QB365

Important Questions -Evolution

12th Standard CBSE

Biology

Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

1) Presence of gills in the tadpole of frog indicates that **1**

(a) fishes evolved from frog-like ancestors (b) frogs will have gills in future

(c) frogs evolved from gilled ancestors (d) fishes were amphibious in the past

2) Which of the following is a living fossil? **1**

(a) Moss (b) Saccharomyces (c) Spirogyra (d) Cyas

3) De Vries gave his mutation theory on organic evolution while working on **1**

(a) pisum sativum (b) Drosophila melanogaster (c) Oenothera lamarckiana (d) Althea rosea

4) 3-5 billion years ago, which flora dominated the earth? **1**

(a) Archaebacteria (b) Mosses (c) Lichens (d) Blue-green algae

5) According to the theory of mutation by Hugo de Vries **1**

(a) only small mutation takes part in variation (b) only large mutation takes part in variation

(c) both small and large mutation cause variation in species (d) none of the above

6) A living connecting link which provides evidences for organic evolution is **1**

(a) Sphenodon between reptile and bird (b) lung fishes between pisces and reptile

(c) Archaeopteryx between reptile and bird (d) duck-billed platypus between reptiles and mammals

7) In the case of peppered moth (Biston betularia) the black-coloured from became dominant over the light-coloured form in England during industrial revolution. This is an example of **1**

(a) inheritance of dark colour character acquired due to the darker environment

(b) natural selection whereby darker forms were selected

(c) appearance of the darker coloured individuals due to very poor sunlight (d) protective mimicry

8) Jurassic period of the mesozoic era is characterized by **1**

(a) flowering plants and first dinosaurs appear

(b) gymnosperms are dominant plants and first birds appear

(c) radiation of reptiles and origin of mammal like reptiles

(d) dinosaurs become extinct and angiosperms appear

9) The diversity in the type of beak of finches adapted to different feeding habits on the Galapagos islands, as observed by Darwin, provides evidence for **1**

(a) Origin of species by natural selection (b) Intraspecific variation (c) Intraspecific competition

(d) Interspecific competition

10) The unit of natural selection is **1**

(a) an individual (b) a species (c) a genus (d) a population

Section - B

11) What does the comparison between the eyes of Octopus and those of mammals say about their ancestry and evolution? **2**

12) Divergent evolution leads to homologous structures. Explain with the help of an example. **2**

13) State Hardy-Weinberg principle of genetic equilibrium. Knowing that genetic drift disturbs this equilibrium, mention what this disturbance in genetic equilibrium leads to. **2**

14) How does 'fitness' of a population help in evolution? **2**

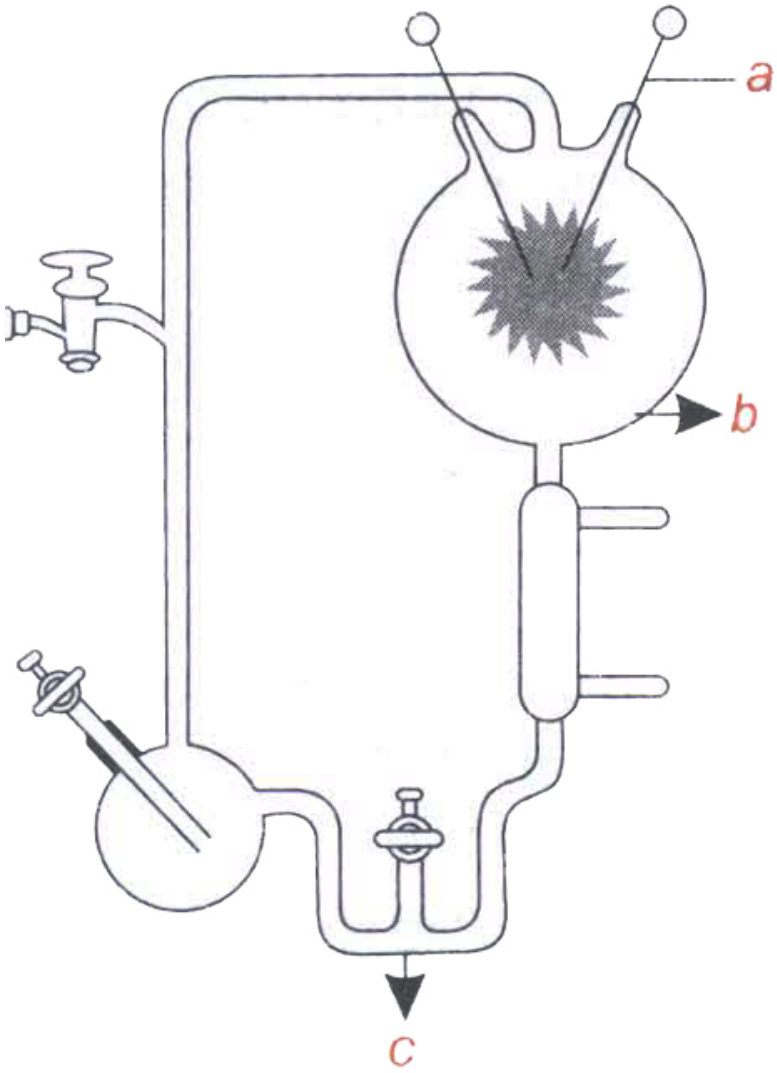
15) All vertebrate embryos show some similarities an early stage. Mention two such similarities. What do they indicate? Explain. **2**

