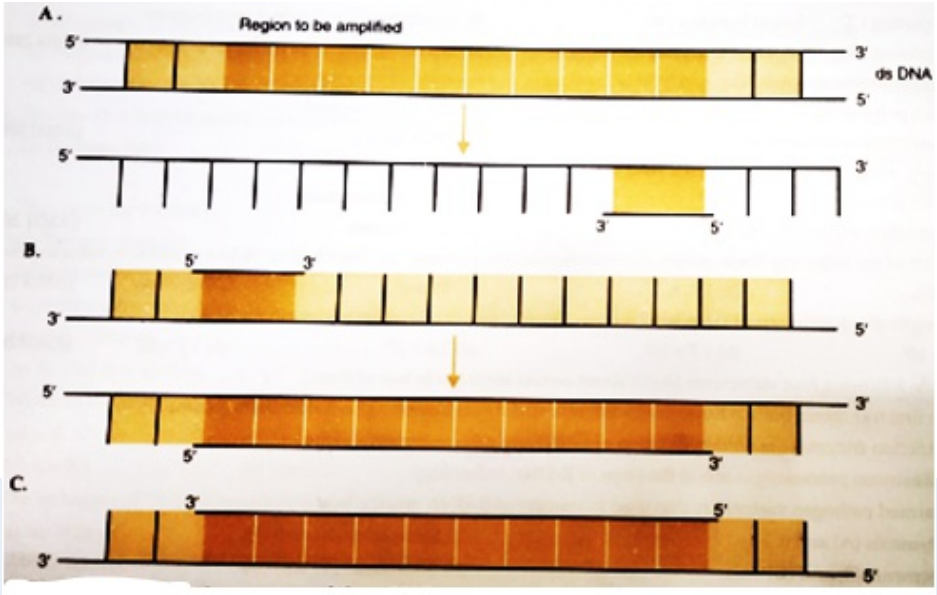
a. Example (4)

b. Example (1)

c. Example (2)

d. Example (3)

3. The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents?




a. C - extension in the presence of heat stable DNA polymerase.

b. A - denaturation at a temperature of about 50°C.

c. B - denaturation at a temperature of about 98°C separating the two DNA strands.

d. A - annealing with two sets of primers.

4. Stanley Cohen and Herbert Boyer worked on which bacteria?

a. Salmonella typhimurium

b. Aspergillusniger

c. Bacillus subtilis

d. Proteus vulgaris

5. Which article of the Constitution of India specifies that, "it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures."

a. Article 32

b. article 48

c. article 51-A

d. article 52-A

**Section B**

6. What are the three major phases in the life cycle of an organism? Define each phase.

**OR**

Name the pollinating agents of flowers like maize and wheat. Give any two favourable features of such a flower.

7. What are the two factors which have raised life expectancy in the developing countries?
8. Describe three methods by which parental genes may form recombination (new combinations).
9. What is the role of nonsense codon in protein synthesis?
10. What is cross breeding? What advantages does it confer? Give one example.
11. Explain why children eating golden rice are unlikely to suffer from 'night blindness'?
12. Distinguish between: Production and Decomposition

**Section C**

13. Name the cell that develops into the embryo sac and explain how this cell leads to the formation of embryo sac. Also mention the role played by the various cells of the embryo sac.
14. Draw a diagram of an enlarged view of T.S. of one microsporangium of an angiosperm and label the following parts:

    i. Tapetum
    ii. Middle layer

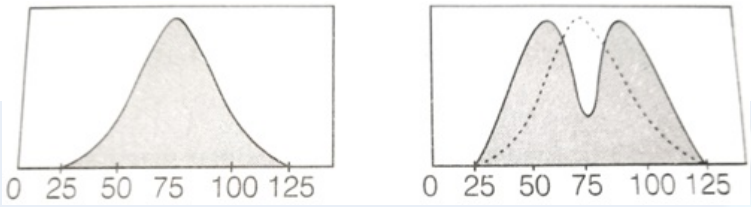
iii. Endothecium
iv. Microspore mother cell

15. Using a Punnett square work out the distribution of phenotypic features in the first filial generation after a cross between a homozygous female and a heterozygous male for a single locus.

