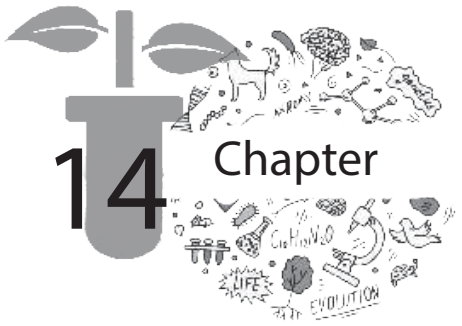


14 Chapter

Evolution

MULTIPLE CHOICE QUESTIONS

Topic 1 | Origin of Life and Evolution of Life Forms

1. Conventional religious literature tells us about the theory of
(a) Religious creation
(b) Abiogenetic creation
(c) Spontaneous creation
(d) Special creation

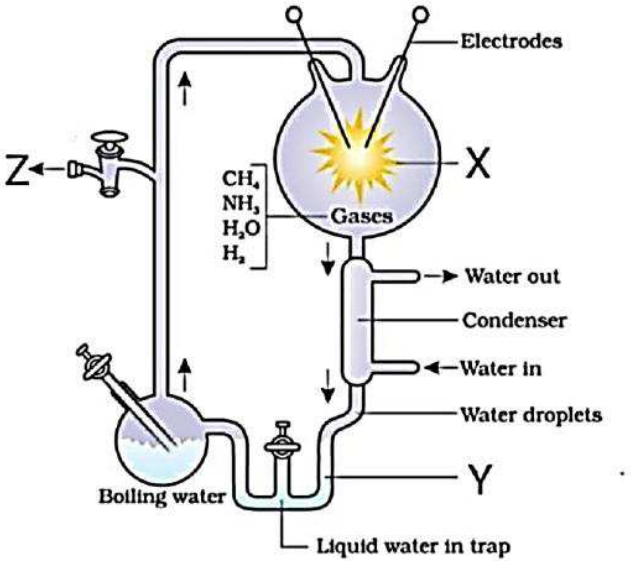
2. Special creation theory has three connotations. Select the correct connotation among the following.
(a) All living organisms (species or types) that we see today were created as such.
(b) The diversity was always the same since creation and will be the same in future also.
(c) Earth is about 40000 years old
(d) Both (a) and (b)

3. Select the correct statement among the following.
(a) All the ideas of Special creation theory were strongly challenged during the eighteenth century.
(b) Based on observations made during a sea voyage in a sail ship called H.M.S. Beagle round the world, Charles Darwin concluded that existing living forms share similarities to varying degrees not only among themselves but also with life forms that existed millions of years ago. Many such life forms do exist anymore.
(c) There had been extinctions of different life forms in the years gone by just as new forms of life arose at same periods of history of earth.
(d) Any population has built in variation in characteristics.

4. How many statements among the following are incorrect?
i. Those characteristics which enable some to survive better in natural conditions (climate, food, physical factors, etc.) would outbreed others that are less-endowed to survive under such natural conditions.
ii. The fitness, according to Darwin, refers ultimately and only to reproductive fitness.
iii. Those who are better fit in an environment leave more progeny than others. These, therefore, will survive more and hence are selected by nature. Darwin called it natural selection and implied it as a mechanism of evolution.
iv. Alfred Wallace, a physicist worked in Malay Archipelago.
v. The geological history of earth closely correlates with the physical history of earth.
(a) 3 (b) 4
(c) 2 (d) 1

5. The history of Earth can be studied in terms of
(a) Epochs (b) Periods
(c) Eras (d) All of these

6. Select the correct option about the given figure.
(a) The given figure represents diagrammatic representation of Miller's Experiment.
(b) X- Vacuum pump
(c) Y – Water containing inorganic compounds
(d) Z – Spark discharge



7. The study of the history of life forms of the earth is called
(a) Evolutionary Biology
(b) Ecology
(c) Environmental biology
(d) Comparative anatomy

8. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Origin of the universe	(1)	4.5 billion years ago
(B)	Origin of earth	(2)	4 billion years ago
(C)	Origin of life	(3)	2.7 billion years ago
(D)	Origin of first eukaryotes	(4)	20 billion years ago

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

9. Select the correct statement among the following.
(a) The universe is very old – almost 20000 million years old.
(b) Huge clusters of galaxies comprise the universe. Galaxies contain stars and clouds of gas and dust.
(c) The Big Bang theory attempts to explain to us the origin of universe.
(d) All of these.

10. Select the correct statement about the Big Bang theory.
(a) It talks of many huge explosions unimaginable in physical terms.
(b) The universe expanded and hence, the temperature increased. Hydrogen and Helium formed sometime later.
(c) The gases condensed under gravitation and formed the galaxies of the present day universe.
(d) In the solar system of the Milky Way galaxy, earth was supposed to have been formed about 4.5 million years back.

11. Select the correct statement about early Earth 4.5 billion year ago.
(a) There was a thick atmosphere on early Earth.
(b) Water vapour, hydrogen, carbon dioxide and ammonia released from molten mass covered the surface.
(c) The UV rays from the sun broke up water into Hydrogen and Oxygen and the lighter O_2 escaped. Oxygen combined with ammonia and methane to form water, CO_2 and others.
(d) The ozone layer was formed. As it cooled, the water vapor fell as rain, to fill all the depressions and form oceans.

12. When did life appear on earth?
(a) 500 billion years after the formation of Earth
(b) Almost four billion years back.
(c) Both (a) and (b)
(d) Almost three billion years back

13. Select the correct statement among the following.
(a) Some scientists believe that life came from outside.
(b) Early Greek thinkers thought units of life called spores were transferred to different planets including earth.

