

## MCQs

1. The armored mammal that lives only in America, is the:  
 (A) Echidna       (B) Penguin       (C) Porcupine       (D) Armadillo
2. The total aggregate of genes in a population at any one time is called:  
 (A) Genome       (B) Succession       (C) Gene flow       (D) Gene pool
3. A group of interbreeding individuals belonging into a particular species and sharing a common geography area is called:  
 (A) Community       (B) Ecosystem       (C) Population       (D) Biosphere
4. A localized group of individuals belonging to the same species is called as:  
 (A) Population       (B) Community       (C) Ecosystem       (D) Biosphere
5. The change in frequency of allelest at a locus that occurs by change is called:  
 (A) Gene pool       (B) Genetic       (C) Mutation       (D) Genetic drift
6. Emigration and immigration of members of population causes disturbance in the:  
 (A) Genetic Drift n       (B) Genotype       (C) Gene pool       (D) Gene frequency
7. The ultimate source of all evolutionary changes, which affect gene frequency is:  
 (A) Mutation       (B) Selection       (C) Migration       (D) Genetic drift
8. The ultimate source of changes is:  
 (A) Evolution       (B) Genetic drift       (C) Mutation       (D) Migration
9. Lyell published the principle of:  
 (A) Population       (B) Community       (C) Geology       (D) Biome
10. According to Endosymbiotic hypothesis, the aerobic bacteria developed into:  
 (A) Mitochondria       (B) Ribosomes       (C) Chloroplasts       (D) Golgi bobies
11. Biogeography, is the geographical distribution of:  
 (A) Phylum       (B) Class       (C) Species       (D) Genus
12. The floral parts of a flowering plant are:  
 (A) Different       (B) Similar       (C) Analogous       (D) Homologous
13. Endosymbiont Hypothesis was proposed by:  
 (A) Lynn Margulis       (B) Wallace       (C) Lamarck       (D) Linnaeus
14. Archaeobacteria can tolerance temperature up to:  
 (A) 120<sup>o</sup> C       (B) 50<sup>o</sup> C       (C) 70<sup>o</sup> C       (D) 100<sup>o</sup> C
15. Flagella may have arisen through ingestion of Prokaryotes like:  
 (A) Closteridium       (B) Vibro       (C) Salmonella       (D) Spirochetes

16. Which one is not a vestigial organ of human being?  
 (A) Appendix (B) **Eye lid**  
 (C) Coccyx (D) Nictitating membrane
17. Darwin's theory, as presented in the Origin of Species, mainly concerned:  
 (A) **How new species arise** (B) The origin of life  
 (C) How adaptations evolve (D) How extinctions occur
18. The gill pouches of mammals and birds are:  
 (A) **Support for "ontogeny recapitulates phylogeny"** (B) Evidence for the degeneration of unused body parts  
 (C) Used by the embryos to breathe (D) Used by the embryos to breathe
19. The smallest biological unit that can evolve over time is:  
 (A) **A population** (B) An individual  
 (C) A particular cell (D) A species
20. Among the scientists who believed in divine creation was:  
 (A) Lamark (B) **Carolus Linnaeus** (C) Darwin (D) Hyell
21. In a population with two alleles for a particular locus, B and b, the allele frequency of B is 0.7. What would be the frequency of heterozygote (Bb) if the population is in Hardy-Weinberg equilibrium?  
 (A) 0.7 (B) 0.09 (C) **0.42** (D) 0.49
22. Selection acts directly on:  
 (A) 0.42 (B) Each allele (C) Genotype (D) **Phenotype**
23. In a population that is in Hardy-Weinberg equilibrium, 16% of the individuals show the recessive trait. What is the frequency of the dominant allele in the population?  
 (A) 0.04 (B) 0.84 (C) 0.7 (D) **0.6**
24. According to endosymbiont hypothesis, the aerobic bacteria developed into:  
 (A) Ribosomes (B) Lysosomes (C) Golgi apparatus (D) **Mitochondria**
25. Flagella may have arisen through the ingestion of prokaryotes similar to spiral shaped bacteria called:  
 (A) E-coli (B) Streptococcus (C) **Spirochete** (D) Rhizobium
26. A respiratory protein found in all aerobic species is the:  
 (A) **Cytochrome - c** (B) Cytochrome - a (C) Cytochrome - b (D) Cytochrome - d
27. Which respiratory protein is found in all aerobic species?  
 (A) Glial cell line (B) Cysteine (C) Serine (D) **Cytochrome**
28. Who published the essay on the "principle of population"?  
 (A) Wallace (B) **Malthus** (C) Lamarck (D) Lyell
29. Wallace developed theory of natural selection essentially identical to:  
 (A) Lamarck (B) Linnaeus (C) Hutton (D) **Darwin**

