CHAPTER 7

EVOLUTION

MULTIPLE CHOICE QUESTIONS

1. Which of the following is used as an atmospheric pollution indicator?
   a. Lepidoptera
   b. Lichens
   c. *Lycopersicon*
   d. *Lycopodium*

2. The theory of spontaneous generation stated that:
   a. life arose from living forms only
   b. life can arise from both living and non-living
   c. life can arise from non-living things only.
   d. life arises spontaneously, neither from living nor from the non-living.

3. Animal husbandry and plant breeding programmes are the examples of:
   a. reverse evolution
   b. artificial selection
   c. mutation
   d. natural selection

4. Palaentological evidences for evolution refer to the:
   a. development of embryo
   b. homologous organs
   c. fossils
   d. analogous organs.

5. The bones of forelimbs of whale, bat, cheetah and man are similar in structure, because:
   a. one organism has given rise to another
   b. they share a common ancestor

c. they perform the same function
d. the have biochemical similarities

6. Analogous organs arise due to:
   a. divergent evolution
   b. artificial selection
   c. genetic drift
   d. convergent evolution

7. $(p+q)^2 = P^2 + 2pq + q^2 = 1$ represents an equation used in:
   a. population genetics
   b. mendelian genetics
   c. biometrics
   d. molecular genetics

8. Appearance of antibiotic-resistant bacteria is an example of:
   a. adaptive radiation
   b. transduction
   c. pre-existing variation in the population
   d. divergent evolution

9. Evolution of life shows that life forms had a trend of moving from:
   a. land to water
   b. dryland to wet land
   c. fresh water to sea water
   d. water to land

10. Viviparity is considered to be more evolved because:
    a. the young ones are left on their own
    b. the young ones are protected by a thick shell
    c. the young ones are protected inside the mother's body and are looked after they are born leading to more chances of survival
    d. the embryo takes a long time to develop

11. Fossils are generally found in:
    a. Sedimentary rocks
    b. Igneous rocks
    c. Metamorphic rocks
    d. Any type of rock

12. For the MN-blood group system, the frequencies of M and N alleles are 0.7 and 0.3, respectively. The expected frequency of MN-blood group bearing organisms is likely to be
    a. 42%
    b. 49%
    c. 9%
    d. 58%

13. Which type of selection is industrial melanism observed in moth, *Biston bitularia*:
    a. Stabilising
    b. Directional
    c. Disruptive
    d. Artificial

14. The most accepted line of descent in human evolution is:
    a. Australopithecus → Ramapithecus → Homo sapiens → homo habilis
    b. Homo erectus → Homo habilis → Homo sapiens
    c. Ramapithecus → Homo habilis → Homo erectus → Homo sapiens
    d. Australopithecus → Ramapithecus → Homo erectus → Homo habilis → Homo sapiens.

15. Which of the following is an example for link species?
    a. Lobe fish
    b. Dodo bird
    c. Sea weed
    d. Tyrannosaurus *rex*

16. Match the scientists listed under column 'A' with ideas listed column 'B'.

	Column 1		Column 2
i.	Darwin	M.	abiogenesis
ii.	Oparin	N.	use and disuse of organs
iii.	Lamarck	O.	continental drift theory
iv.	Wagner	P.	evolution by natural selection

    a. i-M; ii-P; iii-N; iv-O
    b. i-P; ii-M; iii-N; iv-O
    c. i-N; ii-P; iii-O; iv-M
    d. i-p; ii-O; iii-N; iv-M

17. In 1953 S. L. Miller created primitive earth conditions in the laboratory and gave experimental evidence for origin of first form of life from pre-existing non-living organic molecules. The primitive earth conditions created include:
    a. low temperature, volcanic storms, atmosphere rich in oxygen
    b. low temperature, volcanic storms, reducing atmosphere
    c. high temperature, volcanic storms, non-reducing atmosphere
    d. high temperature, volcanic storms, reducing atmosphere containing CH_4, NH_3 etc.

18. Variations during mutations of meiotic recombinations are:
    a. random and directionless
    b. random and directional
    c. random and small
    d. random, small and directional

VERY SHORT ANSWER TYPE QUESTIONS

1. What were the characteristics of life forms that had been fossilised?
2. Did aquatic life forms get fossilised? If, yes where do we come across such fossils?
3. What are we referring to? When we say 'simple organisms' or 'complex organisms'.
4. How do we compute the age of a living tree?
5. Give an example for convergent evolution and identify the features towards which they are converging.
6. How do we compute the age of a fossil?
7. What is the most important pre-condition for adaptive radiation?
8. How do we compute the age of a rock?
9. When we talk of functional macromolecules (e.g. proteins as enzymes, hormones, receptors, antibodies etc), towards what are they evolving?
10. In a certain population, the frequency of three genotypes is as follows:

Genotypes:	BB	Bb	bb
frequency:	22%	62%	16%

What is the likely frequency of B and b alleles?

11. Among the five factors that are known to affect Hardy-Weinberg equilibrium, three factors are gene flow, genetic drift and genetic recombination. What are the other two factors?

12. What is founder effect?

13. Who among the *Dryopithecus* and *Ramapithecus* was more man-like?

14. By what Latin name the first hominid was known?

15. Among *Ramapithecus*, *Australopithecines* and *Homo habilis* - who probably did not eat meat?

SHORT ANSWER TYPE QUESTIONS

1. Louis Pasteur's experiments, if you recall, proved that life can arise from only pre-existing life. Can we correct this as life evolves from pre-existent life or otherwise we will never answer the question as to how the first forms of life arose? Comment.

2. The scientists believe that evolution is gradual. But extinction, part of evolutionary story, are 'sudden' and 'abrupt' and also group-specific. Comment whether a natural disaster can be the cause for extinction of species.

3. Why is nascent oxygen supported to be toxic to aerobic life forms?

4. While creation and presence of variation is directionless, natural selection is directional as it is in the context of adaptation. Comment.

5. The evolutionary story of moths in England during industrialisation reveals, that 'evolution is apparently reversible'. Clarify this statement.

6. Comment on the statement that "evolution and natural selection are end result or consequence of some other processes but themselves are not processes".

7. State and explain any three factors affecting allele frequency in populations.

8. Gene flow occurs through generations. Gene flow can occur across language barriers in humans. If we have a technique of measuring specific allele frequencies in different population of the world, can we not predict human migratory patterns in pre-history and history? Do you agree or disagree? Provide explanation to your answer.

9. How do you express the meaning of words like race, breed, cultivars or variety?

10. When we say "survival of the fittest", does it mean that

    a. those which are fit only survive, or
    b. those that survive are called fit?

    Comment.

11. Enumerate three most characteristic criteria for designating a Mendelian population.

12. "Migration may enhance or blurr the effects of selection". Comment.

LONG ANSWER TYPE QUESTIONS

1. Name the law that states that the sum of allelic frequencies in a population remains constant. What are the five factors that influence these values?

2. Explain divergent evolution in detail. What is the driving force behind it?

3. You have studied the story of Pepper moths in England. Had the industries been removed, what impact could it have on the moth population? Discuss.

4. What are the key concepts in the evolution theory of Darwin?

5. Two organisms occupying a particular geographical area (say desert) show similar adaptive strategies. Taking examples, describe the phenomenon.

6. We are told that evolution is a continuing phenomenon for all living things. Are humans also evolving? Justify your answer.

7. Had Darwin been aware of Mendel's work, would he been able to explain the origin of variations. Discuss.