(c) 'Panspermia' is still a favourite idea for some astronomers.
(d) All of these

14. For a long time it was believed that life came out of decaying and rotting matter like straw, mud, etc. This was the theory of _____.
(a) Biogenesis
(b) Spontaneous generation
(c) Non-spontaneous generation
(d) Both (a) and (b)

15. Select the incorrect statement among the following.
(a) Louis Pasteur by careful experimentation demonstrated that life comes only from pre-existing life.
(b) Louis Pasteur showed that in pre-sterilised flasks, life did not come from killed yeast while in another flask open to air, new living organisms arose from 'killed yeast'.
(c) Spontaneous generation theory was dismissed by Louis Pasteur.
(d) Louis Pasteur answered how the first life form came on earth.

16. How many statements are incorrect among the following?
i. Oparin of England and Haldane of Russia proposed that the first form of life could have come from pre-existing non-living organic molecules (e.g., RNA, protein, etc.) and that formation of life was preceded by chemical evolution
ii. The conditions on earth were – high temperature, volcanic storms, reducing atmosphere containing CH_4, O_2, etc.
iii. In 1952, S.L. Miller, an American scientist created similar conditions in a laboratory scale
iv. S.L. Miller created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapour at 800°C.
v. With limited evidence, the first part of the conjectured story, i.e., chemical evolution was more or less accepted.

(a) 2 (b) 3
(c) 4 (d) 5

17. In S.L. Miller's electric discharge experiment, he observed formation of _____.
(a) Amino sugar (b) Glucosamine
(c) Amino acid (d) Proteins

18. In experiments similar to S.L. Miller's discharge experiment others observed, formation of how many of the following substances.
Sugars, Nitrogen gas, Pigment, Fats, Nitrogen bases, Amino sugar
(a) 3 (b) 4
(c) 5 (d) 6

19. Select the incorrect statement among the following.
(a) We have no idea about how the first self-replicating metabolic capsule of life arose.
(b) The first non-cellular forms of life could have originated 3 billion years back. They would have been giant molecules (RNA, Protein, Polysaccharides, etc.). These capsules reproduced their molecules perhaps.
(c) The first cellular form of life did not possibly originate till about 2 million years ago. These were probably single-cells.
(d) All life forms were in water environment only. This version of biogenesis, i.e., the first form of life arose slowly through evolutionary forces from non-living molecules is accepted by majority.

20. Chemical evolution refers to-
(a) Formation of diverse inorganic molecules from organic constituents
(b) Formation of diverse organic molecules from radioactive constituents
(c) Formation of diverse organic molecules from inorganic constituents
(d) Formation of diverse non-reducing molecules from inorganic constituents

Topic 2 | The Evidences for Evolution

21. Fossils are _____
(a) the preserved remains of the past life forms.
(b) mineralized form of hard body parts such as bones, teeth, etc.
(c) found mainly in the layers of sedimentary rocks.
(d) all of these

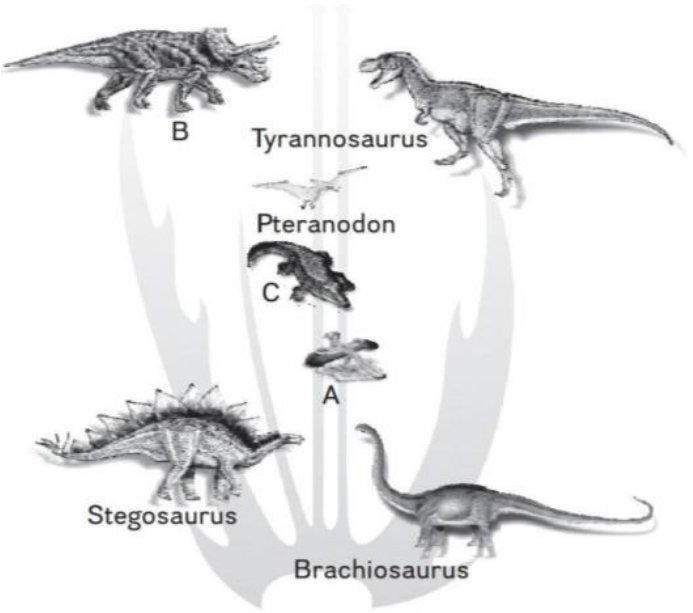
22. Consider the following statements about fossils:
(a) Rock sediments of different ages contain fossils of life forms that died during the formation of that particular layer of sediment.
(b) Fossil records are based on the sequence of occurrence of fossils in various strata of sedimentary rocks.
Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

23. Which of the following represents the paleontological evidence of evolution?
(a) Preserved remains of Dinosaurs obtained from sedimentary rocks.
(b) Presence of homologous structures.
(c) Presence of analogous structures.
(d) Presence of vestigial parts.

24. Fossils serve as one of the evidence of evolution because
(a) Fossil records show that various groups of organisms dominated earth during the different course of evolution.
(b) Many organisms are extinct today.
(c) Certain groups of organisms are restricted to a certain geological time period.

Select the option with all correct statements.
(a) Only a (b) Only b
(c) Both b and c (d) a, b and c

25. Given below is the family tree of dinosaurs and their living present day counterpart organisms. Which of the given options correctly name A, B and C?



(a) A: Triceratops; B: Archaeopteryx; C: Crocodilian
(b) A: Triceratops; B: Crocodilian; C: Archaeopteryx
(c) A: Archaeopteryx; B: Triceratops; C: Crocodilian
(d) A: Archaeopteryx; B: Crocodilian; C: Triceratops

26. Embryological support for evolution was proposed by _____ based upon the observation of certain features during embryonic stage common to all vertebrates that are absent in adult.
(a) Ernst Mayr (b) JBS Haldane
(c) Ernst Haeckel (d) Charles Lyell

27. Sweet potato is a ___(I)___ modification whereas potato is a ___(II)___ modification.
(a) (I)- Stem (b) (II)- Root
(c) Both (a) and (b) (d) None of these

28. Which of the given statement is incorrect about radiometric dating?
(a) A method to determine the absolute age of the fossils.
(b) It is based on the process of decay of radioactive isotopes.
(c) A method to determine the relative age of the fossils.
(d) Organisms accumulate isotopes of substances during their lifetime.

