

# DPP - Daily Practice Problems

## Chapter-wise Sheets

Date :

Start Time :

End Time :

# BIOLOGY

CB29

SYLLABUS : Evolution

Max. Marks : 180

Marking Scheme : + 4 for correct & (–1) for incorrect

Time : 60 min.

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. Genetic drift operates only in
  - (a) smaller populations
  - (b) larger populations
  - (c) mendelian populations
  - (d) island populations
2. *Archaeopteryx* is connecting link between
  - (a) Reptiles and birds
  - (b) Reptiles and mammals
  - (c) Fishes and reptiles
  - (d) Chordates and nonchordates
3. Which of the following is true?
  - (a) Wings of birds and insects are homologous organs.
  - (b) Human hands and bird's wings are analogous organs.
  - (c) Human hands and bat's wings are analogous organs.
  - (d) Flipper of seal and wing of birds are homologous organs.
4. Which one of the following phenomena supports Darwin's concept of natural selection in organic evolution?
  - (a) Development of transgenic animals.
  - (b) Production of 'Dolly', the sheep by cloning.
  - (c) Prevalence of pesticide resistance insects.
  - (d) Development of organs from 'stem cells' for organ transplantation.
5. What is the correct arrangement of periods of palaeozoic era in ascending order in geological time scale?
  - (a) Cambrian → Devonian → Ordovician → Silurian → Carboniferous → Permian
  - (b) Cambrian → Ordovician → Silurian → Devonian → Carboniferous → Permian
  - (c) Cambrian → Ordovician → Devonian → Silurian → Carboniferous → Permian
  - (d) Silurian → Devonian → Cambrian → Ordovician → Permian → Carboniferous
6. The brain capacity of *Homo erectus* was about
  - (a) 650 cc
  - (b) 900 cc
  - (c) 1500 cc
  - (d) 1400 cc

RESPONSE  
GRID

1. (a)(b)(c)(d)  
6. (a)(b)(c)(d)

2. (a)(b)(c)(d)

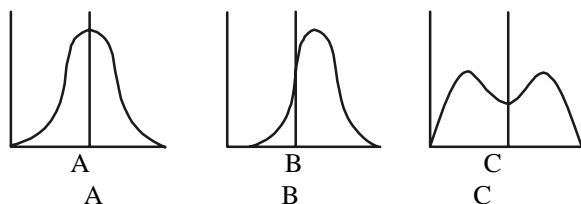
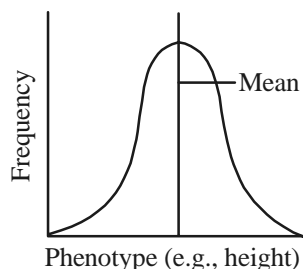
3. (a)(b)(c)(d)

4. (a)(b)(c)(d)

5. (a)(b)(c)(d)

Space for Rough Work

7. Following is the digrammatic representation of the operation of natural selection on different traits. Which of the following options correctly identifies all the three graphs A, B and C.



- (a) Directional      Stabilizing      Disruptive  
(b) Stabilizing      Directional      Disruptive  
(c) Disruptive      Stabilizing      Directional  
(d) Directional      Disruptive      Stabilizing
8. First life form on earth was a  
(a) cyanobacterium      (b) chemoheterotroph  
(c) autotroph      (d) photoautotroph
9. The cranial capacity was largest among the  
(a) Peking man      (b) Java ape man  
(c) African man      (d) Neanderthal man
10. The Hardy-Weinberg principle cannot operate if  
(a) the population is very large  
(b) frequent mutations occur in the population  
(c) the population has no chance of interaction with other populations  
(d) free interbreeding occurs among all members of the population
11. The different forms of interbreeding species that live in different geographical regions are called  
(a) sibling species      (b) sympatric species  
(c) allopatric species      (d) polytypic species
12. At a particular locus, frequency of allele A is 0.6 and that of allele a is 0.4. What would be the frequency of heterozygotes in a random mating population at equilibrium?  
(a) 0.36      (b) 0.16  
(c) 0.24      (d) 0.48
13. On the primitive earth, polymers such as proteins and nucleic acids in aqueous suspension formed the spherical aggregates. These are called  
(a) primitosomes      (b) liposomes  
(c) primitogens      (d) coacervates
14. Which of the following evidences does not favour the Lamarckian concept of inheritance of acquired characters?  
(a) Lack of pigment in cave-dwelling animals  
(b) Melanization in peppered moth  
(c) Absence of limbs in snakes  
(d) Presence of webbed toes in aquatic birds.
15. Genetic drift is change of  
(a) gene frequency in same generation  
(b) appearance of recessive genes  
(c) gene frequency from one generation to next  
(d) None of these
16. The Miller-Urey abiotic synthesis experiment (and other subsequent, similar experiments) showed that...  
(a) simple organic molecules can form spontaneously under conditions like those thought to prevail early in the earth's history.  
(b) the earliest life forms introduced large amounts of oxygen to the atmosphere.  
(c) life can be created in a test tube.  
(d) long chains of DNA can form under abiotic conditions.
17. In evolutionary terms, an organism's fitness is measured by its  
(a) health  
(b) contribution to the gene pool of the next generation  
(c) mutation rate  
(d) genetic variability
18. Frequency of a character or a mutant gene in a population is expected to increase if the phenotype or its gene is.  
(a) dominant      (b) favourably selected  
(c) recessive      (d) sex linked