**OR**

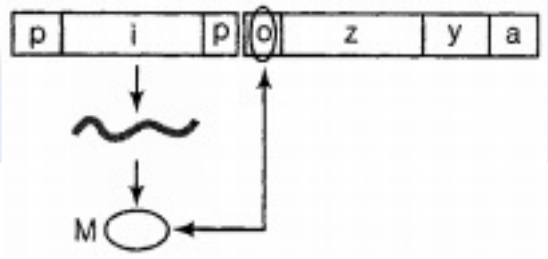
Define point mutation? Give one example.

16. Refer the graph and answer the questions that follow:




i. The graph depicts which type of natural selection?
ii. Explain the other two effects/types of natural selection.

17. Observe the diagram given below and answer the questions that follow:




i. Name the molecule M that binds with the operator.
ii. Mention the consequences of such binding.
iii. What will prevent the binding of the molecule M with the operator gene? Mention the event that follows.

18. Explain in brief the role of animal husbandry in human welfare.

19. Compare and contrast the advantages and disadvantages of production of genetically modified crops.

20. Alien species are a threat to native species. Justify taking examples of an animal and a

plant alien species.

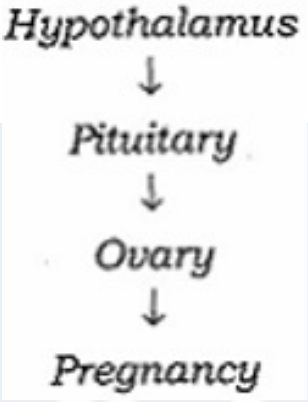
**OR**

Amazonian rain forest has the greatest biodiversity on earth. List any two hypothesis that are proposed by the biologists to account for the greater biological diversity.

21. Describe briefly the following: Downstream processing.

**Section D**

22. Study the following flow chart and answer the following question:



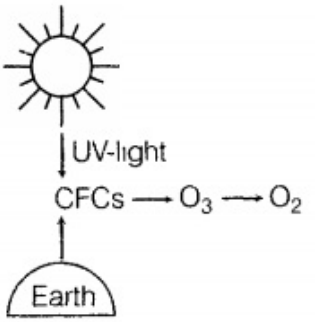

i. Name the hormones involved in each state.
ii. Explain the functions of hormones involved in each state.
iii. Write the name of the placental hormone.

23. Observe the picture showing the utilization of microbes in household products and answer the following questions:


i. Write the names of bacteria that are used in the production of curd.
ii. Write the function of Amylase, maltase and zymase in the baking industry.

iii. Dosa and Idli are produced by which type of fermentation?

24. Observe the diagram and answer the following questions:



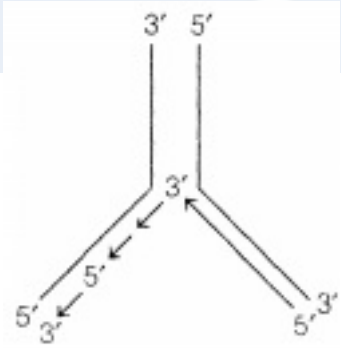

i. Expand CFC.
ii. How does it reduce ozone to oxygen?
iii. How does CFC affect the ozone layer?

**Section E**

25. Recently a girl baby has been reported to suffer from haemophilia. How is it possible? Explain with the help of a cross.

**OR**

i. Why do you see two different types of replicating strands in the given DNA replication fork? Explain. Name these strands.




ii. Explain the importance of origin of replication in a replication fork

26. Explain the following terms:

i. Callus and suspension cultures
ii. Meristem culture
iii. Embryo culture

**OR**

An active member of an awareness group conducts regular programmes to sensitise public against alcoholism youth-a serious health hazard in his locality. Identify the values this member of the group is trying to propagate amongst the people in his locality.

27. Write note on Biological magnification.

**OR**

Explain how xerarch succession progresses from xeric to mesic condition and forms a stable climax community. You may use a flow chart.