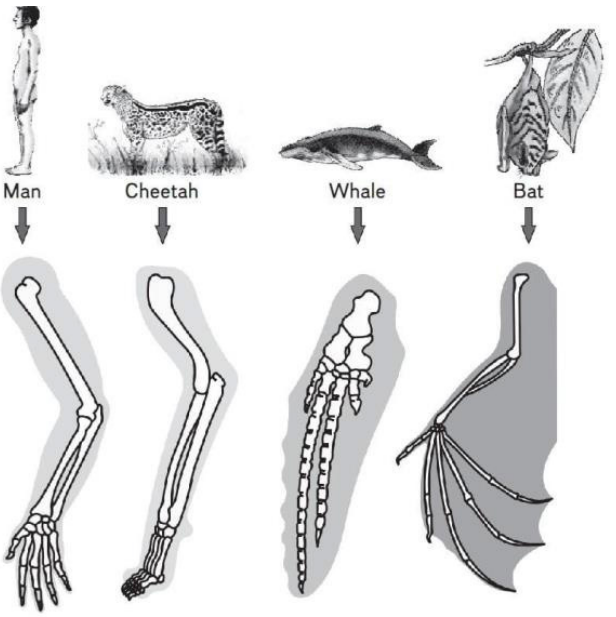
29. Consider the following statements:
(a) Comparative anatomical and morphological details of different but related organisms demonstrate a basic similarity.
(b) The same structures in different organisms are derived from a common ancestor.

Choose the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

30. Similar structures with different functions present in different species because of their common ancestry is known as _____
(a) Analogous structures
(b) Homologous structures
(c) Vestigial organs
(d) Homoplasy

31. Presence of homologous structures in different but related organisms is the result of _____
(a) Common ancestry
(b) Divergent evolution
(c) Convergent evolution
(d) Both (a) and (b)

32. The image shows the forelimbs of a whale, bat, cheetah and human (all mammals). Choose the correct option regarding the same.



(a) The basic similarities in the arrangement of bones in forelimbs of whales, bats, cheetahs and humans reflect their common ancestry.
(b) The forelimbs of whales, bats, cheetahs and humans are analogous structures.
(c) The image represents structures that evolved from convergent evolution.
(d) The image represents vestigial structures.

33. Which of the following structures represent homology?
(a) Wings of butterflies and birds
(b) Eyes of octopus and mammals
(c) Thorns and tendrils of *Bougainvillea* and *Cucurbita*
(d) Flippers of penguins and dolphins

34. Which of the following structures is homologous to the wing of a bird?
(a) Wing of a moth
(b) Hind-limb of the rabbit
(c) Flipper of the whale
(d) The dorsal fin of a shark

35. Independent evolution of structures with similar functions but different anatomy in distantly related organisms is known as _____
(a) Convergent evolution
(b) Divergent evolution

(c) Homology
(d) Mutation

36. The process of _____ evolution develops similar features in organisms with separate ancestries.
(a) Divergent (b) Convergent
(c) Homology (d) Speciation

37. Analogous structures are a result of _____
(a) stabilizing selection
(b) divergent evolution
(c) convergent evolution
(d) shared ancestry

38. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Cactus spine and pea tendril	(1)	Analogous structures
(B)	Wings of insects and birds	(2)	Vestigial structures
(C)	Hind limb bones of whales	(3)	Natural selection
(D)	Darwin's finches	(4)	Homologous structures

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

39. The wings of a bird and the wings of an insect are
(a) homologous structures and represent divergent evolution
(b) phylogenetic structures and represent divergent evolution
(c) analogous structures and represent convergent evolution
(d) homologous structures and represent convergent evolution

40. Which of the following examples does not represent analogous organs?
(a) Eyes of octopus and mammals.
(b) Sweet potato and potatoes.
(c) The spine of barberry and thorns of hawthorn.
(d) Eyes of cave-dwelling animals.

41. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Common proteins and genes present in diverse organisms	(1)	Artificial selection
(B)	Vertebrates heart or brain	(2)	Anatomical evidence of evolution
(C)	Animal husbandry and plant breeding	(3)	Natural selection
(D)	Industrial melanism	(4)	Biochemical evidence of evolution

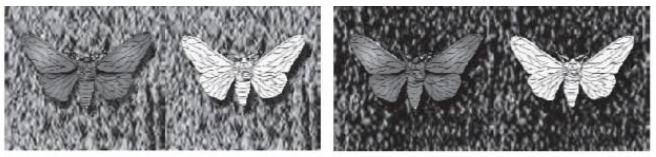
Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

42. Select the incorrect match from the following options.
(a) Tendrils and passionflower and thorns of pomegranate - homologous organs.
(b) Tendrils of *Vitis* and thorns of *Carissa* – homologous organs.
(c) Tendrils of balloon vine and bulbils of *Agave* – homologous organs.
(d) Scale leaves of onion and spines of *Opuntia* – analogous organs.