30. An essay on the principle of population was published by:  
(A) Sutton (B) **Malthus** (C) Lyell (D) Darwin
31. Book "The origin of species" was written by:  
(A) **Darwin** (B) Linnaean (C) Lamarck (D) Wallace
32. Alfred Wallace developed a theory of natural selection essentially identical to:  
(A) **Darwin's** (B) Linnaeu's (C) Lamark's (D) Mendel's
33. An example of natural selection in action is evolution of antibiotic resistance in:  
(A) Algae (B) Fungi (C) Viruses (D) **Bacteria**
34. The first photosynthetic organisms probably used Hydrogen Sulfide as a source of Hydrogen for reducing CO<sub>2</sub> to:  
(A) H<sub>2</sub>CO<sub>3</sub> (B) **Sugars** (C) RUBP (D) Malate
35. Darwin "Origin of species" was published in:  
(A) 1850 (B) 1890 (C) 1865 (D) **1840**
36. How many types of finches did Darwin collect on Galapagos Island:  
(A) 20 types (B) **13 types** (C) 25 types (D) 30 types
37. The armored mammal that lives only in America is the:  
(A) Porcupine (B) Echidna (C) Pangolin (D) **Armadillo**
38. Armadillo, the armoured mammals live only in:  
(A) Europe (B) **America** (C) Australia (D) Asia
39. The vermiform appendix is a vestigial organ in:  
(A) Carnivores (B) Omnivores (C) Herbivores (D) **Fungivores**
40. In terrestrial vertebrates, the gill pouches develop into:  
(A) Gills (B) Lungs (C) Nose (D) **Eustachian tube**
41. Most fossils are found in:  
(A) Mud (B) **Sedimentary rock** (C) Ice (D) Stony rock c
42. Endangered species of plants have been recorded to more than:  
(A) 300 (B) 400 (C) 600 (D) **500**
43. Which one of the following is endangered in Pakistan:  
(A) Indian rhino (B) Cheer pheasant (C) Tiger (D) **Indus dophin**
44. In Pakistan among the animals declared extinct is:  
(A) White headed (B) **Crocodile** (C) Marbled teal (D) Houbara Bustard
45. Zoos and botanical gardens are to save species whose extinction is:  
(A) Permanent (B) Prominent (C) Dominant (D) **Imminent**

### Fill in the blanks.

1. Archaeobacteria can tolerate high temperature up to .....
2. The first eukaryote appeared about ..... years ago.
3. .... presented the theory of the origin of species by means of Natural Selection.
4. .... developed a theory of natural selection essentially identical to Darwin's.
5. .... are considered to be the ancestors of all life.
6. A respiratory protein called ..... is found in all aerobic organisms.
7. Total aggregate of genes in a population at any time is called its .....
8. Hardy Weinberg theorem describes a ..... population.
9. .... is a series of changes in the genetic composition of a population over time.
10. Level of classification between species and family is called .....
11. Hardy Weinberg equation is binomial expansion of .....
12. An ..... species is in imminent danger of extinction throughout its range.
13. A ..... is a localized group of individuals belonging to the same species.
14. The first photosynthetic organisms used ..... as source of hydrogen for reducing carbon dioxide to sugars.
15. .... published an essay on 'The Principle of Population'.

### Answers

1.	120° C	2.	1.5 Billion	3.	Darwin
4.	Alfred Wallace	5.	Prokaryotes	6.	Cytochromes
7.	Gene pool	8.	Non-evolving	9.	Evolution
10.	Genus	11.	$(p + q)^2$	12.	Endangered
13.	Population	14.	H <sub>2</sub> S	15.	Malthus

### ★ Short Questions Answers ★

1. **What are the sources of hydrogen for reducing CO<sub>2</sub> in first photosynthetic organism?**

Ans: The first photosynthetic organism probably used hydrogen sulphide as a source of hydrogen for reducing carbon dioxide to sugars.

2. **Which idea is known as endosymbiont hypothesis?**

Ans: The eukaryotic cell might have evolved when a large anaerobic amoeboid prokaryotic ingested small aerobic bacteria and stabilized them instead of digesting them. This is

**known** as endosymbiont hypothesis.

3. **What was the second idea of Lamarck called?**

Ans: The second idea of Lamarck adopted, was **called** the inheritance of acquired characteristics. In this concept of heredity, the modifications an organism acquires during its lifetime can be passed along to its offspring e.g., the long neck of the giraffe.

4. **What is the important turning point for evolutionary theory?**

Ans: The origin of species convinced most biologists that species are products of evolution. An important turning point for evolutionary theory was the birth of population genetics, which emphasizes the extensive genetic variation within populations and recognizes the importance of quantitative characters.

5. **How natural selection occurs?**

Ans: Natural selection occurs through an interaction between the environment and the variability inherent in any population.

6. **What was the statement or theorem of Hardy-Weinberg?**

Ans: **It states** that the frequencies of alleles and genotypes in a population's gene pool remain constant over the generation unless acted upon by agents other than sexual recombination.

7. **Which mating is called non-random mating?**

Ans: Individuals with certain genotypes sometimes mate with one another more commonly than would be expected on a random basis. This is **called** non-random mating.