**CBSE Class 12 Biology**
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## Solution

## Section A

1. (d) Nutrition and fluid medium for sperm movement
   **Explanation:** Prostate gland and seminal vehicle provide nutrient to sperm and also provide fluid medium for the motility of sperm.

   **OR**

   (b) AIDS
   **Explanation:** Regular use of contraceptive methods may cause some side effects such as abdominal pain, breast cancer and nausea. AIDS is a viral disease caused by HIV and not a side effect of contraceptive method.
2. (d) Sterilization techniques
   **Explanation:** A number of birth control measures are used to prevent unwanted pregnancy. Sterilization technique is considered as the safest way. Condom prevents unwanted pregnancy as well as sexually transmitted disease.

   **OR**

   (d) Example (3)
   **Explanation:** Polymorpho- nuclear leukocytes and monocytes provide cellular barrier immunity which is an active immunity. Saliva in mouth and tears in eyes provide physiological barrier.
3. (c) B - denaturation at a temperature of about 98°C separating the two DNA strands.
   **Explanation:** B - denaturation at a temperature of about 98°C separating the two DNA strands.
4. (a) Salmonella typhimurium
   Explanation: Stanley Cohen and Herbert Boyer worked on bacterium Salmonella typhimuriumin 1972 by isolating the antibiotic resistance gene by cutting out a piece of DNA from a plasmid which was responsible for conferring antibiotic resistance.
5. (c) article 51-A

Explanation: All the fundamental duties are contained in Art. 51A. to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures is a fundamental duty listed in constitution of India.

**Section B**

6. Juvenile phase, Reproductive phase, Senescent phase
   Juvenile phase: The phase of growth in the organisms before reproductive maturity.
   **Reproductive phase:** In this phase organisms attains reproductive maturity.
   **Senescent phase:** The phase between reproductive maturity and death.

**OR**

In the case of maize, the pollinating agent is wind. These flowers are unisexual, small, colourless, inconspicuous and odourless. The male flowers are numerous and have versatile anthers where female flowers have long silky stigmas protruding out of cob. In wheat, it is self-pollination. Both anthers and stigma of bisexual flowers from the same plant mature simultaneously before the bud opens, thus to ensure successful complete self-Pollination.

7. i. Decline in death rate.
   ii. Increase in medical facilities.

8. Recombinations of genes arise by following three methods:

   i. **By crossing over-** The mechanism of recombination of the genes due to the interchange of chromatid segments at the time of synapsis of homologous chromosomes during pachytene of meiosis-I is called crossing over.
   ii. Random segregation of chromosomes at the time of gamete formation.
   iii. The Random fusion of gametes at the time of fertilization.

9. Nonsense codon as the name indicates, code for nothing in a growing polypeptide chain thus the addition of new amino acid stops and the process of translation stops. Thus, nonsense codons act as stop signals and terminate the translation process. There are three nonsense codons viz. UAG, UAA, and UGA.

10. Cross breeding is the mating between animals of different breeds. It involves mating

of superior males of one breed with superior females of another breed.
This method allows the desirable qualities of two different breeds to be combined.
Thus the hybrid progeny will have the desirable traits of both the breeds.
**Example:** Hisardale is a new breed of sheep developed by crossing Bikaneri ewes and Marino rams.

11. mainly children, become blind every year, 50% of whom die within a year of becoming blind. Nearly nine million children die of malnutrion every year. Vitamin A deficiency (VAD) severely affects their immune system.

    Golden Rice has been engineered to contain the genes necessary to make up the biochemical pathway for pro-vitamin A production. Moreover, the genetic construct was designed to be expressed exclusively in the rice endosperm, ie in the edible part of the seed. The intensity of the golden colour is an indicator of the concentration of beta-carotene in the grain.