43. Industrial melanism is an example of
(a) Neo-Darwinism (b) Natural selection
(c) Mutation (d) Neo-Lamarckism

44. The given image shows white-winged and dark-winged moths.



I II

(a) Image I represents the survival advantage of white-winged moths in unpolluted areas.
(b) Image II represents the survival advantage of dark-winged moths in polluted areas.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

45. Which of the following serves as an indicator of atmospheric pollution?
(a) Lichens (b) *Rhizopus*
(c) *Penicillin* (d) *Lycopodium*

46. Match Column-I with Column-II.

	Column I		**Column II**
A)	Herbicide resistant varieties	(1)	A herbivore sauropod
B)	Brachiosaurus	(2)	Bony plates on the back
C)	Stegosaurus	(3)	A flying reptile
D)	Pteranodon	(4)	Evolution by anthropogenic action

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

47. Assertion: *Archaeopteryx* is a dead connecting link between reptiles and birds.

Reason: *Archaeopteryx* is the earliest known bird.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

48. Assertion: Evolution is not a directed process in the sense of determinism.

Reason: Evolution is based on chance events that occur in nature.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

49. Select the correct order of extinction of following dinosaurs?
I. Stegosaurus
II. Brachiosaurus
III. Pteranodon
IV. Triceratops
V. Tyrannosaurus
(a) II, I, III, V, IV (b) II, I, V, IV, III
(c) III, V, IV, II, I (d) None of these

Topic 3 Adaptive Radiation

50. The mechanism of adaptive radiation was first explained by
(a) Darwin (b) Morgan
(c) Lamarck (d) Hugo de Vries

51. Consider the following statements.
(a) Darwin compared the animals and plant species of Galapagos Islands with those of mainland of South America.
(b) He found observable and distinct similarities and differences among them.

(c) Flora and fauna of the Galapagos Islands do not exhibit resemblances to that of the South American mainland.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b and c) are false.
(c) Both (a) and (b) are false.
(d) All are false.

52. Lamarck was a _____.
(a) French zoologist (b) German botanist
(c) French naturalist (d) British botanist

53. Diversification of single ancestral species into many species in a relatively short period of time is called
(a) Artificial selection (b) Adaptive radiation
(c) Homology (d) Natural selection

54. Adaptive radiation occurs when
(a) lineages of an ancestral species encounter an empty niche.
(b) populations of a species exhibit random mating.
(c) gene flow between the populations of a species continues.
(d) adaptive radiation does not occur in nature.

55. Darwin's finches are an example of
(a) adaptive radiation (b) microevolution
(c) genetic drift (d) gene flow

56. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as
(a) Adaptive radiation
(b) Natural selection option
(c) Migration option
(d) Divergent evolution

57. Consider the following statements:
(a) Adaptive radiation occurs when numerous unexploited ecological opportunities are available.
(b) Islands have a large number of empty ecological niche as compared to the mainland present in the same geographical location.

Choose the correct answer.
(a) Both (a) and (b) are true.
(b) (a) is true but (b and c) are false.
(c) Both (a) and (b) are false.
(d) All are false.

58. _____ and _____ are the two key concepts of Darwinian theory of Evolution.
(a) Branching descent
(b) Natural Selection
(c) Both (a) and (b)
(d) None of these

59. The evolution of multiple species by the process of adaptive radiation cannot occur
(a) on remote islands
(b) in Darwin's finches
(c) in Australian marsupials
(d) in a habitat with a large number of existing species

60. Select the incorrect statement among the following.
(a) Lamarck said that evolution of life forms had occurred but driven by use and disuse of organs.
(b) Lamarck gave the examples of Giraffes who in an attempt to forage leaves on tall trees had to adapt by elongation of their necks.
(c) Giraffes passed on this acquired character of elongated neck to succeeding generations, Giraffes, slowly, over the years, came to acquire long necks.
(d) Everybody believes Lamarck's conjecture today.

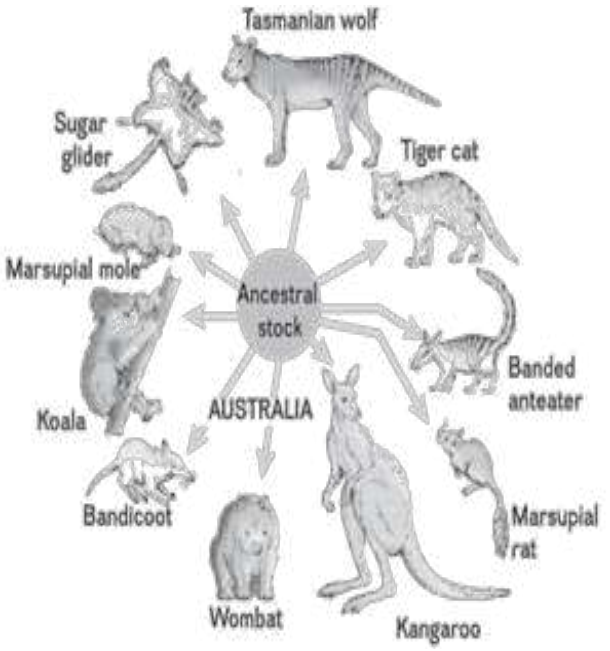
61. Which of the following statements does not reflect adaptive radiation in marsupials?
(a) Australia was geographically isolated from the rest of the world during the continental drift.
(b) The geographical isolation of Australia prevented the immigration of placental

mammals to the continent.

(c) Marsupials were the dominant mammals on the land of the Australian continent.

(d) Geographical isolation of Australia followed the migration of placental mammals to the continent.

62. Select the correct option for the given image:



(a) Convergent evolution in Australian marsupials

(b) Gene flow

(c) Adaptive radiation in Australian marsupials

(d) Both (a) and (c) are correct

63. A population of a species invades a new area. Which of the following condition will lead to adaptive radiation?

(a) Area with many habitats occupied by a large number of species.

(b) Area with large number of habitats having very low food supply.

(c) Area with a single type of vacant habitat

(d) Area with many types of vacant habitats.

64. When more than one (i) appeared to have occurred in an isolated geographical area (representing different habitats), one can call this (ii).

Select the correct option regarding the given statement.