**RESPONSE  
GRID**

7. (a)(b)(c)(d)	8. (a)(b)(c)(d)	9. (a)(b)(c)(d)	10. (a)(b)(c)(d)	11. (a)(b)(c)(d)
12. (a)(b)(c)(d)	13. (a)(b)(c)(d)	14. (a)(b)(c)(d)	15. (a)(b)(c)(d)	16. (a)(b)(c)(d)
17. (a)(b)(c)(d)	18. (a)(b)(c)(d)			

Space for Rough Work

19. In a population of bears, which would be considered the fittest?  
 (a) The biggest bear  
 (b) The bear having the largest number of mutations  
 (c) The bear that blends in with its environment the best  
 (d) The bear that leaves the most descendants
20. Presence of temporary gill pouches in embryos of snakes, birds and mammals indicates that  
 (a) these embryos need the pouches for breathing  
 (b) common ancestor of these animals had gill pouches  
 (c) lungs evolved from gills  
 (d) fluid medium in which these embryos develop has abundant
21. Which of the following statements is correct?  
 (a) Present apes are ancestors of man anatomically  
 (b) Proconsul was perhaps the common ancestor of apes and man  
 (c) Proconsul was the ancestor of man and not of apes  
 (d) None of these
22. What is common to whale, seal and shark?  
 (a) Thick subcutaneous fat  
 (b) Convergent evolution  
 (c) Homoiothermy  
 (d) Seasonal migration
23. One of the important consequences of geographical isolation is:  
 (a) preventing speciation  
 (b) speciation through reproductive isolation  
 (c) random creation of new species  
 (d) no change in the isolated fauna
24. Which one of the following in birds, indicates their reptilian ancestry?  
 (a) Scales on their hind limbs  
 (b) Eggs with a calcareous shell  
 (c) Four-chambered heart  
 (d) Both (a) and (b)
25. Jurassic period of the mesozoic era was characterised by:  
 (a) Radiation of reptiles and origin of mammal-like reptiles  
 (b) Dinosaurs become extinct and angiosperms appeared  
 (c) Flowering plants and first dinosaurs appeared  
 (d) Gymnosperms were dominant plants and first birds appeared
26. Which one of the following scientists name is correctly matched with the theory put forth by him?  
 (a) Weismann - Theory of continuity of Germplasm  
 (b) Pasteur - Inheritance of acquired characters  
 (c) De Vries - Natural selection  
 (d) Mendel - Theory of Pangenesis
27. The eye of octopus and eye of cat show different patterns of structure, yet they perform similar function. This is an example of:  
 (a) Homologous organs that have evolved due to divergent evolution.  
 (b) Analogous organs that have evolved due to convergent evolution.  
 (c) Analogous organs that have evolved due to divergent evolution.  
 (d) Homologous organs that have evolved due to convergent evolution.
28. Variation in gene frequencies within populations can occur by chance rather than by natural selection. This is referred to as:  
 (a) genetic drift  
 (b) random mating  
 (c) genetic load  
 (d) genetic flow
29. The finch species of Galapagos Islands are grouped according to their food sources. Which of the following is not a finch food?  
 (a) Seeds (b) Carrion  
 (c) Insects (d) Tree buds
30. Evolution is  
 (a) progressive development of a race  
 (b) history and development of a race along with variations  
 (c) history of a race  
 (d) development of a race
31. Homologous organs are  
 (a) Wings of Insects and Bat  
 (b) Gills of Fish and lungs of Rabbit  
 (c) Pectoral fins of Fish and fore limbs of Horse  
 (d) Wings of Grasshopper and Crow