12.

| | Production | Decomposition |
|---|---|---|
| 1. | It is the process of formation of fresh biomass from inorganic matter by the producers (plants) using sunlight. | It is the process by which complex organic material is broken down by the decomposers. |
| 2. | Energy is trapped in this process. | Energy is released in this process. |
| 3. | It requires sunlight. | It does not require sunlight. |
| 4. | It is an anabolic process. | It is a catabolic process. |
| 5 | Example: Plants | Examples: Bacteria, Fungi |

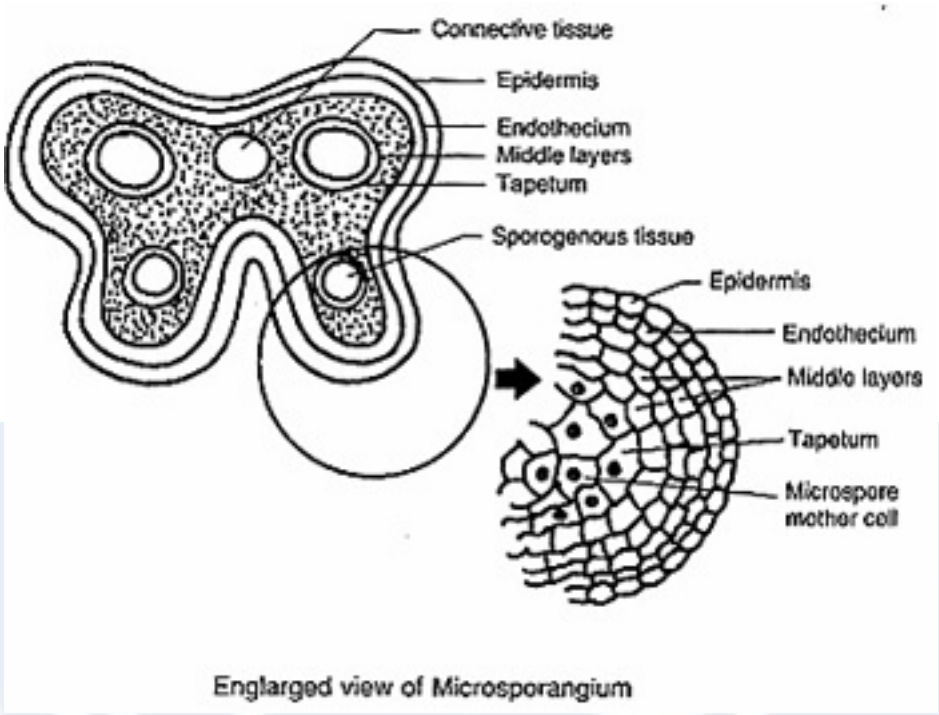
**Section C**

13. Megaspore mother cell. It undergoes meiosis to form 7 celled 8-nucleate stage embryo sac. Nucleus of megaspore mother cell undergoes mitosis and two cells move to opposite poles. Two successive mitotic divisions form an 8 nucleate embryo sac cells formation takes place after nuclear divisions. Three cells group together at micropylar end, egg apparatus with an egg cell and two synergids. Three cells group

at chalazal end and two nuclei move to centre. Roles of various cells:

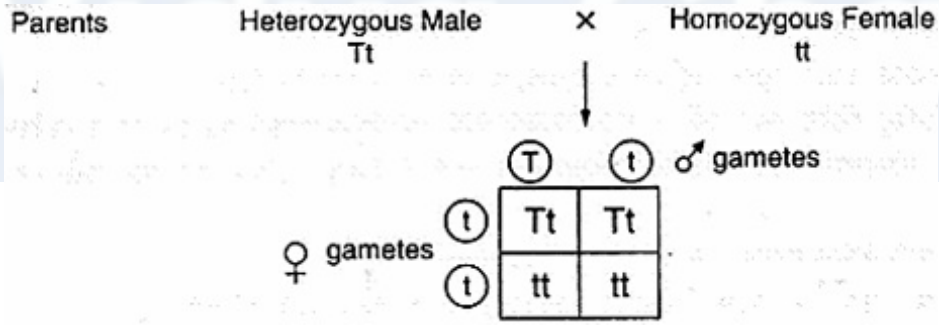
1. Polar nuclei fuses with a male gamete to form triploid endosperm. (Triple fusion)
2. Egg cell fuses with male gamete to form zygote.
3. Synergids guides the pollen tube.

14.




Englarged view of Microsporangium

15.