(a) (i) Adaptive radiation; (ii) Divergent evolution

(b) (i) Adaptive radiation; (ii) Convergent evolution

(c) (i) Convergent evolution; (ii) Adaptive radiation

(d) (i) Divergent evolution; (ii) Adaptive radiation

65. Australian marsupials correspond to the placental mammals present in North America because

(a) gene flow occurred between Australian marsupials and North American placental mammals.

(b) adaptive radiation in Australian marsupials paralleled the evolution of placental mammals in North America.

(c) some North American placental mammal served as founder population for Australian marsupials.

(d) some Australian marsupials served as founder population for North American placental mammals.

66. Match the placental mammals given in Column-I to their corresponding Australian marsupials given in Column- II.

	Column I		**Column II**
(A)	Mole	(1)	Marsupial mole
(B)	Anteater	(2)	Marsupial mouse
(C)	Mouse	(3)	Spotted cuscus
(D)	Lemur	(4)	Numbat

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

67. Match the placental mammals given in Column-I to their corresponding Australian marsupials given in Column- II.

	Column I		Column II
(A)	Flying squirrel	(1)	Tasmanian tiger cat
(B)	Bobcat	(2)	Tasmanian wolf
(C)	Wolf	(3)	Long-eared bandicoot
(D)	Rabbit	(4)	Flying phalanger

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	4	1	3	2

Topic 6 Biological Evolution and Mechanism of Evolution

68. According to Darwin, the driving force of evolution is
(a) mutation (b) natural selection
(c) gene flow (d) migration

69. Evolution by natural selection requires
(a) presence of acquired variations among the individuals
(b) presence of genetic variations among the individuals
(c) isolated habitat
(d) constant environmental conditions

70. Consider the following statements:
(a) Evolution by natural selection started with the origin of cellular life forms with differences in metabolic capability.
(b) The theory of natural selection was given by Lamarck.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) is false.
(d) (a) is false but (b) is true.

71. The rate of evolution of new species in fishes is slower than that of in bacterial populations because
(a) the evolution of new species is linked to their lifespan.
(b) evolution of new species is linked to the habitat.
(c) both fishes and bacteria exhibit the same rate of evolution.
(d) species do not evolve at all.

72. Evolution of antibiotic-resistant bacterial population represents the fact that
(a) acquired traits are inherited.
(b) nature selects for fitness.
(c) genetic variations are not a prerequisite factor for natural selection.
(d) the theory of spontaneous generation of life holds true.

73. Fitness refers to
(a) the ability of some organisms to survive under hostile conditions due to the presence of adaptive genetic features.
(b) the ability of an organism to survive hostile conditions due to acquired features with no genetic basis.
(c) the ability of organisms to migrate.
(d) both a and b are true.

74. _____ is the end result of the ability to adapt and get selected by nature.
(a) Mutation (b) Fitness
(c) Adaptation (d) Acclimatization

75. Which of the following options correctly represent the two key features of Darwin's theory of evolution?
(a) Mutation and natural selection.
(b) Artificial and natural selection.
(c) Branching descent and natural selection.
(d) Branching descent and mutation.

76. Saltation is referred as
(a) Single step small mutation
(b) Multiple step small mutation
(c) Single step large mutation
(d) None of these

77. Match Column-I with Column-II.

	Column I		Column II
(A)	Branching descent	(1)	Unity and diversity of life
(B)	Natural selection	(2)	Source of new genes
(C)	Mutation	(3)	Lamarck
(D)	Inheritance of acquired features	(4)	Tendency of organisms to become adapted to the environment

Select the correct option.

	A	B	C	D
(a)	4	1	3	2
(b)	1	4	2	3
(c)	4	1	2	3
(d)	4	2	1	3

78. The first scientist to propose that evolution is a natural process rather than a divine intervention was

(a) Darwin (b) Lamarck
(c) Pasteur (d) Hugo de Vries

79. Select the correct option regarding Lamarck's principles of evolution:

(a) Use and disuse; inheritance of acquired characters.
(b) Natural selection; fitness.
(c) Mutation; inheritance of acquired characters.
(d) Inheritance of acquired characters; gene flow.

80. Evolution of long and muscular neck of present day giraffe occurred as giraffes stretched their necks higher to reach the higher canopy of tall trees. The given statement represents the view of ..... about evolution.

(a) Darwin (b) Lamarck
(c) Louis Pasteur (d) Cuvier

81. Match Column-I with Column-II.

	Column I		Column II
(A)	Innate drive to become complex	(1)	Use and disuse
(B)	An Essay on the Principle of Population	(2)	Thomas Malthus
(C)	Evolution of long-necked giraffe population	(3)	Natural selection
(D)	Industrial melanism	(4)	Lamarck

Select the correct option.

	A	B	C	D
(a)	4	1	3	2
(b)	4	1	2	3
(c)	1	4	2	3
(d)	4	2	1	3

82. Natural selection is based on certain observations whish are factual. Such observations are

(a) Natural resources are limited.
(b) Populations are stable in size except for seasonal fluctuation.
(c) Members of a population vary in characteristics (in fact no two individuals are alike) even though they look superficially similar, most of variations are inherited.
(d) All of these

83. Match the aspects of Darwin's theory of natural selection in Column-I with the correct description in Column-II.

	Column I		Column II
(A)	Variation	(1)	Competition for limited available resources
(B)	Overproduction	(2)	Increases the survival
(C)	Struggle for existence	(3)	More offspring
(D)	Differential reproductive success	(4)	Geometric increase in population size

Select the correct option.