8. **On what evidence Darwin's theory of evolution was mainly based.**

Ans: Darwin's theory of evolution was mainly based on evidence from the geographical distribution of species and from the fossil record.

9. **Who was Darwin's predecessor who developed a comprehensive model that attempted to explain how life evolves?**

Ans: Jean Baptiste Lamarck (1744-1829).

10. **What is spirochete?**

Ans: A helical bacterium which is flexible and has periplasmic flagella is **called** spirochete.

11. **Define bio-geography.**

Ans: The study of geographical distribution of life on earth. **Bio-geographers** attempt to explain the factors that influence where species of plants and animals live on earth.

12. **What are fossils?**

Ans: Any remain impressions or traces of organisms of a formal geological age.

13. **Define embryology.**

Ans: Study of animal development from fertilized egg to formation of all major organs.

14. **What is molecular biology?**

Ans: The study of biochemical structures and function of organisms at molecular level.

15. **What does evolution refer?**

Ans: Evolution refers to the processes that have transformed life on earth from its earliest

forms to the vast diversity that is observed today.

16. **What is the concept of special creation?**

Ans: According to the theory of special creation all living things came into existence in their present forms especially and specifically created by nature. Among the scientists who believed in divine creation was Carolus Linnaeus.

17. **What is the concept of Evolution?**

Ans: The idea that organisms might evolve through time, with one type of organism giving rise to another type of organism is **called** evolution.

18. **What Darwin said about Finches of Galapagos?**

Ans: Among the birds Darwin collected 13 types of finches that, although quite similar, seemed to be different species. Some were unique to individual islands, while other species were distributed on two or more islands that were close together.

19. **What did Lamarck said about the use and disuse of organs?**

Ans: Lamarck argued that those parts of the body used extensively to cope with the environment become larger and stronger, while those that are not used deteriorate.

20. **What was Darwin's idea of Origin of Species?**

Ans: A new species would arise from an ancestral form by the gradual accumulation for adaptations to different environment, separated from original habitat by geographical barriers. Over many generations, the two population could become dissimilar enough to be designated separate species.

21. **What was the contribution of Wallace in the development of theory of natural selection?**

Ans: Alfred Wallace developed a theory of natural selection essentially identical to Darwin's. Wallace's paper, along with extracts from Darwin's unpublished 1844 essay, were presented to the Linnaean society of London on July 1, 1858.

22. **Define the theory of natural selection.**

Ans: Nature will select the organism whose inherited characteristics fit them best to their environment and eliminate others.

23. **What is Neodarwinism?**

Ans: According to neodarwinism the new species evolve due to extensive genetic variation within populations and natural selection.

24. **What does indicate that prokaryotes are ancestors of all life?**

Ans: Evidence from biochemistry, molecular biology, and cell biology places prokaryotes as the ancestors of all life, and predicts that bacteria should precede all eukaryotic life in the fossil record.

25. **What are homologous structures?**

Ans: Similarity in characteristics resulting from common ancestry is **known** as homology, and such anatomical signs of evolution are called homologous structures. For example: the forelegs (cat etc.), wings(bat), flippers(whale), and arms(man).

26. **What are vestigial organs?**

Ans: Vestigial organs are historical remnants of structures that had important functions in

ancestors but are no longer essential. For instance: vermiform appendix in carnivores and man.

27. **Name some vestigial structures in man.**

Ans: Ear muscles, nictitating membrane, vermiform appendix and coccyx in man are vestigial structures.

28. **Differentiate between homologous and analogous organs.**

Ans: Homologous organs are functionally different but structurally alike e.g., forelimbs of man, bat, horse, whale, etc., are **example** of divergent evolution. Analogous organs are functionally alike but structurally different e.g., wings of bat, birds and insects are **examples** of convergent evolution.

29. **Differentiate between natural selection and artificial selection.**

Ans: Natural selection occurs through an interaction between the environment and the variability inherent in any population, while the selective breeding of domesticated plants and animals by man is **called** artificial selection.

30. **What is population?**

Ans: Population is a group of inter-breeding individuals belonging to a particular species and sharing a common geographic area or a population is a localized group of individuals' belongings to the same species.

31. **Define species.**

Ans: A species is a group of individuals that have the potential to interbreed in nature.

32. **What is gene pool?**

Ans: The total aggregate of genes in a population at one time is called the population's gene pool. It consists of all alleles at all gene loci in all individuals of the population.

33. **Define the Hardy-Weinberg theorem.**

Ans: It states that the frequencies of alleles and genotypes in a population's gene pool remain constant over the generation unless acted upon by agents other than sexual recombination.

34. **What is Hardy-Weinberg equation used for?**

Ans: A general formula, **called** the Hardy-Weinberg equation is used for calculating the frequencies of alleles and genotypes in populations at equilibrium.

35. **What factors affect the gene frequency?**

Ans: **Factors that affect that gene frequency:**

- ❖ Mutation.
- ❖ Migration.
- ❖ Genetic drift.
- ❖ Non-random mating.
- ❖ Selection.