The phenotypic ratio in $F_1$ gen.

| **Tall** | **Dwarf** |
|---|---|
| 2 | 2 |
| 1 | 1 |

**OR**

Mutations are new sudden, inheritable, discontinuous variations which appear in the organisms due to a permanent change in their genotype.

Point mutations are a type of gene mutations which involve the substitution, deletion or insertion of a single nucleotide or nitrogen base of the cistron e.g., Sickle Cell anaemia, an autosomal hereditary disorder is caused by the formation of abnormal haemoglobin called $Hb^S$. $Hb^S$ differs from normal haemoglobin $Hb^A$ in only one amino acid-6th amino acid of $\beta$-chain of glutamic acid is replaced by valine. Thus, disorder is due to the change of one nitrogen base in the cistron.

16. i. The graph depicts disruptive natural selection. This type of selection tends to eliminate intermediate types.
    ii. The other two types of natural selection are
        a. Directional selection - Large number of individuals acquire value other than mean character value.
        b. Stabilizing selection - Large number of individuals acquire mean character value.
17. i. M-Repressor
    ii. When repressor binds to the operator, transcription by RNA polymerase is prevented.
    iii. An inducer prevents the binding of repressor to operator. Due to this RNA polymerase gets access to the promoter and transcription proceeds.
18. Animal husbandry deals with the scientific management of livestock. It includes various aspects such as feeding, breeding, and control diseases to raise the population of animal livestock. Animal husbandry usually includes animals such as cattle, pig, sheep, poultry, and fish which are useful for humans in various ways.

    These animals are managed for the production of commercially important products such as milk, meat, wool, egg, honey, silk, etc. The increase in human population has increased the demand of these products.

    Hence, it is necessary to improve the management of livestock scientifically.

19. **Advantages of GM crops:**
    (i) Genetic modification has made crops more tolerant to abiotic stresses (cold, drought, heat, salt)
    (ii) Viral resistance can be introduced.

(iii) Over ripening losses can be reduced e.g. Flavr Savr tomato
(iv) Enhanced nutritional value of food e.g. Golden Rice
(v) Reduced reliance on chemical pesticides.

**Disadvantages of GM crops:**
(i) Transgenes in crop plants can endanger native species. For example, the gene for Bt toxin expressed in pollen might end natural pollinators like honey bees
(ii) Weeds also become resistant
(iii) Products of transgene may be allergic or toxic.
(iv) They cause damage to the natural environment.

20. When alien species are introduced in a particular ecosystem, they become invasive. Alien species compete for food and other resources which threatens survival of native species. For example:

    - The Nile Perch introduced in lake Victoria in East Africa led to the gradual extinction of more than 200 species of Cichild fish in the lake. Introduction of African cat fish (Clarias gariepinus) for aquaculture purpose is posing threat to the indigenous catfish in our rivers.
    - Invasive weed species like water hyacinth (Eicchornia), carrot grass (Parthenium) have posed a threat to our native species.

**OR**

Two hypothesis proposed to explain the greater biological diversity in amazon rainforest are:
(i) Speciation is generally a function of time. Temperate regions have been subjected to frequent glaciations in the past but tropical latitudes have remained undisturbed for millions of years. This has provided longer time for evolution and species diversification.
(ii) Tropical environments are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialization which leads to a greater diversity in plant and animal species. Also, more solar energy is available in the tropics which contributes to higher productivity. This indirectly contributes to species

diversity.

21. After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The processes include separation and purification, which are collectively referred to as downstream processing. The product has to be formulated with suitable preservatives. Such formulation has to undergo thorough clinical trials as in case of drugs. Strict quality control testing for each product is also required. The downstream processing and quality control testing very from product to product