	A	B	C	D
(a)	2	4	1	3
(b)	4	1	3	2

(c) 4 1 2 3
(d) 4 2 1 3

84. Hugo Devries explained mutations as a source of genetic variations while working on
(a) evening primrose (b) garden pea
(c) finches (d) fruit fly

85. Variations caused by mutation, as proposed by Hugo de Vries, are-
(a) random and directional
(b) random and directionless
(c) small and directional
(d) small and directionless

86. According to Hugo de Vries and Darwin, the driving factor for evolution is _____ and _____ respectively.
(a) minor variations, mutation
(b) natural selection, mutation
(c) mutation, minor variations
(d) mutation, acquired variations

87. Mutations are random and directionless while Darwinian variations are-
(a) small and directional
(b) large and directional
(c) small and directionless
(d) large and directionless

88. Consider the following statements:
(a) For Darwin, evolution was gradual and driven by small genetic variations.
(b) For de Vries, evolution was a single step process driven by large mutation.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

89. The mutation is directionless as
(a) it can change any DNA sequence and is always beneficial for the individual.
(b) it can change any DNA sequence and may be beneficial or harmful for the individual.
(c) mutation imparts small variations.
(d) mutation imparts large variations.

90. Which of the following statements is incorrect?
(a) No variant is completely wiped out in the case of dark-winged and white-winged moths in England.
(b) The essence of Darwinian theory about evolution is natural selection.
(c) Microbes that divide fast have the ability to multiply and become millions of individuals within hours.
(d) When we say that fitness of B is better than that of A under the new conditions, it means that A is better adapted than B under new conditions.

91. According to Hugo de Vries, large differences among the individuals evolve by _____ without any intermediate forms.
(a) gradual and small changes
(b) natural selection
(c) saltation
(d) gene flow

92. Assertion: Evolution refers to modification in the lines of descent.

Reason: Natural selection is the equal survival success of individuals of a population.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

93. Assertion: Darwin's theory of evolution was based on the inheritance of adaptive genetic variations.

Reason: He could not recognize the mechanism of inheritance.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.

(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

Topic 4 | Hardy-Weinberg Principle

94. Select the incorrect statement among the following.
(a) $p^2 + 2pq + q^2 = 1$. This is binomial expansion of $(p + q)^2$.
(b) When frequency measured, differs from expected values, the difference (direction) indicates the extent of evolutionary change.
(c) Hardy-Weinberg principle says that phenotype frequencies in a population are stable and is constant from generation to generation.
(d) The gene pool (total genes and their alleles in a population) remains a constant. This is called genetic equilibrium. Sum total of all the allelic frequencies is 1.

95. How many of the following factors are known to affect Hardy-Weinberg equilibrium?

Gene migration, gene flow, genetic drift, mutation, genetic recombination, natural selection.
(a) 4 (b) 5
(c) 6 (d) 3

96. Total genes and their alleles in a population make
(a) gene pool (b) genotype
(c) phenotype (d) mutation

97. Consider the following statements:
(a) Allele frequencies are supposed to remain constant over generations.
(b) Hardy-Weinberg equation is the algebraic representation of the allele frequencies of a population.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

98. Genetic equilibrium represents that
(a) the population is not evolving for the locus under study.
(b) the allele frequencies and genotype frequencies remain constant over generations.
(c) the allele frequencies remain constant over generations but genotype frequencies change.
(d) both (a) and (b) are correct.

99. The sum total of all allele frequencies for a particular locus is always _____
(a) 0
(b) 1
(c) more than 1
(d) cannot be determined

100. The frequency of an allele in a population ranges from
(a) 0 to 1
B) more than 1
(c) less than 0
(d) can be any number

101. Select the incorrect match:
(a) Frequency of a dominant allele in the population – p.
(b) Frequency of a recessive allele in the population – q.
(c) Frequency of heterozygous dominant genotype – 2pq.
(d) Frequency of homozygous dominant genotype – q^2.

102. In the Hardy-Weinberg equation, the frequency of heterozygous individual is represented by
(a) p^2 (b) 2pq
(c) pq (d) q^2

103. The binomial expansion of $(p + q)^2$ is
(a) $p^2 + 2pq + q^2 = 1$
(b) $p^2 + q^2 = 1$

(c) $p^2 + 2pq = 1$
(d) $p + q = 1$

104. Differences between expected and observed allele frequencies in a population represent that
(a) the population is at Hardy-Weinberg equilibrium.
(b) the population is evolving.
(c) the population is deviating from Hardy-Weinberg equilibrium.
(d) both (b) and (c) are correct.

105. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?
(a) 0.36(AA); 0.48(Aa); 0.16(aa)
(b) 0.16(AA); 0.24(Aa); 0.36(aa)
(c) 0.16(AA); 0.48(Aa); 0.36(aa)
(d) 0.16(AA); 0.36(Aa); 0.48(aa)

106. In a population at Hardy-Weinberg equilibrium, the frequency of homozygous dominant genotype is 0.36. What are the frequencies of dominant and recessive alleles for the locus?
(a) p = 0.4; q = 0.6
(b) p = 0.6; q = 0.4
(c) p = 0.36; q = 0.4
(d) p = 0.4; q = 0.36

107. A population will not exist in Hardy- Weinberg equilibrium if
(a) there is no migration
(b) the population is large
(c) individuals mate selectively
(d) there are no mutations

108. Consider the following statements:
(a) Gene flow, genetic drift, mutation, natural selection and genetic recombination deviate the population from the Hardy-Weinberg equilibrium.
(b) Small population size is required to maintain constant allele frequencies over generations.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

109. Select the correctly matched option.
(a) Gene flow: Changes in allele frequencies by a chance event.
(b) Mutation: Migration of individuals of the population.
(c) Random mating: Equal chances of each individual in a population to mate with any other individual.
(d) Natural selection: Selection of mate on the basis of morphological features.