**RESPONSE  
GRID**

- |                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 19. (a) (b) (c) (d) | 20. (a) (b) (c) (d) | 21. (a) (b) (c) (d) | 22. (a) (b) (c) (d) | 23. (a) (b) (c) (d) |
| 24. (a) (b) (c) (d) | 25. (a) (b) (c) (d) | 26. (a) (b) (c) (d) | 27. (a) (b) (c) (d) | 28. (a) (b) (c) (d) |
| 29. (a) (b) (c) (d) | 30. (a) (b) (c) (d) | 31. (a) (b) (c) (d) |                     |                     |

Space for Rough Work

32. Theory of inheritance of acquired characters was given by  
(a) Wallace (b) Lamarck  
(c) Darwin (d) De Vries
33. The kind of evolution in which two species of different genealogy come to resemble one another closely, is termed as  
(a) progressive evolution  
(b) convergent evolution  
(c) parallel evolution  
(d) retrogressive evolution
34. The presence of gill slits in the embryos of all vertebrates, supports the theory of  
(a) biogenesis  
(b) recapitulation  
(c) metamorphosis  
(d) organic evolution
35. The change of the light-coloured variety of peppered moth (*Biston betularia*) to its darker variety (*Biston carbonaria*) is due to  
(a) mutation (b) regeneration  
(c) genetic isolation (d) temporal isolation
36. Which of the following primate is the closest relative of humans?  
(a) Rhesus monkey (b) Orangutan  
(c) Gorilla (d) Gibbon
37. Which of the following is the relatively most accurate method for dating of fossils?  
(a) Radio-carbon method  
(b) Potassium-argon method  
(c) Electron-spin resonance method  
(d) Uranium-lead method
38. Adaptive radiation refers to  
(a) evolution of different species from a common ancestor  
(b) migration of members of a species to different geographical areas  
(c) power of adaptation in an individual to a variety of environments  
(d) adaptations due to geographical isolation.
39. What was the most significant trend in evolution of modern man (*Homo sapiens*) from his ancestors ?  
(a) Upright posture  
(b) Shortening of jaws  
(c) Binocular vision  
(d) Increasing brain capacity
40. According to Oparin, which one of the following was **not** present in the primitive atmosphere of the earth?  
(a) Methane (b) Oxygen  
(c) Hydrogen (d) Water vapour
41. There is no life on moon due to the absence of  
(a) O<sub>2</sub> (b) water  
(c) light (d) temperature
42. Which one of the following statements is correct?  
(a) Cro-Magnon man's fossil has been found in Ethiopia  
(b) *Homo erectus* is the ancestor of man  
(c) Neanderthal man is the direct ancestor of *Homo sapiens*  
(d) *Australopithecus* is the real ancestor of modern man
43. Atmosphere of earth just before the origin of life consisted of  
(a) water vapours, CH<sub>4</sub>, NH<sub>3</sub> and oxygen.  
(b) CO<sub>2</sub>, NH<sub>3</sub>, and CH<sub>2</sub>  
(c) CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub> and water vapours.  
(d) CH<sub>4</sub>, O<sub>3</sub>, O<sub>2</sub> and water vapours.
44. The extinct human ancestor who ate only fruits and hunted with stone weapons was  
(a) *Ramapithecus* (b) *Australopithecus*  
(c) *Dryopithecus* (d) *Homo habilis*
45. Tasmanian Wolf is a marsupial while Wolf is a placental mammal. This shows  
(a) convergent evolution  
(b) divergent evolution  
(c) inheritance of acquired characters  
(d) None of these

**RESPONSE  
GRID**

32. (a) (b) (c) (d)

33. (a) (b) (c) (d)

34. (a) (b) (c) (d)

35. (a) (b) (c) (d)

36. (a) (b) (c) (d)

37. (a) (b) (c) (d)

38. (a) (b) (c) (d)

39. (a) (b) (c) (d)

40. (a) (b) (c) (d)

41. (a) (b) (c) (d)

42. (a) (b) (c) (d)

43. (a) (b) (c) (d)

44. (a) (b) (c) (d)

45. (a) (b) (c) (d)

Space for Rough Work

**DAILY PRACTICE PROBLEM DPP CHAPTERWISE 29 - BIOLOGY**

Total Questions	45	Total Marks	180
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	45	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