**Section D**

22. i. The hormones involved in each stage are as follows:
    a. **Hypothalamus-** Gonadotropin-releasing hormone (GnRH)
    b. **Pituitary-** FSH and LH
    c. **Ovary-** LH
    d. **Pregnancy-** Progesterone and Human chorionic gonadotropin (hCG)

    ii. The functions of the hormone involved in each stage are as follows:
    a. **Hypothalamus:** It releases gonadotropin-releasing hormone (GnRH), which stimulates pituitary.
    b. **Pituitary:** After stimulation, it secretes FSH and LH. FSH regulates the functioning of the ovary during follicular phase by stimulating the growth of an ovarian follicle into mature Graafian follicle and secretion of oestrogens from the follicle cells. LH stimulates the mature follicle to rupture and release the ovum(ovulation).
    c. **Ovary:** After ovulation LH stimulates the formation of corpus luteum inside the ruptured follicle.
    d. **Pregnancy:** Corpus luteum starts the secretion of progesterone and hCG is secreted from the placenta which is essential for the maintenance of pregnancy.

    iii. Human chorionic gonadotropin (hCG) hormone is secreted from the placenta.

23. i. Lactic Acid Bacteria (LAB) which include Lactobacillus acidophilus, L. lactis and Streptococcus lactis.

    ii. Amylase hydrolyses starch into maltose.
    Maltase changes maltose to glucose.

Zymase converts glucose to ethanol and $CO_2$.

iii. Anaerobic bacterial fermentation of rice.

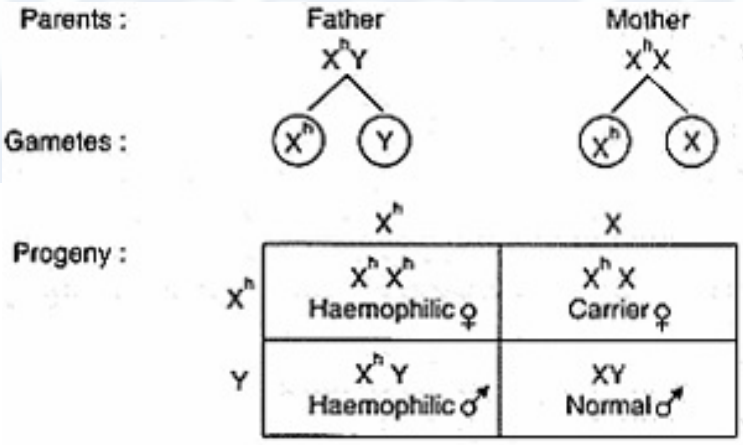
24. i. CFC- Chlorofluorocarbon.

ii. The concept of JFM was introduced by the Government of India. In this program, support of local communities was taken for conservation of forests and in return, the local people were made to use the products obtained from the forest free of cost. In this program, local people protect the forest, which helps in the conservation of the forest and its biodiversity.

iii. Once in the atmosphere, CFCs drift slowly upward to the stratosphere, where they are broken up by ultraviolet radiation, releasing chlorine atoms, which are able to destroy ozone molecules.

**Section E**

25. Haemophilia is a sex-linked disease that occurs due to the presence of a recessive sex-linked gene h carried by X-chromosome. For a daughter to be a haemophilic mother should be a carrier $(X^hX)$ and father should be haemophilic.$(X^nY)$ A female becomes haemophilic only when both its X-chromosomes carry the gene $(X^hX^h)$ The cross is as follows:




| | $X^n$ | X |
|---|---|---|
| $X^n$ | $X^nX^n$ Haemophilic ♀ | $X^nX$ Carrier ♀ |
| Y | $X^nY$ Haemophilic ♂ | XY Normal ♂ |

**OR**

i. Two different types of parent strands function as template strands.
On the template strand with 3'$\rightarrow$5' polarity, the new strand is synthesised as a continuous strand because the enzyme DNA polymerase can carry out polymerisation of the nucleotides only in 5'$\rightarrow$3' direction. This is called continuous synthesis and the strand is called the **leading strand**.
On the template strand with 5'$\rightarrow$3' polarity, the new strand is synthesised from the point of replication fork in short stretches called Okazaki fragments and this strand is called **lagging strand**.
Okazaki fragments are later joined by DNA ligases to form a continuous strand.

ii. Replication of DNA does not initiate randomly, and DNA polymerases on their own cannot initiate replication.
So, there is a need for a specific sequence, called the origin of replication from which the replication starts. DNA polymerase binds to it and continues the process.