110. Addition or removal of alleles from the gene pool of a population due to migration of individuals is known as-
(a) genetic drift (b) gene flow
(c) natural selection (d) artificial selection

111. Genetic drift operates in
(a) a small isolated population
(b) large isolated population
(c) non-reproductive population
(d) slow reproductive population

112. Match the terms in Column-I with the correct description in Column-II.

	Column I		**Column II**
(A)	Genetic drift	(1)	Genetic drift due to small colonizing population
(B)	Founder effect	(2)	Change in allele frequency by a chance event
(C)	Bottleneck effect	(3)	A major factor to introduce variations in sexually reproducing populations
(D)	Genetic combination	(4)	Adverse environmental factors

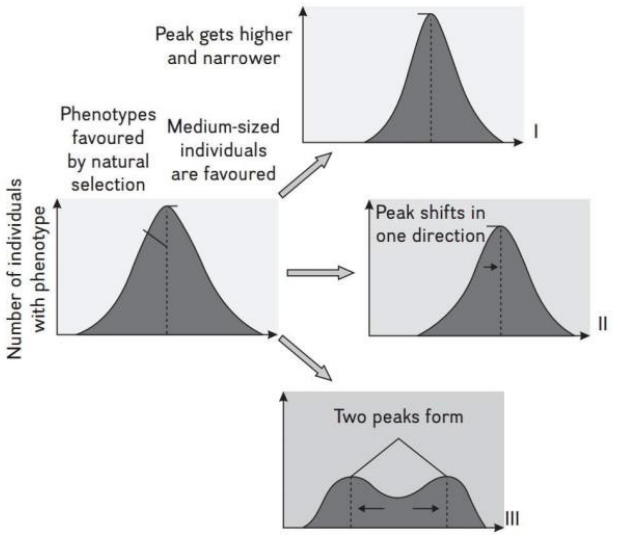
Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	2	1	4	3
(c)	3	2	4	1
(d)	4	1	3	2

113. A small number of finches from the mainland were blown by a cyclone to a new island. The resultant new population of finches had distinct gene pool from the source population. It represents the

(a) gene flow (b) mutation
(c) founder effect (d) selective mating

114. Name the types of natural selection as depicted in images I, II and III. Select the correct option.



(a) I-Stabilizing; II-Disruptive; III-Directional
(b) I-Stabilizing; II-Directional; III-Disruptive
(c) I-Directional; II-Stabilizing; III-Disruptive
(d) I-Disruptive; II-Stabilizing; III-Directional

115. In a species, the weight of the newborn ranges from 2 to 5 kg. 97% of newborns with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weight from 2 to 2.5 kg or 4.5 to 5 kg die. Which type of selection process is taking place?

(a) Directional selection
(b) Stabilizing selection
(c) Disruptive solution
(d) Cyclical selection

116. Name the type of natural selection that tends to reduce the genetic variations in the population without affecting the mean.

(a) Disruptive selection
(b) Directional selection
(c) Stabilizing selection
(d) Both a and b are correct

117. The black-bellied finches with large beak sizes are able to feed on the most abundant food types in the habitat while the finches intermediate and small beak size die at a young age due to starvation.

This represents:

(a) Disruptive selection
(b) Directional selection
(c) Stabilizing selection
(d) Sexual selection

118. Natural selection in which more individuals acquire mean character value is known as _____ while the one wherein more individuals acquire peripheral character value at both ends of the distribution curve is _____

(a) stabilizing selection; disruptive selection
(b) disruptive selection; stabilizing selection
(c) disruptive selection; directional selection
(d) stabilizing selection; directional selection

119. Which of the given statement is incorrect?

(a) The peak of the distribution curve gets higher and narrower by stabilizing selection.
(b) Directional selection shifts the peak of the distribution curve in one direction.
(c) Disruptive selection does not affect the peak of the distribution curve.
(d) Stabilizing selection does not affect the mean of the phenotype.

120. Artificial selection to obtain cows yielding higher milk output represents:

(a) directional selection as it pushes the mean of the character in one direction.
(b) disruptive selection as it splits the population into two, one yielding higher output and the other lower output.
(c) stabilizing selection followed by disruptive selection as it stabilizes the population to produce higher-yielding cows.
(d) stabilizing selection as it stabilizes this character in the population.

121. The northern elephant seal of North America and nearby islands was nearly hunted to extinction. The conservation efforts restored the population size. However, the restored population is vulnerable to extinction due to
(a) Stabilizing selection
(b) Bottleneck effect
(c) Founders effect
(d) Natural selection

Topic 5 | A Brief Account of Evolution

122. Sea weeds and few plants existed probably around
(a) 0.32 bya (b) 400 mya
(c) 500 mya (d) 3.2 bya

123. Jawless fish probably evolved around -
(a) 400 mya (b) 350 mya
(c) 450 mya (d) 600 mya

124. Select the correct statement among the following.
(a) By the time of 500 mya, invertebrates were formed but were not active.
(b) The first organisms that invaded land were plants. They were widespread on land when animals invaded land.
(c) The amphibians evolved into reptiles. They lay thin-shelled eggs which do not dry up in sun unlike those of amphibians
(d) After amphibians in the next 2000 million years or so, reptiles of different shapes and sizes dominated on Earth.

125. _____ were present but they all fell to form coal deposits slowly.
(a) Giant grass (b) Giant ferns
(c) Pteridophytes (d) Both (b) and (c)

126. Select the incorrect statement among the following.
(a) Some of these land reptiles went back into water to evolve into amphibians like reptiles probably 200 mya (e.g., *Ichthyosaurs*).
(b) About 65 mya, the dinosaurs suddenly disappeared from the earth.
(c) The first mammals were like shrews. Their fossils are small sized. Mammals were viviparous and protected their unborn young inside the mother's body.
(d) Mammals were more intelligent in sensing and avoiding danger at least. When reptiles came down mammals took over this earth.