16) Amongst pea tendrils, Opuntia spines, lemon thorn and Cucurbita tendrils, which ones are homologous structures? Why do you call them homologous? **2**

17) Discuss, is evolution a process or the end result of a process. **2**

18) When and where did Australopithecus live? Mention their characteristics. **2**

19) Name the scientist who had used the set-up shown below: **2**



Write the purpose of 'a' in the set-up and the conclusion, the scientist arrived at.

20) Evolution is a change in the gene frequencies in a population in response to changes in the environment in a time scale of years and not centuries. Justify this statement with reference to DDT. How does the theory of Hugo de Vries support this? **2**

Section - C

21) (a) Explain taking one example of vertebrate anatomy, that evolution of life has occurred on earth. (b) 'Nature selects for fitness'. Explain with suitable example. **5**

22) State the hypothesis of Oparin and Haldane about the primeval Earth condition. What do you understand by Haldane's hot, dilute soup? State its significance. **5**

23) What is biogeography? How Darwin succeeded to use the evidence from biogeography in favour of evolution? **5**

24) State the modifications of forelimb in animals as an example of homology. **5**

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Section - A

1) (c) frogs evolved from gilled ancestors **1**

2) (d) Cyas 1

3) (c) Oenothera lamarckiana 1

4) (d) Blue-green algae 1

5) (c) both small and large mutation cause variation in species 1

6) (d) duck-billed platypus between reptiles and mammals 1

7) (b) natural selection whereby darker forms were selected 1

8) (b) gymnosperms are dominant plants and first birds appear 1

9) (a) Origin of species by natural selection 1

10) (a) an individual 1

Section - B

11) 2

Eyes of Octopus and those of mammals are analogous structures, which have resulted from convergent evolution. - They have not evolved from common ancestors.

12) 2

Divergent evolution is the evolutionary process, where the same structure develops along different directions in different groups of organisms adaptions to different needs. - All the different structures evolved are homologous structures, as they all have a similar anatomical structure, though they perform different functions, e.g. the thorn of Bougainvillea and tendril of Cucurbita are homologous organs, as both of them are modified stems, which perform different functions.

13) 2

Hardy-Weinberg principle states that allele frequencies in a population are stable and remain constant generation after generation; it is called genetic equilibrium. Genetic drift - Genetic drift refers to the random changes in the allele frequencies of a population, in the allele frequencies of a population, that occur only by chance. - When the change in the allele frequency is so different in the original drifted population that it becomes a new species, the original population becomes founders and such an effect, is called founder effect.

14) 2

- Fitness, according to Darwin, refers ultimately and only to reproductive fitness. - Those who are better fit in an environment would outbreed others, who are less fit in that environment; they leave more progeny (with more fit individuals) than others. - They will survive better and are selected by nature (natural selection) to reproduce and increase their population size.

15) 2

(i) All vertebrate embryos develop a row of gill slits, which are functional only in fish and not in other vertebrates. (ii) Notochord is present in all vertebrate embryos. Such similarities indicate that they have descended/evolved from a common ancestor.