# HINTS & SOLUTIONS

## DPP/CB29

1. (a) Genetic drift can operate only on smaller populations where its fluctuation can be observed in the proportion of allele distribution in the presence of external disturbances. Genetic drift is the random change in allele number and frequency in a gene pool.
2. (a)
3. (d) Flipper of seal and wing of birds are modified forelimbs, thus, have same fundamental structure but have different functions. Flippers are meant for swimming and wings are meant for flying. Therefore, these organs are homologous organs.
4. (c) Prevalence of pesticide resistant insects supports natural selection theory e.g., DDT was thought to be an effective insecticide against household pests (like mosquitoes houseflies, body lice) in 1945. But, within 2 to 3 years of its introduction, new DDT resistant mosquitoes appeared in the population. These mutant strains, soon became well established in the population by natural selection and thus replaced the original DDT-sensitive mosquitoes.
5. (b) Paleozoic era is the era of ancient life. The correct arrangement of periods of this era is Cambrian → Ordovician (age of invertebrates) → Silurian → Devonian (age of fishes) → Carboniferous (age of Amphibians) → Permian.
6. (b) *Homo erectus* appeared about 1.7 million years ago in middle pleistocene. Its brain capacity was about 900 cc. He was about 1.5-1.8 m tall having erect posture.
7. (b) Stabilizing selection favours average sized individuals while eliminates small sized individuals. It reduces variation and thus, does not promote evolutionary change. But it maintains the mean value from generation to generation. In directional selection, the population changes towards one particular direction. It favours small or large sized individuals and more individuals of that type will be present in next generation. The mean size of the population changes. Disruptive selection favours both small-sized and large-sized individuals. It eliminates most of members with mean expression, so produces two peaks in the distribution of the trait that may lead to development of two different individuals. It is important in bringing about evolutionary change.
8. (b) It is presumed that the first living organisms were chemoheterotrophs that obtained energy by the fermentation of complex organic substances available to them from the sea broth. They were anaerobes.
9. (d) The cranial capacity of Neanderthal man was 1400 cc, of Peking man was 850 - 1100 cc, of java ape man was 800 - 1000 cc and of African man was 500 cc.
10. (b) Hardy-Weinberg principle describes a theoretical situation in which a population is undergoing no evolutionary change. It states that allele frequencies in a population are stable and constant from generation to generation. There are five factors that affect Hardy-Weinberg Principle. These are - mutation, gene flow, genetic drift, genetic recombination and natural selection pressure.
11. (c) In allopatric speciation, a part of the population becomes geographically isolated from the main population. The population becomes entirely separated and finally constitutes a new species in Galapagos Islands is an example of allopatric speciation.
12. (d) In a stable population, for a gene with two alleles, 'A' (dominant) and 'a' (recessive), if the frequency of 'A' is p and the frequency of 'a' is q, then the frequencies of the three possible genotypes (AA, Aa and aa) can be expressed by the Hardy-Weinberg equation:  

$$p^2 + 2pq + q^2 = 1$$
 where  $p^2$  = Frequency of AA (homozygous dominant) individuals  
 $q^2$  = Frequency of aa (homozygous recessive) individuals  
 $2pq$  = Frequency of Aa (heterozygous) individuals  
 so,  $p = 0.6$  and  $q = 0.4$  (given)  
 $\therefore 2pq$  (frequency of heterozygote) =  $2 \times 0.6 \times 0.4 = 0.48$ .
13. (d)
14. (b) According to Lamarckism (proposed by Lamarck), whatever characters an individual acquires in its life time due to internal vital force, effect of environment, new needs, use/disuse of organs, they are inherited to next generations. This process continues and after several generations, the variations are accumulated upto such an extent that they give rise to new species. Melanization in peppered moth favours Darwin's theory of natural selection.
15. (c)
16. (a) In 1953, Stanley Miller and Harold Urey created, in the laboratory, conditions comparable to those of early Earth, with water vapour, hydrogen, methane, and ammonia. The Miller-Urey apparatus produced a variety of amino acids and other organic compounds found in living organisms today.
17. (b)
18. (b)
19. (d) Fitness is a measure of an organism's genetic contribution to the next generation.
20. (b)
21. (b)
22. (b) The analogous organs show convergent evolution due to similar adaptation. They do not support organic evolution. Whale, seal and shark shows convergent evolution due to similar habitats.
23. (b) Speciation takes place via reproductive isolation which is the most important consequence of geographical isolation.
24. (d) Scales on their hind limbs and eggs with calcareous shell, indicates in birds about their reptilian ancestry.
25. (d) Jurassic period of mesozoic era was about 19-20 crore years ago & lasted for about 5.5-6 crore years. The climate was hot and damp. It is called the age of dinosaurs. 1st primitive bird *Archaeopteryx* evolved from reptiles. 1st angiosperm appeared as a dicotyledon but gymnosperms were dominant.
26. (a) The theory of the continuity of the germplasm was published by August Weismann (1834-1914) in 1886. It proposes that the contents of the reproductive cells (sperms and ova) are passed on unchanged from one generation to the next, unaffected by any changes undergone by the rest of the body. It thus, rules out any possibility of the inheritance of acquired characteristics, and has become fundamental to Neo-Darwinian theory.
27. (b) The eye of octopus and eye of cat show different patterns of structure, yet they perform similar functions. This is an example of analogous organs.  
 Analogous organs have evolved due to convergent evolution. Analogous organs have developed in the evolutionary process through adaptation of quite different organisms to similar mode of life.

