4 : Heredity and Evolution

1. Why is variation important for a species? **[2017] ...[1M]**

2. A cross between pea plant with white flowers (vv) and pea plant with violet flowers (VV) resulted in F_2 progeny in which ratio of violet (VV) and white (vv) flowers will be : **[2023] ...[1M]**

   (a) 1 : 1 (b) 2 : 1

   (c) 3 : 1 (d) 1 : 3

3. **A** : In humans, if gene (B) is responsible for black eyes and gene (b) is responsible for brown eyes, then the colour of eyes of the progeny having gene combination Bb, bb or BB will be black only.

   R : The black colour of the eyes is a dominant trait. **[2023] ...[1M]**

   (a) Both (A) and (R) are true and (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

4. Give one example each of characters that are inherited and the ones that are acquired in humans. Mention the difference between the inherited and the acquired characters. **[2010] ...[2M]**

5. A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F_1 progeny? **[2018] ...[2M]**

6. Describe any three ways in which individuals with a particular trait may increase in population. **[2011] ...[3M]**

7. A blue colour flower plant denoted by BB is crossbred with a white colour flower plant denoted by bb. **[2012]...[3M]**

   (a) State the colour of flower you expect in their F_1 generation plants.

   (b) What must be the percentage of white flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?

   (c) State the expected ratio of the genotypes BB and Bb in the F_2 progeny.

8. "A trait may be inherited, but may not be expressed." Justify this statement with the help of a suitable example. **[2014] ...[3M]**

9. What are chromosomes? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained. **[2015] ...[3M]**

10. How do Mendel's experiment show that traits are inherited independently? **[2016] ...[3M]**

11. How did Mendel's explain that it is possible that a trait is inherited but not expressed in an organism? **[2017] ...[3M]**

12. Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in F_1 and F_2 generations when he crossed the tall and short plants? Write the ratio he obtained in F_2 generation plants. **[2019] ...[3M]**

13. List two differences between acquired traits and inherited traits by giving an example of each. **[2019] ...[3M]**

14. (a) Name the two types of gametes produced by men.

    (b) Does a male child inherit X chromosome from his father? Justify.

    (c) How many types of gametes are produced by a human female? **[2022] ...[3M]**

15. ***Case Study Based Questions :***

    Mendel blended his knowledge of Science and mathematics to keep the count of the individuals exhibiting a particular trait in each generation. He observed a number of contrasting visible characters controlled in pea plants in a field. He conducted many experiments to arrive at the laws of inheritance. **[2022] ...[4M]**

    (a) What do the F_1 progeny of tall plants with round seeds and short plants with wrinkled seeds look like?

    (b) Name the recessive traits in above case.

    (c) Mention the type of the new combinations of plants obtained in F_2 progeny along with their ratio, if F_1 progeny was allowed to self pollinate.

OR

If 1600 plants were obtained in F_2 progeny, write the number of plants having traits:

(i) Tall with round seeds

(ii) Short with wrinkled seeds

Write the conclusion of the above experiment.

16. The most obvious outcome of the reproductive process is the generation of individuals of similar design, but in sexual reproduction they may not be exactly alike. The resemblances as well as differences are marked. The rules of heredity determine the process by which traits and characteristics are reliably inherited. Many experiments have been done to study the rules of inheritance. **[2022]**

(i) Why an offspring of human being is not a true copy of his parents in sexual reproduction? **[1]**

(ii) While performing experiments on inheritance in plants, what is the difference between F_1 and F_2 generation? **[1]**

(iii) (A) Why do we say that variations are useful for the survival of a species over time? **[2]**

OR

(B) Study Mendel's cross between two plants with a pair of contrasting characters. **[2]**

RRYY × rryy

Round Yellow Wrinkled Green

He observed 4 types of combinations in F_2 generation. Which of these were new combinations? Why do new features which are not present in the parents, appear in F_2 generation?

17. 'The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it.' Justify this statement with the help of flow chart showing determination of sex of a newborn. **[2012]...[5M]**

18. How do Mendel's experiments show that the

(a) Traits may be dominant or recessive

(b) Traits are inherited independently **[2015] ...[5M]**

19. With the help of one example for each, distinguish between the acquired traits and the inherited traits. Why are the traits/experiences acquired during the entire lifetime of an individual not inherited in the next generation? Explain the reason of this fact with an example. **[2017] ...[5M]**

20. (a) What is genetics?

(b) What are genes? Where are the genes located?

(c) State and define three factors responsible for the rise of a new species. **[2020]...[5M]**

5 : Our Environment

1. How is the increasing demand for energy adversely affecting our environment? **[2010] ...[1M]**

2. Select two non-biodegradable substances from the following waste generated in a kitchen: Spoilt food, paper bags, milk bags, vegetable peels, tin cans, used tea leaves solution **[2012] ...[1M]**

3. Mention one negative effect of our affluent life style on the environment. **[2013, 2014] ...[1M]**

4. In a food chain of frog, grass, insect and snake, assign trophic level to frog. **[2016] ...[1M]**

5. In the following food chain, 20,000 J of energy was available to the plants. How much energy would be available to man in this chain?

Plants → Sheep → Man **[2017] ...[1M]**

6. **Answer question numbers (i) to (iv) on the basis of your understanding of the following paragraphs and the related studied concepts.**

Human body is made up of five important components, of which water is the main component. Food as well as potable water are essential for every human being. The food is