127. South America mammals resembled how many of the following animals?

Horse, Cow, Monkey, Hippopotamus, Bear, Deer, Rabbit
(a) 5 (b) 4
(c) 3 (d) 2

128. Select the incorrect statement among the following.
(a) Due to continental drift, when South America joined North America, these animals were overridden by North American fauna.
(b) Due to continental drift pouched mammals of Australia survived because of lack of competition from any other mammal.
(c) Evolution of horse, elephant, virus, etc., are special stories of evolution.
(d) The most successful story is the evolution of man with language skills and self-consciousness.

129. Select the correct statement about cells with a membranous envelope.
(a) The mechanism of how non-cellular aggregates of giant macromolecules could evolve into cells with membranous envelope is not known.
(b) Some of these cells had the ability to release O_2.
(c) The reaction could have been similar to the light reaction in photosynthesis where water is split with the help of solar energy captured and channelised by appropriate light harvesting pigments.
(d) All of these

130. Fish with stout and strong fins could move on land and go back to water. This was about -
(a) 360 mya (b) 350 mya
(c) 0.4 bya (d) 3.5 bya

131. Select the correct statement about Coelacanth.
(a) In 1938, a fish caught in South America happened to be a Coelacanth which was thought to be extinct
(b) Coelacanth called lobefins evolved into the first reptile that lived on both land and water.
(c) There are no specimens of Coelacanth left with us.
(d) Coelacanth were ancestors of modern day frogs and turtles.

132. Select the correct statement about *Tyrannosaurus rex*?
(a) *Tyrannosaurus rex* had huge fearsome dagger like teeth.
(b) *Tyrannosaurus rex* was about 20 feet in height.
(c) *Tyrannosaurus rex* was biggest of all dinosaurs.
(d) All of these

133. The probable reason for disappearance of dinosaur was/were
(a) Climatic changes killed them
(b) Most of them evolved into birds.
(c) Both (a) and (b)
(d) Dinosaurs did not disappear.

134. How many of the following animals live wholly in water?

Whales, Shark, Dolphins, Turtles, Seals, Sea cows.
(a) 5 (b) 4
(c) 3 (d) 2

Topic 6 | Origin and Evolution of Man

135. Consider the following statements:
(a) *Dryopithecus* and *Ramapithecus* lived on Earth about 15 mya.
(b) They were primates with a hairy appearance and walked like gorillas.

Choose the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

136. *Ramapithecus* was more _____ while *Dryopithecus* was more _____
(a) great ape-like; man-like
(b) man-like; ape-like
(c) ape-like; man-like
(d) both a and b are true

137. Which of the following is the immediate ancestor of genus *Homo*?
(a) *Dryopithecus* (b) *Ramapithecus*
(c) *Australopithecines* (d) Sahelanthropus

138. Match Column-I with Column-II.

	Column I		**Column II**
(A)	*Australopithecus africanus*	(1)	The oldest member of genus *Homo*
(B)	*Homo habilis*	(2)	Java man
(C)	*Homo erectus*	(3)	Cave painting
(D)	Neanderthal man	(4)	Lucy

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	2	4	1	3
(d)	4	1	3	2

139. Consider the following statement.
(a) *Homo habilis* is also known as 'handy man' and could cook food using fire.
(b) *Homo erectus* was about 5 feet tall upright hominid and exhibited improved hunting skills.
Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

140. Which of the following hominid has a brain capacity of 1400cc and used hide to protect their body.
(a) *Homo habilis*
(b) *Homo erectus*
(c) *Homo sapiens*
(d) The Neanderthal man

141. The chronological order of human evolution from early to the recent is
(a) *Australopithecus* > *Ramapithecus* > *Homo habilis* > *Homo erectus*
(b) *Ramapithecus* > *Australopithecus* > *Homo habilis* > *Homo erectus*
(c) *Ramapithecus* > *Homo habilis* > *Australopithecus* > *Homo erectus*
(d) *Australopithecus* > *Homo habilis* > *Ramapithecus* > *Homo erectus*

142. Match the hominids with their correct brain size.

	Column I		**Column II**
(A)	*Homo habilis*	(1)	900 cc
(B)	*Homo neanderthalensis*	(2)	1350 cc
(C)	*Homo erectus*	(3)	650–800 cc
(D)	Homo sapiens	(4)	1400 cc

Select the correct option.

	A	B	C	D
(a)	4	1	3	2
(b)	3	4	1	2
(c)	4	1	2	3
(d)	2	4	1	3

143. Which of the following had the smallest brain capacity?
(a) *Homo neanderthalensis*
(b) *Homo habilis*
(c) *Homo erectus*
(d) *Homo sapiens*

144. Which of the following pair is incorrectly matched?
(a) *Australopithecines* – Fruit eater
(b) Pre-historic cave art –18000 years ago
(c) Agriculture and human settlements – 10000 years back
(d) Origin of modern *Homo sapiens* – 1,00,000–40,000 years back

145. Assertion: *Ramapithecus* was more man-like while *Dryopithecus* was more ape-like.

Reason: *Ramapithecus* had a thick layer of enamel.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

146. Assertion: Evolution of modern humans exhibited a gradual increase in brain size.

Reason: *Homo habilis* had the smallest brain capacity.
(a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

91. (c) 92. (c) 93. (a) 94. (c) 95. (c) 96. (a) 97. (a) 98. (d) 99. (b) 100. (a)
101. (d) 102. (b) 103. (a) 104. (d) 105. (c) 106. (b) 107. (c) 108. (b) 109. (c) 110. (b)
111. (a) 112. (b) 113. (c) 114. (b) 115. (b) 116. (c) 117. (b) 118. (a) 119. (c) 120. (a)
121. (b) 122. (a) 123. (b) 124. (b) 125. (b) 126. (a) 127. (b) 128. (c) 129. (d) 130. (b)
131. (c) 132. (d) 133. (c) 134. (b) 135. (a) 136. (b) 137. (c) 138. (b) 139. (a) 140. (d)
141. (b) 142. (b) 143. (b) 144. (d) 145. (a) 146. (b)