26. i. **Callus and suspension cultures:** A callus culture is an unorganized and undifferentiated mass of cells on an agar-gelled medium while a suspension culture is cells/tissues cultured in a liquid medium which then produce clumps of few to many cells. The cells become meristematic and divide to give rise to a mass of cells. Suspension cultures grow faster than the callus cultures but callus cultures are easier to maintain as they don't need agitation unlike suspension culture.

ii. **Meristem culture:** The cultivation of axillary or apical shoot meristems is called meristem culture. The meristems are generally free from virus. The explants commonly used in meristem culture are shoot apices and nodal segments. These explants are cultured on a medium containing cytokinins. The plantlets thus obtained are subjected to hardening and ultimately established in the field.

iii. **Embryo culture:** It involves removing of young embryos from developing seeds and placing them on suitable nutrient medium to get the seedlings.

**OR**

The dependence or addiction of alcohol is called alcoholism and the addict to alcohol

is termed alcoholic. The word alcohol refers to ethyl alcohol or ethanol ($C_2H_5OH$). It is manufactured by fermentation of sugars.
An active member sensitises the public by making them aware of the problems caused by alcohol amongst youths.
**These problems are:**

i. **Social problems-** Unemployment, child abuse, marital tension, financial difficulties and a problem with the law such as violence, traffic offences.
ii. **Psychological problems-** Depression, deterioration of the sexual relationship, anger and rude, hangover problem in the morning.
iii. **Physical problems-** Variable and can affect virtually any organ in the body such as cardiovascular, gastrointestinal, CNS, liver and reproductive system.

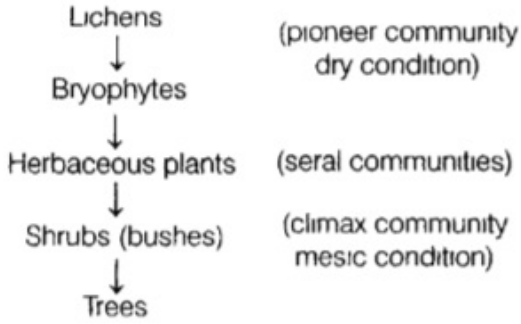
The member of the awareness group is trying to aware the people that alcoholism is a curse in the people. Many adolescents get affected physically and mentally. He is propagating values: observation, service to society, empathy, problem-solving and sense of responsibility.

27. **Biological magnification:** Industrial Wastes released into the water bodies contain toxic substances such as arsenic, cadmium, mercury, lead, zinc, cyanides, etc. These materials are very harmful to animals including human beings. These substances enter the food chains at the producer's levels and their concentration goes on increasing, with each trophic level. The phenomenon of increase in the concentration of harmful toxic substances at each trophic level of a food chain is called biomagnification e.g., river water has very low conc.- of DDT but the carnivorous fish may contain very high concentration and is quite unfit for eating by man. Similarly, mercury discharged into rivers is changed by bacteria to neurotoxic form methyl mercury. Methyl mercury is highly poisonous and may be directly absorbed in fish and lastly find the entry in human beings.
Zooplankton (0.01 ppm) $\longrightarrow$ Shrimp (1.0 ppm) $\longrightarrow$ Fish (2.0 ppm) $\longrightarrow$ Large Fish (20.0 ppm) $\longrightarrow$ Man (40.0 ppm)

**OR**

Xerarch succession occurs in dry areas and the series progresses from xeric to mesic

condition. The climax community remains stable as long as environment remains unchanged. With time, the xerophytic habitat gets converted into a mesophytic one. Stages of xerarch succession are




Primary Succession on Rocks (Xerarch succession)

i. Lichens are the pioneer species on a bare rock.
ii. Lichens secrete acids to dissolve rock, help in weathering and soil formation
iii. Later, small plants like bryophytes appear, which hold m small amount of soil
iv. Bryophytes are succeeded by bigger plants
v. After several more stages of succession, ultimately a stable climax forest community is formed
vi. In this way, xerophytic habitat gets converted into a mesophytic climax community All successions whether taking place in water or on land, proceed to form a similar mesic climax community.