CBSE Test Paper-02

Chapter 09 Heredity and Evolution

1. Find the statement which is not true **(1)**
   a. Biogenetic law was proposed by Darwin
   b. All vertebrates embryos show some embryological evidence in support of their common ancestry
   c. The nictitating membrane in human eye is a vestigial organ
   d. A chimpanzee can hold object by its hand and an elephant by its trunk

2. Which of the following is not correct- **(1)**
   a. For every molecule of fat there is a gene
   b. For production of every enzyme there is a gene
   c. For every protein there is a gene
   d. For every hormone there is a gene

3. The theory of chemical evolution of life was experimentally demonstrated by- **(1)**
   a. Mendel
   b. Oparin
   c. Darwin
   d. Miller and Urey

4. Haemophilia is more commonly seen in human males than in human females because **(1)**
   a. This disease is due to an X-linked recessive mutation
   b. A greater proportion of girls die in infancy
   c. This disease is due to an X-linked dominant
   d. This disease is due to a Y-linked recessive mutation

5. Statement A : Genetic recombination is one of the source of variation,
   Statement B : Natural selection may lead to the evolution of a new group. (which is correct) **(1)**

a. Statement A is true, B is false
b. Statement B is true, A is false
c. Both the statement A and B are true
d. Neither statement A nor Statement B is true

6. How many contrasting traits Mendel noted in garden pea? **(1)**

7. Homologies of man at the level of chromosomes are visible with which ape? **(1)**

8. Where will you find the most ancient and recent fossil? **(1)**

9. Give one word for a disease that makes a man unable to distinguish red colour from green colour. **(1)**

10. What is natural selection in modern terms? Elucidate the three different effects of natural selection on variation. **(3)**

11. What is fossilization? How are fossils formed? **(3)**

12. In evolutionary terms can we say that which among bacteria, spider, fish and chimpanzee has a 'better' body design? Why or why not? **(3)**

13. Why do all the gametes formed in human females have X chromosome? **(3)**

14. Bacteria have a simpler body plan when compared with human beings. Does it mean that human beings are more evolved than bacteria? Provide a suitable explanation. **(5)**

15. Describe Darwin's theory of evolution. **(5)**

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Ansewrs

1. a. Biogenetic law was proposed by Darwin
   Explanation: Biogenetic law, also called Recapitulation Theory, postulation, by Ernst Haeckel in 1866, that ontogeny recapitulates phylogeny—i.e., the development of the animal embryo and young traces the evolutionary development of the species.
2. a. For every molecule of fat there is a gene
   Explanation: Hormone and enzymes are proteins and formation of any particular protein is controlled by a particular gene. Hence, all other options are correct.
3. d. Miller and Urey
   Explanation: Miller and Urey. The Miller–Urey experiment (or Miller experiment) was a chemical experiment that simulated the conditions thought at the time to be present on the early Earth, and tested the chemical origin of life under those conditions
4. a. This disease is due to an X-linked recessive mutation
   Explanation: Hemophilia is a bleeding disorder that slows down the blood clotting process. People who have hemophilia often have longer bleeding after an injury or surgery.
   Hemophilia is inherited in an X-linked recessive pattern. A condition is considered X-linked when gene mutation that causes it is located on the X chromosome, one of the two sex chromosomes. In males (who have only one X chromosome), one altered copy of the gene in each cell is enough to cause the condition. Since females have two X chromosomes, a mutation must be present in both copies of the gene to cause the hemophilia. Males are affected by X-linked recessive disorders much more frequently than females.
5. c. Both the statement A and B are true
   Explanation: Genetic recombination is the production of offspring with

combinations of traits that differ from those found in either parent.
Natural selection leads to evolutionary change when individuals with certain characteristics have a greater survival or reproductive rate than other individuals in a population and pass on these inheritable genetic characteristics to their offspring.

6. Seven
7. Chimpanzee.
8. The most ancient fossils will occur in the older rocks: whereas most recent fossils will occur in the youngest rocks.
9. Daltonism / colour blindness.
10. **Natural selection:** In modern term natural selection is differential reproduction.
Natural selection is main evolutionary process which causes the change of allele frequencies or in other words selection is the consistent differences in contribution of various genotypes to the next generation.
If in a population both small and largest individuals contribute relatively fewer offspring to the next generation then those closer to the average size do, stabilizing selection is operating.
If centre of population contributes more then equilibrium is maintained while if extremes of population work then two peaks in the distribution of a trait produced, while former is disruptive selection.
11. The process of fossils formation is called fossilization. Fossils are formed when organisms die; their bodies get decomposed and lost. Sometimes the body or a part of it may be in such an environment that it does not let it decompose completely. The mud will eventually harden and retain the impression of the body parts of the organism. This mud with the impression will be called fossil of the organism.
12. It depends on our perception of ‘better’ design. If complexity of body design is the criterion, then chimpanzee is obviously better than bacteria. But if ability of survival in almost all kinds of habitat is a criterion then bacteria are far ahead than any other group of organisms.
13. Human females have a pair of X chromosomes called sex chromosomes. Hence, after gametogenesis, an X chromosome will always be present in each gamete. Hence all

the gametes possess an X chromosome.

14. It depends on our perspective through which we try to evaluate evolution. If complexity in body design is the parameter to define evolution, then human beings are more evolved than bacteria. Human beings are multicellular with organ system level of organisation whereas bacteria is unicellular and show cellular level of organization. In terms of complexity human beings are definitely highly evolved compared to bacteria.

    But when we compare the ability of survival, then situation is just opposite. Human beings are living in almost every part of the earth, but they can live only on land Moreover, in extreme environmental conditions, human beings make artificial facilities to counter the adverse conditions. This means their body is not adapted to withstand extreme climatic conditions they have to thrive on artificially created resources. Bacteria, on the other hand, are known to be present almost everywhere on earth. They are known to live even in some of the harshest conditions; like Sulphur spring, crater of volcano, etc. Bacteria can survive in highly acidic environment and they can survive extreme temperatures. From this angle, bacteria can be considered as more evolved than human beings.

15. Following are the points of Darwin's theory of natural selection:
    i. Over-production: Every organism has enormous potential to reproduce.
    ii. Struggle for existence: Population size of an organism is limited due to struggle between the members of same species as well as the members of different species. It is due to struggle for food, space and mate.
    iii. Variation: Due to struggle, the fit organisms possess some variations which are favourable, and they can leave the progeny to continue the favourable variations.
    iv. Survival of the fittest: The fittest organism survive to continue the favourable variations.
    v. Formation of a new species: These variations when accumulated for a long time, leads to the origin of a new species.