16) **2**

- Lemon thorn and Cucurbita tendrils are homologous - as both are stem modified. - Opuntia spines and pea tendrils are homologous - as both are leaf modifications. - Homologous organs are those organs in different groups of organisms, that are similar in basic structural and developmental patterns, but perform different functions and are superficially distinct.

17) **2**

- The biodiversity we see today is the story of evolution, i.e. evolution is considered as a process, that has resulted in various life forms. - If we talk about the life on earth, evolution is considered as a consequence of the process, called natural selection. - It is difficult to decide, whether evolution and natural selection are processes or results of some unknown processes.

18) **2**

Australopithecus lived in the East-African grassland. - They were probably not taller than four feet. - They walked upright. - They hunted with stone weapons and essentially ate fruits.

19) **2**

S.L. Miller used this.

- The electrodes (a) are used to create an electric discharge, similar to the lightning in the primitive earth; it was to provide energy.
- He observed formation of amino acids; it proved the chemical evolution.

20) **2**

- As the environment changes, the organisms which are better adapted to the changed environment, could survive better and reproduce. - When DDT was used, initially most of the mosquitoes died, but a few survived. - These few mosquitoes reproduced and the offspring were also resistant to DDT. - Today, the population of mosquitoes consists mainly of DDT-resistant mosquitoes. - The DDT-resistant mosquitoes have appeared in a time scale of months or year and not centuries. - So, evolution is not a direct process but stochastic process based on chance events According to Hugo de Vries, evolution occurs due to mutations, i.e. large differences arising suddenly in a population. - According to him large, single-step mutation, called saltation, must have been the cause of DDT-resistance in mosquitoes.

Section - C

21) **5**

(a) - The forelimbs of cheetah, whales, bats and humans have a similar anatomical structure. - All of them have the bones, humerus, radius, ulna, carpals, metacarpals and phalanges. - It indicates divergent evolution where the same structure has developed along different directions as adaptations to different needs. - Such structures are called homologous organs and homology indicates common ancestry. (b) - Nature selects for fitness. - We must remember that fitness is based on the characteristics which are inherited. - So there must be a genetic basis for getting selected and to evolve; in other words, there are some organisms which are better adapted to survive in an otherwise hostile environment. - Adaptive ability is inherited and it has a genetic basis; hence fitness is the end result of the ability to adapt and get selected by nature.

22) **5**

Alexander I. Oparin (1894-1980), a Russian biochemist and J.B.S. Haldane (1892-1964), a British scientist have put forward the concept of biogenesis. According to Oparin and Haldane primeval earth had reducing condition and atmosphere is free from oxygen. Oxygen remained bound in HO and metallic oxides on the surface of rocks and its particles. The early gas cloud was rich in hydrogen, in form of methane (CH_4) and ammonia (NH_3) and water (H_2O). The organic nolucles formed due to atmospheric reaction accumulated slowly and gradually in sea and constitute what is called "Hot, dilute soup". Significance of hot dilute soup. Thus conditions of reducing nature are unable to oxidize these organic compounds which form the basis of life.

23) **5**

Biogeography means the study of geographical distribution of species. Darwin joined as an unpaid naturalist on a five-year navigational mapping of British Admiralty abrod the ship H.M.S. Beagle. During his voyage Darwin observed and studied a wide variety of plants and animals on continents and in distant seas. Darwin studied on different continents different species. He found different species. He found different species in mainland and islands and showed evolutionary relation of species with biogeography. Darwin studied birds called 'finches' which resemble with original birds of main land from Galapago islands separated. He also noticed giant tortoise, metre long marine and land iguanas, many unusual, plants, insects, sea shell. All these varieties of organisms influenced Darwin to think about evolutionary changes.

24) **5**

The forelimb of vertebrates are pentadactyl, i.e. consist of same bones humerous, radius, ulna, carpals, metacarpals and phalangers, but differ in their function in different organisms. The forelimbs of the following animals got modified as shown below: (i) Whale are modified for swimming

(ii) Bat and bird are modified for flying.

(iii) Horse are modified for running

(iv) Frog are modified for leaping.

(v) Man are modified for grasping. The indicates common ancestry and homology based on divergent evolution.