28. (a) Genetic drift is variation in gene frequencies within populations that can occur by chance rather than by natural selection. Sometimes the change in allele frequency is so different in the new sample of population that they become a different species. The original drifted population becomes founder and the effect is called founder effect.
29. (b) Darwin observed an amazing diversity of creatures on Galapagos islands. He realised that there were many varieties of finches in the same island like seed-eating, with altered beaks insectivorous and vegetarian finches. Carrion are dead bodies. No finches feed on carrion.
30. (b) The term Evolution was given by Herbert Spencer that is "Descent with modifications". Evolution helps us to understand the history of life.  
Evolution is a process in which something changes into a different and usually more complete or better form over time and in response to environment. This results in descendants becoming different from ancestors.
31. (c) Organs that are similar in fundamental structure but different in functions are "Homologous organs", Richard Owen, introduced the term homologous. Pectoral fins of fish and fore limbs of horse similar in structure but different in functions are homologous organs.  
Rest of the organs compared in the question are analogous organs.
32. (b) One of the first attempts to explain the mechanism of evolution was made by Jean Baptiste de Lamarck. His theory was Inheritance of Acquired Characters. The theory states that the characters acquired during life time are passed on to the progeny and then to subsequent generations and new species are produced.
33. (b) Progressive evolution is development of organisms with more elaborate and specialized structures from those having less elaborate features e.g. amphibians from reptiles .Retrogressive or degenerative evolution is development of simpler forms from more complex ones. Such evolution has occurred in case of vestigial organs, parasitic forms, and in reduction of overspecialized structures such as wings in flightless birds. Parallel evolution is formation of similar traits in related groups of organisms independently due to similar requirement e.g. running of two toed deer and one toed Horse. Evolution of wings in insects and birds serve as example of convergent evolution.
34. (b) In the embryos of all vertebrates, the presence of gill slits supports the theory of recapitulation (repeating the early stages of embryogenesis in earlier evolved animals).
35. (a) The change in the colour of peppered moth is due to the mutation of single mendelian gene for the survival in the smoke-laden industrial environment. It is called Industrial melanism.
36. (c) Chimpanzees and gorillas are our closest relatives among the living primates.
37. (c) Electron Spin Resonance method is the most accurate method for dating of fossils.
38. (a) Adaptive radiation refers to evolution of different species from a common ancestor. The mammals are adapted for different mode of life i.e. they show adaptive radiation. They can be aerial (bat), aquatic (whale and dolphins), burrowing or fossorial (rat), cursorial ( horse), scantorial (squirrel) or arboreal (monkey). The adaptive radiation, the term by Osborn, is also known as Divergent evolution.
39. (d) The most significant trend in evolution of modern man (*Homo sapiens*) from his ancestors is development of brain capacity.
40. (b) According to Oparin, the atmosphere of primitive earth was reducing because its atoms were most numerous and most reactive. Free oxygen was not present in significant amount. Large quantities of  $H_2$ ,  $N_2$ , water vapour,  $CO_2$ ,  $CH_4$  and  $NH_3$  were present.
41. (b) There is no life on moon due to absence of water. There are many other reasons for being no life on moon, like insufficient oxygen, unsuitable temperature etc.
42. (b) *Cro-Magnon* fossils have been found in Europe. Neanderthal man is a transitional stage. *Australopithecus* appeared in early Pleistocene.
43. (c) The primitive atmosphere was reducing due to lack of free molecular oxygen. The early atmosphere contained ammonia ( $NH_3$ ), water vapour ( $H_2O$ ), hydrogen ( $H_2$ ), methane ( $CH_4$ ).
44. (a) Marsupials in Australia and placental mammals in North America show convergent evolution. These two subclasses of mammal have adapted in similar ways to a particular food supply, locomotor skill or climate.
45. (b) *Australopithecus* is one of the longest-lived and best-known early human species whose remains were found between 3.85 and 2.95 million years ago in Eastern Africa (Ethiopia, Kenya, and Tanzania). Evidences shows that they hunted with stone weapons but essentially ate fruits.